



Exploring The Rooms with Lykta

Creating Immersive Gaming Experiences through Projected Augmented Reality

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Abstract

The immersive gaming capabilities of projected augmented reality using a prototype system, Lykta, are investigated. To accomplish this a horror game is designed and implemented, drawing design methods from the fields of game design and interaction design. An approach with two design iterations is used, followed by a playtest in which interviews and questionnaires are used to gauge the immersiveness of the experience provided by the game. Throughout the process, improvements are made to the prototype system.

The result is a game played in a dark room. The experiences provides the players with the illusion of exploring the game world using just a flashlight, which in reality is a projector projecting out the game. The results from the playtest are compared to several different kinds of immersion, with findings showing that the players had at least to some degree experienced several different kinds of immersion. Future evaluations of a more quantitative and comparative nature are suitable for determining the immersive aspects of projected augmented reality in more detail, but tentative results suggest that a new type of immersion, spatial immersion, might be a relevant addition to other immersion models.

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Jacob Michelsen, Göteborg November 2013

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1

Introduction

Projection mapping, casting an image from a projector onto an object with correct perspective on the projected image, is seeing greater and greater use in areas such as advertising. It has been used in static exhibitions such as haunted houses¹, car commercials², and projections on the sides of buildings for events³, to name a few examples. By overlaying the physical space with digital content from a static projector many new ways of displaying digital media are made possible, but this technology has so far not been applied to commercial games systems.

Simultaneously there is a strong drive for using augmented reality in a variety of applications. Here, the real world is overlaid with digital information but this is generally done through transparent screens which the users sees through (such as with Google Glass⁴), or by manipulating a real-time camera video feed, e.g. on a camera-equipped smartphone⁵. With the Nintendo 3DS, augmented reality has entered mainstream gaming with the included AR cards⁶, which serve as identification markers for the built in camera and can be used in a variety of included games. These augmented reality devices move the viewpoint around but keep the digital content in roughly the same place.

This technique can be applied to projectors to achieve projected augmented reality. What the the possibilities of using this technique for games?

1.1 Project Context

A technical solution for exploring how the concept of augmented reality can be combined with projection devices was developed during the fall of 2013 at the Interaction Design

¹Secrets of the Haunted Mansion - The Seance Circle http://www.doombuggies.com/secrets_seance.php

²Toyota - Auris Hybrid campaign site <http://www.getyourenergyback.co.uk/>

³Clarion Post Opening Ceremony (Swedish) <http://www.clarionpost.se/invigningsfest>

⁴Google Glass <http://www.google.com/glass/>

⁵LAYAR augmented reality app <https://www.layar.com/>

⁶Nintendo - 3DS AR Cards <http://www.nintendo.com/3ds/ar-cards>

& Technologies programme at the Chalmers University of Technology. This low-cost solution uses commercial, off the shelf parts such as miniature projectors and game controllers, and is called *Lykta*, which is Swedish for lantern. The creators tested it in a virtual art gallery application, but there was also a wish by one of the developers to continue developing the platform to support for interactivity and investigate what possibilities exist in utilizing the technology for gaming applications. This forms the subject of this master's thesis.

1.2 Research Question

Based on what was known in the field of immersive experiences, game design, and the technology in the beginning of the project, the following research question was formulated

What possibilities exist for using the Lykta projected augmented reality system for creating immersive gaming experiences?

1.3 Purpose

The purpose of this master thesis is to investigate how projected augmented reality can be used to create an immersive gaming experience. To achieve this goal, a prototype projected AR platform called *Lykta* will be used as basis for a horror game, which will be developed and playtested during the thesis project. The concept of immersion, its definition and methods for designing games for it will be studied through literature and game studies. This will provide input for the game design and playtest.

1.4 Delimitations

The following are the most important delimitations of the research question, within the context of the 20 week master thesis project.

- Immersion will be gauged through playtesting of a single prototype game as there is not enough time to develop and playtest several different kinds of gaming experiences.
- As the gaming experience will be created by a small team of only three or four people, will be running on prototype hardware, and that there will be little time for testing, summative comparisons to other games will not be carried out. However the design and user experiences may still be compared to other works in the games and interactive experiences field in a qualitative manner.
- As the goal is to create a small game that can act as both a mediation tool in gauging immersion, as well as a technology demo for the Lykta platform, the process must result in a product that can be considered “finished” to some degree. This means that not all design decisions made can be explored fully, and that

many will have to be made through the judgement and previous experience of the author.

2

Background

The master thesis work builds upon previous work done by the author and other students on the projected augmented reality platform Lykta [1], which in turn builds upon a long history of augmented reality (AR) and virtual reality (VR) systems and games. It also deals with game and experience design, in particular that of horror as this was the style of game chosen for the Lykta game developed during the thesis, see section 6.1.2.

2.1 VR and AR Systems

Though prototype computerized immersive display systems were available in research labs from the 60s, such as Sutherland's head-mounted VR display with headtracking *Sword of Damocles*, see fig. 2.1) This used mechanical and ultrasonic distance sensors to track head movements and semitransparent stereo displays in front of the eyes to display the image.

It wasn't until the 90s that they became more accessible to the general public¹. Such systems were still very expensive and typically not found outside research labs and large gaming arcades. A unit often seen in the media was 1000CS by W Industries, later Virtuality, running the game Dactyl Nightmare on a modified Amiga 3000.

Virtual reality became a popular buzzword during the 90s, with many companies creating products and Nintendo joining the trend of immersive gaming with the Virtual Boy² stereo 3D gaming system. Many of these early systems used helmets or surrounded the users with screens to attempt to completely enclose them in the virtual experience [2, 3]. However due to technological constraints and costs the experiences never reached consumers in any large scale.

¹Stereopsis - History of Stereoscopy - Virtual Reality http://askyl.free.fr/index.php?option=com_content&view=article&id=358&Itemid=135

²Killertofu.com - On Virtual Reality in Gaming <http://www.killertofu.com/video-games/2011/on-virtual-reality-in-gaming/>

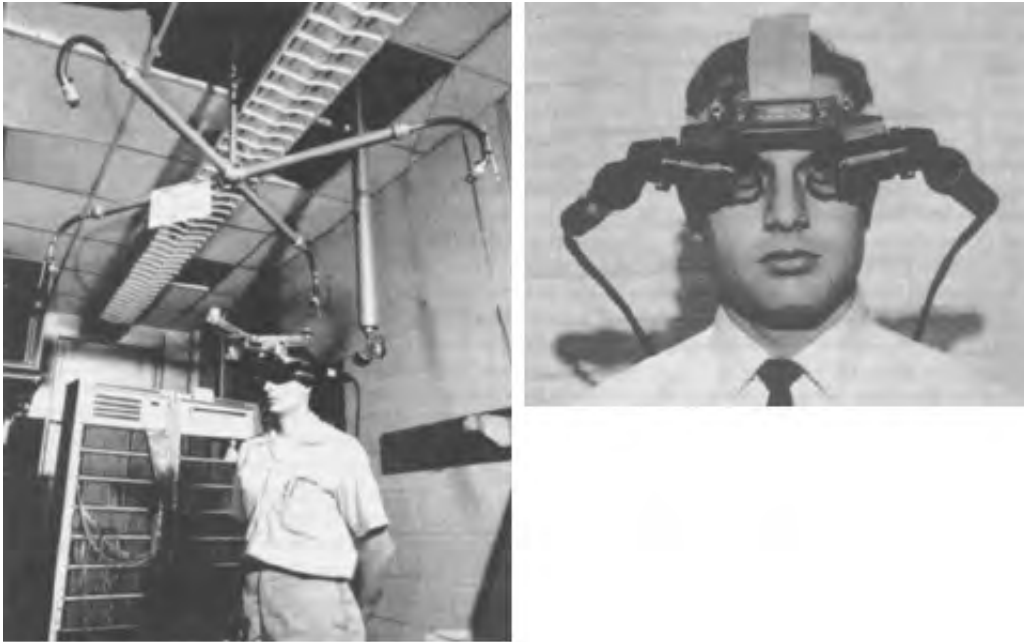


Figure 2.1: Sutherland's *the Sword of Damocles* headtracking virtual reality system, widely considered the first VR and AR display. Left: The ultrasonic and mechanical head orientation sensing rig. Right: Close up view of the head-mounted display with transparent viewing screens.



Figure 2.2: The Project Holodeck virtual reality system, with full head- and body tracking using the Playstation Move and hand tracking using the Razer Hydra. The Oculus Rift VR head mounted display is used for head tracking and wide field of view stereoscopic display.

Modern technology allows these kinds of experiences to be created much easier with more or less off-the-shelf technology. An example of such a solution is Project Holodeck, currently in development at the University of Southern California³, which uses the *Oculus Rift*⁴ headtracking 3D headset together with motion sensitive game controllers such as the Playstation Move and Razer Hydra for full body tracking and wide field of view. Fig. 2.2 shows a photo of the project holodeck setup with two players.

However a common theme with these immersive experiences is that they are not easily shared. 3D TVs usually require expensive glasses for each viewer and makes viewing uncomfortable for those without. Glasses-less 3D is used in the Nintendo 3DS gaming console⁵ but require precise viewing angles, making them uncomfortable to look at for other onlookers. While projects such as Project Holodeck and immersive multiplayer games allow players to participate in the same virtual world, the display devices used mean the players will be separated in the visual sense as they cannot see each other directly.

In augmented reality, the focus is not on replacing the real world with a virtual one but instead enrich, or augment, the real world with digital content. The devices for this are usually location-aware and various content is displayed depending on the location and heading of the device. For output, the most common technique is overlay on a video stream from a camera mounted in the device. With the ubiquitousness of smartphones, the number of augmented reality-capable devices has increased dramatically and many apps have been developed to take advantage of this technology. The popular Nintendo 3DS uses included cards as markers for the onboard 3D camera, and comes included with a variety of AR games⁶. Devices such as Google Glass⁷ are also appearing, which overlay digital content on a private transparent screen in front of the eye of the user. However most of these applications are focused on use by a single user.

By using a projector as output for an augmented reality device, the digital content becomes easily accessible to anyone in the vicinity, which opens up the possibility of creating shared AR experiences.

2.1.1 Projected Augmented Reality

Over the last decade a number of projects have focused on creating movable projectors that adjust to the different projection surfaces in the environment. Early work appeared in the 2001 paper *The Everywhere Displays Projector* [4] by Pinhanez et al. A static projector with a motorized mirror was used to project “mobile displays” almost anywhere in the room where the system was mounted. While many other projects following this would use various algorithms for perspective correction of the image, Pinhanez et al. recognized that this could be accomplished using 3D models in computer graphics engines. It was noted that this would leverage the graphic processing capabilities of

³Project Holodeck <http://www.projectholodeck.com/>

⁴Oculus Rift - Virtual Reality Headset for 3D Gaming <http://www.oculusvr.com/>

⁵Nintendo 3DS <http://www.nintendo.com/3ds>

⁶Nintendo 3DS AR Cards: <http://www.nintendo.com/3ds/ar-cards>

⁷<http://www.google.com/glass/>

modern computers for fast image updates, a requirement for interactive applications if it is to follow along smoothly when the projector moves.

The most important factors for accurate projected augmented reality is an accurate model of the surface to be projected on so that the image can be adjusted (distorted) to fit the surface, combined with accurate positioning and orientation of the projector if it is to be movable. The projected image not only needs to be adjusted for its orientation relative to the surface, but also for the geometry of the surface itself. Additionally the 3D rendering hardware providing the image to the projector must be fast enough to adjust the projected image in real-time.

If the geometry of the surface is simple, a 3D model can be created beforehand. Recently, Molyneaux, Cao et al. have worked on a promising technique using simultaneous localization and mapping (SLAM) [5]. This uses a Microsoft Kinect⁸ depth camera to construct a textured 3D scene of the environment, while simultaneously calculating the position and posture of the device.

Early working portable units were built by Raskar et al, Karitsuka & Sato as the *iLamps* and *Wearable Mixed-Reality* devices [6, 7]. These solved the positioning issue by mounting a camera in conjunction with the projector to recognize visual tags and RF tags on the projection surfaces, with IR LEDs on fingers for touch interactivity. Other solutions used ultrasonic beacons [8].

Raskar et al. added inertial sensors in later projects to increase orientation stability, but still used sensing of static tags for positioning [9]. These later prototypes added a static cursor in the middle of the projected image as a pointing device, making it possible by manipulate data by moving the projector.

Tiny LED projectors (also known as pico projectors) are becoming increasingly common on the market⁹. While these are not as bright as traditional light bulb projectors, their lower power consumption and heat generation mean they can be made more compact and light and are capable of running on batteries for hours at a time. Likewise, recent advances in smartphone technology mean that the required computing and rendering power is easily available through mobile phones. Many of these provide the possibility of outputting high-quality images to a projector, and smartphones are even starting to appear with built-in LED projectors¹⁰.

While smartphones are usually outfitted with GPS receivers, these only provide positioning accuracy down to an order of several meters. Projection mapping requires precision down to centimeter level for results that look pleasing to the eye [8]. Standard positioning solutions such as GPS are also not suitable for indoor use, where their accuracy degrades due to worse signal reception.

Cao et al. are the first to the author's knowledge who achieved accurate positioning and orientation tracking without environment markers or onboard cameras [10, 11]. Their system uses a motion capture system with markers on the handheld unit, detected

⁸Microsoft Corporation - Kinect for Windows <http://www.microsoft.com/en-us/kinectforwindows/>

⁹Techcrunch - Pico Projectors on the Rise <http://techcrunch.com/2011/04/15/pico-projectors-on-the-rise/>

¹⁰Samsung Galaxy Beam product presentation: <http://www.samsung.com/uk/consumer/mobile-devices/smartphones/android/GT-I8530BAABTU>



Figure 2.3: An early version of Lykta projecting paintings onto a surface in the gallery demo. Part of an artwork is seen through the rectangular projected image, but the projection angle of the projector is too narrow to display the whole of this artwork with the user moving back or panning the projector around the surface. The tracking camera is placed on the table in the middle of the image

by a static IR camera. Many types of interactions are explored, including dynamically adding surfaces to the environment. The projecting handheld unit is tethered to a stationary computer, which computes the image.

2.2 Lykta

The Lykta system was developed in a project course at the Interaction Design & Technologies master's programme at Chalmers University of Technology, Göteborg, as an attempt to create a projected augmented reality system. What follows is a description, based on a previously published Lykta technical paper [1], of the system as it appeared in the beginning of the thesis project.

The original context for this solution was a gallery concept where many wireless handsets would be used to explore digital art content. The prototype in use around the time of the start of the project is pictured in fig. 2.3. It used a single projecting handset, and did not use any buttons for additional input. The projected image reacted in a somewhat jerky manner to projector movement but was otherwise reasonably responsive, creating the illusion of static artwork attached to the walls and being lit up by a flashlight. In reality the projector is displaying out the parts of the artwork that fall within its projection area on the wall. It does this by displaying those parts of a 3D model of the



Figure 2.4: The Lykta handset from the gallery demo containing a PS Move controller, a smartphone, and projector.

projection surface, with the artwork attached, that correspond to the parts of the real surface that are covered by the projection. For this accurate position tracking of the projector is required.

Lykta is easily transportable as long as the environment used is measured and reconstructed in a 3D scene beforehand and a small tracking camera is securely placed on-location. If more handheld projection devices are constructed, the system supports up to four simultaneous users, each lighting up their own part of the environment or using a handheld device to interact with the content that another users lights up.

Technically, Lykta consists of a mobile device running a simulation with an accurate model of the room, connected to a handheld projector. The location and orientation is determined using Sony's *PlayStation Move* (PS Move) system¹¹. Fig. 2.4 shows the handheld unit containing the PS Move controller, smartphone and projector. All components are commercial off-the-shelf (COTS), and no permanent modifications needed to be made to the room as only a camera is necessary to set up in order to track movements. Depending on if the system is used as an overlay content over existing physical objects or is played in an entirely dark room, it can be seen as providing a gamut from projected augmented reality to projected virtual reality. In the dark room, the output from the projector will be nearly the only thing users experience visually.

However, as Lykta is a new type of system, reaction to actual usage has not been

¹¹Sony Move.Me <https://us.playstation.com/ps3/playstation-move/move-me/>

tested or documented to any great degree. Will users suspend their disbelief and become immersed in the experience, or will the technical limitations of the low cost projected augmented reality system be too apparent? Influential game developers have already raised concerns over how current display systems do not provide low enough latency for VR without risking motion sickness [12, 13]. It is hoped the Lykta platform can avoid these issues by using fast game input controllers for positioning and orientation and (perhaps most importantly) avoiding the directness required by head-mounted VR.

2.2.1 Positioning

To solve the indoor positioning problem, early versions of Lykta used an overhead-mounted Nintendo Wii controller¹² as a wireless IR camera for tracking the position of IR LEDs on the handheld unit along a plane. However, due to the limited field of view of the Wii controller camera and the limitations of having only two-dimensional tracking, this solution was abandoned.

Seeing the tracking accuracy achieved in *Project Holodeck*¹³, a game project using VR glasses, a new implementation using the PS Move system was completed just before work on this thesis started. However, this limits use of the system to within the area the PS Eye camera can track the glowing sphere in the PS Move controller - roughly 3,5x4m.

2.2.2 Orientation

The Wiimote-assisted versions of Lykta used the sensors of a smartphone (compass, accelerometers and gyroscopes) together with a sensor fusion algorithm. However it was still sensitive to magnetic disturbances, which can be common indoors.

When used in retail gaming applications on the Playstation 3 console, the PS Move system can use computer vision-based position tracking to create a more robust orientation tracking. Sony has made this tracking available through the proprietary *Move.me* server software¹⁴ which runs on a PS 3 console and sends tracking data over network. While providing excellent accuracy and very little error over time, this is a closed solution with no possibility of modifying the tracking system, making it less flexible.

2.2.3 System Overview

A wide-angle PS Eye camera connected to a PS 3 console captures images of the glowing sphere of a PS Move controller mounted together with a projector and smartphone. This visual data is combined with sensor data sent from the controller over bluetooth in the proprietary Move.me server software on the PS3. A host computer receives the position and orientation data of the controller and updates a 3D scene containing the geometry of the projection surface as well as the data that is to be overlaid on this surface. In

¹²Nintendo Wii controller product presentation <http://www.nintendo.com/wii/what-is-wii/#/controls>

¹³Project Holodeck <http://www.projectholodeck.com/>

¹⁴Sony Move.Me <https://us.playstation.com/ps3/playstation-move/move-me/>



Figure 2.5: Overview of the parts comprising the *Lykta* platform. The router handling both the wired and Wi-Fi networks is not shown. Previously published [1].

this scene a virtual camera with the same field of view as the projector’s display angle occupies the same position relative to the virtual scene as the projector occupies relative to the real environment that is to be projected upon. This scene is synced over wireless network with a smartphone client in the handheld projection unit. The image from the virtual camera is then output to the projector through an HDMI video adapter. See fig. 2.5 for an overview image, previously published in a technical report on the Lykta platform [1]. The software on the server and smartphone clients is developed in *Unity3D*¹⁵ with a plugin for receiving data from the Move.me server software¹⁶.

2.2.4 Unity

Software-wise, Lykta is implemented using the free version of *Unity 3D*, an extendible game engine with a powerful graphical editor. Unity was chosen as it had Move.me support, built-in networking, and the tools to create 3D games relatively rapidly. Though primarily a game engine, the environment supports other types of simulations and visualizations.

¹⁵Unity - Game Engine <http://unity3d.com/>

¹⁶Move.Me Unity plugin <https://us.playstation.com/ps3/playstation-move/move-me/>

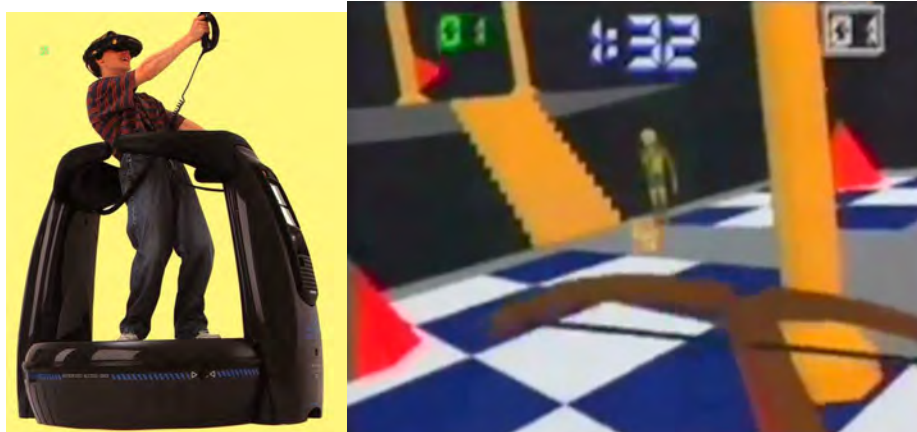


Figure 2.6: Left: Virtuality Stand Up gaming unit, with head-, hand- and body tracking. Right: The game first person view combat game Dactyl Nightmare, one of the more popular games on the machine.

2.3 AR & VR Games

The Game Dactyl Nightmare running on Virtuality’s 1000CS was a first-person fighting and shooting game which leveraged the head-tracking, motion aiming and body sensing of the system to have players fight each other in a virtual arena. See fig. 2.6 for a photo of the unit and ingame screenshot. 350 units were created, with a price tag of \$60 000 per unit.¹⁷

Though Nintendo Virtual Boy was labeled as a VR console for home use and its high-profile failure came into the public eye¹⁸, it provided a stereoscopic 3D gaming experience and not any form of true VR. Competitor SEGA had a similar system in development a couple of years earlier but with additional sensing of head movements, though theirs was an add-on to their existing video game consoles¹⁹. One of the few prototype games shown was a first person vehicle combat game similar to Battlezone (Atari, 1980).

Augmented reality, or mixed reality as it may also be called, has been explored in a number of research projects since the 90s. Tamura et al. at the Mixed Reality Systems Laboratory explored augmented reality games in the early 2000s with the games *AR2 Hockey*, *RV-Border Guards* and *AquaGauntlet* [14, 15]. These used body tracking and see-through VR glasses to overlay the environment and other players with 3D graphics.

Starner et al. also developed and explored game applications of a technical platform, the *Wearable Augmented Reality for Personal, Intelligent, and Networked Gaming* (WARPING) system [16]. They experiment with two different kinds of augmented re-

¹⁷AmigaHistory - Virtuality <http://www.amigahistory.co.uk/virtuality.html>

¹⁸KillerTofu - On Virtual Reality in Gaming <http://www.killertofu.com/video-games/2011/on-virtual-reality-in-gaming/>

¹⁹Virtual Worldlets - Sega VR <http://www.virtualworldlets.net/Shop/ProductsDisplay/VRInterface.php?ID=147>



Figure 2.7: A game being played on the PingPongPlus table, using projected augmented reality. Here, players paint on the table while engaged in a game of ping pong.

ality, one in first person using a see-through VR-helmet, and one projection on a table with cameras detecting movement, in essence creating a touch-sensitive tabletop display. Both of these devices tied into the same game experience.

While not using moving projectors, the *PingPongPlus* project is another early example of a projected AR game, see fig. 2.7. It used a ceiling-mounted projector over a physical ping pong table to augment the existing sports game [17]. Mueller has also used projectors to augment physical games, e.g. with the *Breakout for Two* game which uses teleconferencing equipment and a force-sensitive wall to allow players to challenge each other remotely to a physical ballgame [18].

Augmented reality games are now becoming more common with the capability built into many games consoles and mobile phones. Virtual reality is again becoming a factor in gaming, with promising VR products are heading towards the market, the Oculus Rift and the *Omni Treadmill*²⁰. The CastAR-system, first shown at the World Maker Faire in 2013, promises to support both projected AR and VR by utilizing stereo projectors mounted on 3D glasses, together with head- and surface tracking²¹. Examples of applications for this system includes games. However, the suggested projection surfaces only reflect at an narrow angle back to the user and will look doubled if not viewed through 3D glasses, so the projected experience is not as easily viewable by multiple users as the one provided by Lykta. CastAR will instead use one set of projection glasses for each user, which together with networked gameplay can create a shared projected augmented reality experience.

²⁰ExtremeTech - Walk on Mars using the Oculus Rift and Omni Treadmill <http://www.extremetech.com/extreme/163189-walk-on-mars-using-the-oculus-rift-and-omni-treadmill>

²¹Technical Illusions - CastAR http://technicalillusions.com/?page_id=197

2.4 Horror Games

A type of experience that is dependent on emotional investment and immersion is that of horror. Though these types of games generally have action elements such as fighting, they differ from typical action games such as *Call of Duty* (Infinity Ward, 2003) and *Half-Life* (Valve, 1998) in that they promote aesthetics such as isolation and vulnerability in their game design. The player character may be alone in an unfamiliar environment, with little ammo, knowing that the dangers they meet may be so powerful that they need to flee if they encounter them. They may also employ game mechanics to give the player less direct control, such as slow controls (*Resident Evil*, Capcom, 1996 and *Silent Hill*, Konami, 1999-2012), unusual and difficult combat mechanics (*Fatal Frame*, Tecmo 2001) or very limited field of view by requiring the player to use a flashlight (*Silent Hill* and *Slender*, Parsec Productions, 2012). Another popular horror game, *Amnesia* (Frictional Games, 2010), gives the player a lot of direct control and possibilities to affect the environment, but give the adversaries even more powerful abilities such as teleportation.

Horror games may also provide false information to the player, such as showing imaginary enemies (*Amnesia*) and giving incorrect character health and system status information. The latter was taken to the extreme with *Eternal Darkness: Sanity's Requiem* (Silicon Knights, 2002), which simulated lowering the TV volume (complete with a fake TV-like onscreen display) and giving errors to the effect that the save files containing player progress had been deleted.

Though horror games are generally not designed to give a pleasurable experience to the player, they remain popular. Benford et al. note that these forms of extreme, uncomfortable types of entertainment are a way to fill the void of violence and suffering that has been removed from our everyday life [19].

3

Theory

The work on this master thesis builds upon the theoretical foundation of many fields. Ludology forms the groundwork for game studies, while an understanding of the concept of immersion is essential when designing an experience to elicit this. Methods and theories from the fields of interaction design and game design will be used both in design and evaluation.

3.1 Ludology and Ludic Activities

Ludology is the study of play. However, there are many usages of this word, ranging from children’s unstructured play to rigid schess playing.

The rules create an experience for the player/gamer, and Salen & Zimmerman call this play [20]. A general definition of play is also presented by them by dividing it into three nested categories, see fig. 3.1

Game Play is the formalized, focused interaction that occurs when players follow the rules of the game in order to play it. *Ludic Activities* are the non-game behaviors in which participants are “playing”, such as two tussling animals or a group of children toss a ball in a circle. Game play is a subset of ludic activities. *Being Playful* is the state of being in a playful state of mind, such as when a spirit of play is injected into some other action. This category includes both game play and ludic activities [20].

A classic definition of play comes from the french philosopher Roger Caillois. He proposed a model with four “fundamental categories” of play”, here taken from Salen and Zimmerman’s Rules of Play [20].

Agòn: Competitive play, as in Chess, sports and other contests.

Alèa: Chance-based play, based in games of probability.

Mimicry: Role-playing and make-believe play, including theater and other exercises of the imagination.

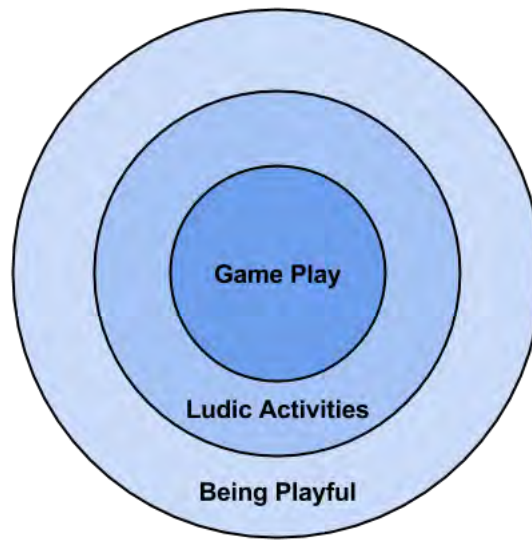


Figure 3.1: Salen & Zimmerman’s general definition of play as three types of activities.

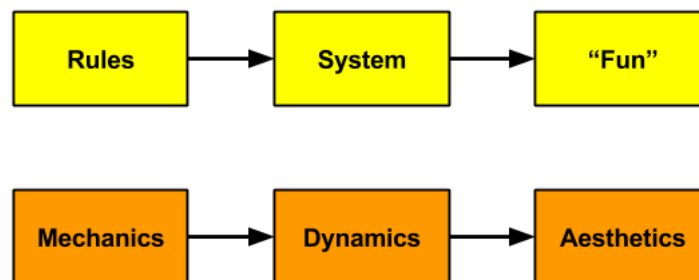


Figure 3.2: Top: The elements of play. Bottom: The corresponding elements of the the MDA framework.

Ilinx: Playing with the physical sensation of vertigo, as when a child spins and spins until he falls down.

The complex interaction between the rules of the game and the player may in turn be explored using frameworks such as Mechanics-Dynamics-Aesthetics, the MDA framework [21]. In this, the formal mechanics of the game create dynamics when the player plays the game, which creates aesthetics as experienced by the player. Fig. 3.2 shows a depiction of the framework in relation to the corresponding elements of play.

3.2 Game Design Theory

When designing an interactive experience the field of games design comes into play.

3.2.1 The Role of Game Design

Fullerton brings up the notion of fun as the reason we play games, noting that there are several different types of fun (making it applicable to e.g. horror games which may not primarily be described as fun). The role of the game designer is to be an advocate for the players and make sure that the game design gives the player the appropriate experience [22]. Salen & Zimmerman notes that it is crucial for game designers to realize that rules do not exist for their own sake.

... it is crucial for game designers to recognize that the creation of rules, even those that are elegant and innovative, is never an end in itself. Rules are merely the means for creating play. If, during the process of game design, you find yourself attempting to perfect an elegant set of rules in a way that fails to impact the experience of the player, your focus has become misdirected. The experience of play represents the heart and soul of a game designer's craft. [20, p.302]

She lists many of the things that are important for a game to be considered “fun” [22]. As the desire to achieve goals is a fundamental part of being human, many of the most games are built around the concept of challenging players. Games can also provide both a story and be an arena for play. The *Grand Theft Auto* series (Rockstar Games, 1997-2013) sets the player free in a large simulated city, and provides a storyline spread out over challenging missions. However, many players will try to find their own fun by playing around aimlessly in the simulated city.

Hunicke et al. wish to move away from the word “fun” and list a taxonomy of why we play games in relation to their MDA framework [21].

1. Sensation - Game sense-pleasure.
2. Fantasy - Game as make-believe.
3. Narrative - Game as drama.
4. Challenge - Game as obstacle course.
5. Fellowship - Game as social framework.
6. Discovery - Game as uncharted territory.
7. Expression - Game as self-discovery.
8. Submission - Game as pastime.

3.2.2 Flow

Of note here is the concept of *flow*. When matched with a challenge that is suitable for a person's skill level, i.e. not too easy and not too hard, they may experience a state that has been labelled flow, where time seems to go by quickly and they will be

completely focused on the task [23]. Flow is usually considered a very enjoyable and desirable state, and in more recent years has started becoming a goal in game design. Apart from the right amount of challenge, aspects such as good feedback and responsive control are important to help the player reach a flow-like state [22].

3.2.3 Diegesis

A concept that is relevant for designing immersive experience is that of diegesis. Originally a concept from narrative analysis where denotes elements that are part of the world portrayed by the story [24], while non-diegetic elements are those that are not part of the world, such as subtitles, narration and music [25]. Non-diegetic elements should most likely be avoided as they may break the sense of a coherent world, though it has also been found that players seem to be remarkably resilient to these non-diegetic elements once they have reached a state of immersion [26] (see section 3.3).

3.2.4 The HUD and Immersion

Good feedback is necessary to create a flow-inducing experience [22, 23]. Many games present information meant as feedback to the player through a *heads-up display*, a transparent overlay over the game scene, displaying numbers and meters relating to the current state of the player and game world. However some argue that the presence of such a HUD may be problematic for inducing immersion, acting both as a non-diegetic element [27] and as a distraction [28]. Fig. 3.3 shows a game from the early first person shooter *Wolfenstein 3D* (ID Software 1992), which had a very noticeable non-diegetic HUD. Apart from attempting to remove as many unnecessary elements as possible from the HUD, another approach is to display this information on displays (or through other means) in the game world, turning them into a diegetic element [29].

3.3 Definition of Immersion

To research the capabilities of Lykta to provide an immersive experience, a thorough definition of *immersion* is required in order to have a clear goal.

3.3.1 Brown & Cairns

One model as suggested by Brown & Cairns is to split it between Engagement, Engrossment and Total Immersion, signifying greater and greater levels of immersion [30]. This is depicted in fig. 3.4.

Engagement is the lowest level of immersion. To reach this, players need to gain access to the game, be able to use the controls, and be provided appropriate feedback to the degree that they can master the main controls.

The second level is engrossment. In this the visuals must match the gamer's expectation, the task must be well-designed and the plot (if present) engaging. Brown & Cairns refer to this as good game construction.



Figure 3.3: Early first person view games such as Wolfenstein 3D often had very noticeable and non-diegetic HUD.

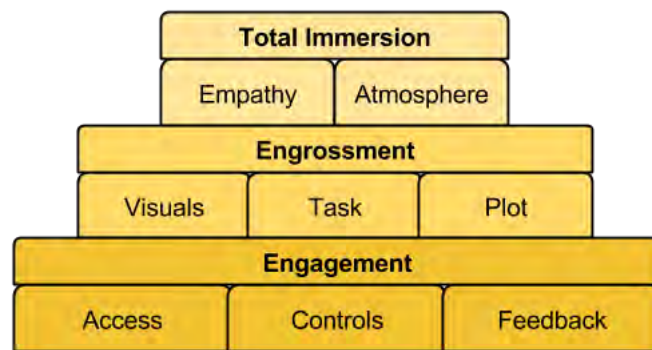


Figure 3.4: Brown & Cairns immersion model [30], own depiction.

The barriers of entry to the final level, total immersion, are lack of empathy for the characters or a lack of feeling for the atmosphere. It is described as being cut off from reality to such an extent that the game is all that matters.

3.3.2 Ermi & Mäyrä

The model of Brown & Cairns mainly concerns immersion into the fiction of the game world, with plot, atmosphere and characters being the primary focus. Ermi & Mäyrä offer a different kind of categorization, separating immersion into sensory immersion, challenge-based immersion and imaginative immersion [31]. They refer to this as the SCI model of immersion, presented in a simplified manner in fig. 3.5.

Sensory Immersion Sensory immersion is defined as the audiovisual presentation of the game overpowering the sensory information coming from the real world. In this

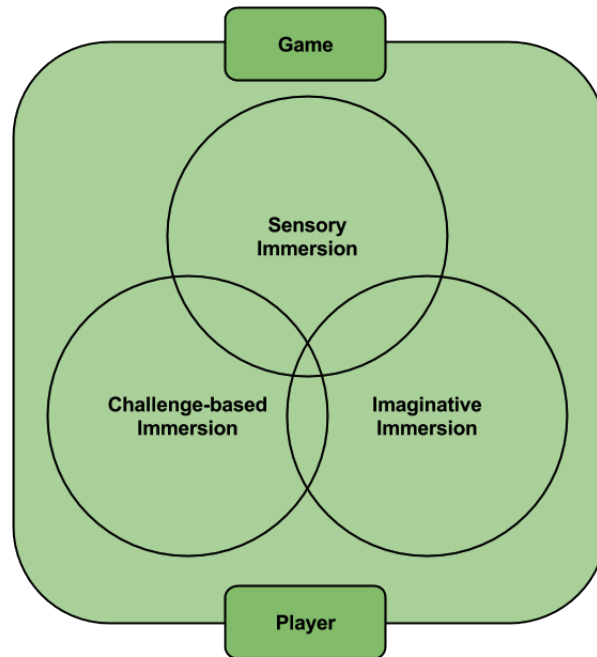


Figure 3.5: Ermi and Mäyrä's SCI model of immersion [31], own depiction.

immersion the player becomes entirely focused on the game world stimuli [31].

CAVE devices are mentioned as possibly being able to provide the purest form of sensory immersion by completely wrapping the users in the audio and visuals of the simulated environment.

Challenge-Based Immersion Challenges, involving either or both of motor skills and mental skills, can trigger this type of immersion if a satisfying balance of challenge and abilities is achieved. In this way it is related to the concept of flow, which also relies on a fine balance of difficulty of the challenge and the abilities of the individual tackling the challenge [23].

Imaginative Immersion This immersion is similar in criteria to Brown & Cairns definition of immersion. This is achieved when one becomes absorbed with the stories and the world, or begins to empathize with the game characters [31]. This does not have to rely on high-fidelity audiovisual devices; being absorbed in a novel is given as an example of something that can provide a high level of imaginative immersion.

3.3.3 Pasch et al. - Movement Factors Affecting Immersion

Pasch et al. [32] look at factors affecting immersion by studying the game Wii Boxing (Nintendo, 2007). They note that movements in the game that to some degree mimic the real ones provide four extra factors affecting immersion.

- Movement-based games provide the addition of physical challenge to the mental one commonly found in video games.
- Control movements corresponding to natural movements can provide a greater feeling of being in control.
- Movement activates the proprioception sense, knowing without visual feedback where the body parts are, for an extra channel of feedback.
- With good avatar mirroring players may emphasize deeper with the characters in the game through the mechanics of mimicry.

3.3.4 Critique Against Immersion

It is important to note here that there are many voices speaking out against the notion of gamers being fully immersed, and to some extent losing themselves, in the virtual worlds presented in the game. Zimmermann & Salen, Linderoth and Juul all argue that a player adopts a kind of double approach to the game [20, 33, 34]. While they may be paying attention to and to an extent immersed in the theme and world of the game, players are always aware of the game within the real world context; it's rules, physical controls, conventions and expectations. Gary Alan Fine uses Goffman's Frame Analysis [35] to sketch out three "levels of meaning" within which the game experience takes place [36]. His study focuses on tabletop RPGs, but applies well to digital games too. The outer frame, the primary framework, is grounded on the ultimate reality of events, the real world. The second frame is the game context, the rules, constraints and technical limitations of the game (own addition), where players control the characters. The center frame is the game world itself, where the players are the characters. Fig. 3.6 shows a very simplified depiction of Fine's frames, where the non-diegetic HUD is depicted as belonging to the Game Context.

Regardless of the critique against total immersion, the different definitions of the term provide many useful benchmarks against which a game can be judged, abandoning the notion that players will ever be fully immersed in the game world. Indeed, it does not seem to contradict e.g. challenge-based immersion, with Juul mentioning that in competitive multiplayer games players may wish to remove the fictitious elements to be more focused on the mechanics and challenges of the games [34].

3.4 The Field of Interaction Design

Game design can be seen as belonging to the field of interaction design [37]. Interaction design shapes the world through digital artifacts [38]. It can be seen as a field of design with IT as the design material. User-centered design processes are widely promoted in this field [38, 39, 40].

Methods such as questionnaires and observations can be used in the beginning of a project for designing an interactive system, to gain a better understanding of the



Figure 3.6: Fine’s three frames within which a game experience takes place. In this the middle frame never replaces the other frames outright, and total imaginative immersion, as defined by Brown & Cairns never takes place. Non-diegetic elements such as the HUD can be seen as belonging to the Game Context frame. The division depicted here is greatly simplified.

intended users of the end product [39]. The data from these studies can then be distilled into tools such as personas and use scenarios [39]. These can be used by the design team throughout the design process to better understand the users. However, in a modern human-centered process for designing interactive systems, the intended end users should be involved throughout the process, both to feed into an iterative design process [39, 40] of prototyping and evaluation, to manage user expectations, and to increase the sense of ownership amongst the users [40].

Additionally, interaction design employs a wide array of techniques and frameworks for ideation, design and analysis.

3.4.1 Methods for Gathering Data on Users

To inform the initial design and to iterate upon it number of methods are employed to gain a better understanding of users and usage.

Ethnographic Studies Mostly employed to gather more background information on users and the use context for requirement elicitation, this involves observing the users in the context in which the system or product will be used [39, 40].

Questionnaires Questionnaires, or surveys, can be handed to users and answered without testing facilitators involvement. Questions are typically formulated using multiple choice questions, or statements together with Likert or semantic differential scales [40].

They should be divided into relevant sections and ordered in such a way that can make answering them a comfortable experience [41]. It may be possible to elicit more personal and in-depth answers by giving users the possibility of writing comments to the questions, but if more qualitative data

Interviews Interview techniques can range from structured, semi-structured to unstructured depending on how much room there is for follow-up questions and how rigid the set of questions that needs to be asked is [40]. Semi-structured and unstructured interview formats open up more possibilities to ask follow-up questions to follow up on interesting leads in the interview that the interviewer did not originally think about.

Mediating tools such as prototypes may be used in interviews, where the user may be asked to carry out certain actions, or the interviewer may point to various aspects of the mediating tool when asking questions. Interviews can also be expanded out into workshops with multiple users, mediation tools and tasks.

Observing Users Observing users may lead to insight that is not voiced by the users themselves. To gather more information, the users can be asked to voice their thoughts when interacting with the prototypes, thinking aloud. However this technique has problems in that users may feel uncomfortable talking to themselves, or may stop talking aloud once the task becomes more demanding (which may be when it is most important to hear the user's thoughts). A better approach could be to have users go at the task in pairs, in which case they will often naturally think out loud and explain the task to each other [40].

3.4.2 Other Theories and Techniques for Design

Uncomfortable Interactions The difficulty of carrying out even ordinary tasks while under negative effect was noted by Norman in his book *Emotional Design* [42]. Though his main point is that attractive things work better, the opposite may prove to be a powerful design tool. Benford et al. claim that the consequences of uncomfortable interaction may in fact make such designs worthwhile, with users possibly gaining poignant insight from the experience or simply having a more powerful experience [19]. This can be used as a model to explain why horror games, which per definition are uncomfortable to play, remain popular.

Ambiguous Design Ambiguous design as formulated by Gaver et al. is another tool that may prove useful when analyzing and designing products and experiences [43]. By enforcing ambiguity in how people, e.g. users interpret digital artifacts, a search for deeper meaning and interpretation is provoked. This can lead to a deeper conceptual appreciation of the artifact [43]. In the case of horror experiences, ambiguity invites the user's imagination to run wild through fear of the unknown.

Three types of ambiguity are introduced by Gaver et al; Ambiguity of information, ambiguity of context, and ambiguity of relationship. Examples of ambiguity of informa-

tion include unclear displays, and having systems over-interpret information. Ambiguity of context includes juxtaposing design aesthetics, and reusing features of products for other purposes. Ambiguity of relationship can include using controversial subject matter and designing to provoke mixed feelings from the user.

Trajectories Trajectories into experiences are discussed by Benford et al. [44] and can be an important design consideration when designing experiences. By creating a coherent context in and out of the main experience, the impact of the experience may be strengthened [44]. This can be especially effective when creating an cross media experience that extends out into the real world. Additionally, orchestrators can be used during the experience to help steer it along the intended path. Benford et al. give the example of *Desert Rain*, a 45 minute experience where participants are first subjected to a briefing, dress up in uniform, partake in the experience, and finally receive a small token to take home. During the experience orchestrators could subtly intervene to maintain the overall journey through the experience.

A very simple example of a self-created trajectory would be voluntarily darkening the room when watching a horror movie or playing a horror game to strengthen the emotional effect, or playing a tabletop RPG in a setting which fits the theme of the game.

Seamful Design With a complex technological systems the presented user experience may break down from time to time and the “seams” in the technology expose themselves. A traditional approach would be to try to hide these seams. However Chalmers & Galani and Benford & Broll suggest using these imperfections in the design [45, 46]. Examples include a location-based mobile game which takes advantage of the inherent uncertainty and patchy coverage of GPS as an essential part of the game design, and resource-managing multiplayer mobile games which are built upon the concept of only occasionally syncing data to a central server, a restriction brought upon by the mobile data traffic costs. The the latter case, it brings a challenging uncertainty into the supply and demand mechanics of the game.

Seamful design is more than just a technique, it can be considered a different way to relate to IT as a material. With wood carving, you need to take the imperfections of the material into account when choosing what to make of it [47]. Similarly by figuring out how to utilize the imperfections of IT, better designs can be created.

4

Design Methodology

At the CHI Conference in 2012 [48], William Gaver argued that unlike more traditional forms of research, the practice of research through design (which is often employed in e.g. interaction design) may not result in theories but rather with theory as annotations to realized design examples. A major difference is that design research generally does not work towards attempting to falsify theories but rather to confirm them.

The problem is, the argument is not that X will always lead to successful designs (however success is evaluated), which would clearly be open to refutation. How could it be? There are too many other factors involved in a design project to make that kind of guarantee. Instead, there is always an implicit sometimes in statements about how to design successfully, to reflect the myriad of factors that remain untheorised yet crucial to a project's success. Assertions that X will sometimes lead to successful outcomes, however, are unfalsifiable, because no number of unsuccessful design efforts would actually disprove the assertion—after all, the next attempt might be successful. [48]

In this thesis work, such a design example will be realized to provide arguments for the research question. The methods used for creating this design example are taken primarily from the fields of interaction design and game design.

4.1 Interaction Design

Design work usually draws from many different toolboxes of theory in order to solve what is essentially a *wicked problem*. According to Rittel & Webber's definition, a wicked problem does not have an ultimate, easily testable and unique solution [49].

Since interaction design promotes a very user-centric approach, a common design methodology is that of iterative design. Here, prototypes are built and tested in a context that mimics the intended real use context (e.g. with real users). The results from the

test then feed into another development loop with new versions of the prototypes, which are tested again, and so on [38, 39].

4.2 Playtesting

Both Jackson & Schuessler and Fullerton recognize that game design is a form of wicked problem, that “*There is no definite answer [to what makes a game good]*” [50], and that “*Unfortunately, fun is one of the most elusive concepts you will ever try to pin down*” [22, p.312].

The concept of user evaluation in interaction design is mirrored in the common practice of *playtesting* in game design. Historically playtesting has been seen as a way to find bugs and other issues later in the design process, some argue for an approach with very early prototypes to verify the core game design with real players [22]. The approach of early testing may have deeper roots within board gaming and wargaming communities, where it was advocated by Jackson & Schuessler in the early 80s [50]. They suggest using both informed users (self-testing and playing with other game designers, who have prior knowledge of the design process and the design challenges) and regular users (gamers [51]) in the design process. Fullerton suggests using confidants in the early playtesting and as soon as possible testing with the target audience.

For the playtest itself, Fullerton suggests the following plan [22].

- 2-3 Minutes. Introduction - Welcome the playtesters and introduce yourself and the testing procedure.
- 5 Minutes. Warm-up Discussion - Ask questions to find out about the players.
- 15-20 Minutes. Play session - The players can either be left alone and observed discreetly through e.g. a video feed, or observed directly. It’s a good idea to ask the playtesters to think out loud, saying out loud what they are thinking and what choices they are making.
- 15-20 Minutes. Discussion of Game Experience - An semi-structured interview, one-on-one with the player.
- Wrap-up - Thank the playtesters, gather contact information.

4.3 Game Design

Taking advice from Fullerton’s notions of what makes a game fun (see section 3.2.1) , the game will have to be constructed in a way as to provide meaningful choices and goals, both ultimate goals and smaller subgoals along the way [22]. Fullerton advocates setting player experience goals instead of stating features when drawing up the early design; this fits the goal of designing for various types of immersion well.

The difficulty will have to be right and the controls and feedback good enough to attempt to create flow [23] and to promote challenge-based immersion [31]. Lykta enables

multiple players to share the same experience, in which case the aesthetic fellowship should be strived for and the MDA framework might be a good tool in the design (see section 3.2.1) However, one of the most important skills for game designer is to be able to draw on experience from playing and analyzing games and being able to draw design inspiration from the other works in the field [22]. Additionally, many design choices will undoubtedly also be based off technical limitations of the Lykta platform, such as the limited projecting angle of the projector. This limits the field of view for players. By embracing these limitations in the vein of seamful design, instead of working around or against them, a better design can be created.

4.4 Horror Games

The design tools and methods from the field of interaction design and experience design can also be applied when designing horror games.

Games such as *Eternal Darkness* also use techniques similar to Gaver’s ambiguity of information [43] and playing off well-known seams in the technology [45] to give the illusion of both the protagonist and the player going insane. These “sanity effects” include displaying incorrect information on the HUD, and reporting that the player’s memory card save files (a technical necessity when using optical disc based games) have been deleted¹. *Amnesia* uses a similar system although in a more diegetic manner by adding filters and details such as cockroaches to the environment when the protagonist loses sanity.

¹<http://www.giantbomb.com/eternal-darkness-sanitys-requiem/3030-7512/>

5

Planning

Lykta was used for a virtual art display in the middle of January 2013, which meant that by the beginning of the thesis work the very basic functionality of the platform had been verified in a live test. Support for more interactive gameplay would then be added and tested in the first phase of the thesis work. The Lykta platform would then be used as a basis for crafting an immersive horror experience aimed at provoking an emotional response from players. This work was planned to lead up to Lykta being displayed with a live interactive demo at *Vetenskapsfestivalen* in Gothenburg, a festival of the sciences¹. At the beginning of the project, the final playtest was set to occur at the Automat Indie Arcade event, arranged by the nonprofit organization Dataspelsakademin², before summer.

The approach chosen to evaluate the capabilities of Lykta to provide an immersive experience was to create a prototype for players to test, and then evaluate it with the data gathered from the test. This is a classic approach in interaction design, where the experience can be seen as a mediation tool in dialogue with the users. A more stringent approach could have involved a version of the experience running on standard computers and played like an ordinary networked computer game as a comparison of the immersiveness of Lykta against a more traditional platform for interactive experiences. The development environment that forms the basis of the current Lykta system, Unity3D, supports quick conversion of software between such different platforms. However, development of such alternative solutions would still be prohibitively expensive in both time and resources for the scope of this project as many alternative solutions for e.g. mouse and keyboard control would have to be developed. This is an example of the methodological choices made under the guidance of design research methodology, see section 4.

Additionally, due to the nature of game experiences the process must result in a

¹Vetenskapsfestivalen, Göteborg - <http://vetenskapsfestivalen.se/english/>

²About Automat Indiearkad - <http://automatarkad.tumblr.com/about>

product that can stand more or less on its own and be playable. It needs to have some sort of beginning and end, an ultimate goal with smaller sub-goals along the way to provide a sense of progress [22], and a suitable level of challenge throughout the experience [22, 31]. This means that not all design decisions made can be explored fully, and that many will have to be made through the judgement and previous experience of the author.

5.1 Time Plan

The master thesis was planned to be carried out over a period of 20 weeks. During the prestudy a time plan was created. This was divided up into phases of development and testing.

In the case of Lykta the development and testing was split up into two phases. The first was to focus on interactions and general use of the Lykta system, to know what kind of gameplay mechanics work and which do not. This is similar to an approach suggested by Fullerton, to prototype the core gameplay mechanisms first and build out from there[22].

The second phase would focus on development of the experience as a whole and end in a playtest, where *“people come to play [the game] to see if it engenders the experience for which it was designed”* [52]. Playtesting is a very common method to verify design choices within gameplay design, see section 4.2 Due to time constraints and setup procedures it was not expected that it would be possible to iterate, i.e. prototype, evaluate and adjust, more than once or twice during this phase.

See fig. 5.1 for the full preliminary time plan. What follows is a summary of the discrete steps as initially planned.

- Pre-study - Create proposal, gather current research, fix technical details with Lykta platform.
- Dev I - Create the scene and a number of interactions. No music, art assets etc, but gathering requirements for these and finding outside help.
- Test I - Test interactions, get general feedback.
- Dev II - Add art assets and atmospheric effects, improve technical details.
- Test II - Test emotive qualities of experience.
- Wrap-up - Finish thesis report and create presentation.

Week	Date	Phase	Description
1 January	31/12		
2	7/1	Pre-study	“Finalize” Lykta platform and investigate current research on projected AR
3	14/1		<i>Virtual Showroom prototype exhibited at library</i>
4	21/1		Finish proposal and finalize research question
5	28/1	Dev I	Enhance support for interactions in Lykta platform/Test graffiti app on Lykta
6 Feb	4/2		Choose/design physical and digital space for the interactions/Design interactions
7	11/2		Start testing interactions internally/informally/Ghost hunt done
8	18/2		Continue designing interactions
9	25/2	Test I	External/formal testing of interactions, without “atmosphere”
10 March	4/3		Continue external/formal testing of interactions
11	11/3	Dev II	Listen to two master thesis presentations/Report should have been started
12	18/3		Set dimensions and location of physical and digital scene for horror experience
13	25/3		Continue designing horror experience, work with with external artists
14 April	1/4		Start testing horror experience internally/informally
15	8/4		Continue developing and test informally
16	15/4		<i>Prepare for vetenskapsfestivalen</i>
17	22/4		<i>Display and test current prototypes at Vetenskapsfestivalen</i>
18 May	29/4	Test II	Finalize experience/start external/formal testing
19	6/5		External/formal testing of horror experience
20	13/5	Wrap-up	External/formal testing of horror experience/Write report
21	20/5		Start finishing up documentation
22	27/5		Oppose thesis
23 June	3/6		Report done
24	10/6		Thesis presentation and report submission
25	17/6		Buffer

Table 5.1: Preliminary time plan for master thesis work.

5.2 Risk Analysis

An initial risk analysis was conducted. This was especially important as Lykta was an untested platform and a number of factors may pose a risk to the goals of the thesis work. Above all else these risks highlight the technical limitations of the system, which

would come to influence the design of the experience.

The identified risks below are classed with a risk level (1-5, 5 being greatest impact) and a likelihood level (E-A, A being most likely).

- 3-C Projected image does not sync fast enough to changes in orientation
 - Determine how playtesters feel about this, and if no suitable solutions can be found then redesign experience so exact projection mapping of room is no longer required.
- 3-A Coverage of PS Move camera is not sufficient for play area covering whole room.
 - Try different camera hardware or settings, or add support for additional tracking camera(s), or make play area smaller.
- 4-A PS Move camera often cannot see tracking ball on PS Move controller due to player obscuring it.
 - Try to find more suitable camera position, add additional tracking controllers and/or add support for additional tracking camera(s).
- 4-E Interference from projector directly on camera or on the tracking ball of the multitool affects tracking.
 - Turn down brightness on projected image, adjust PS Move camera position, adjust location of puzzles and targets in gameplay.
- 2-B Shadow from multitool player interferes with visibility too much while solving puzzles.
 - Adjust puzzle positions, e.g. moving them above head of the player.
- 4-D Drift in PS Move affects image too much for players to orient themselves properly.
 - Leave handset overnight to verify no drift with current API. If significant drift, build in occasional recalibration into game-play, e.g. have player put Lykta handset into holder to refill lantern oil or have some other diegetic explanation.

5.2.1 Sound and Graphic Design

Interactive experiences and games require assets such as audio and graphics. In the case of a more lifelike experience, the graphical assets may consist of both 2D images (textures) and 3D models (meshes). The dark environments in many horror games, lend themselves well to the limited budget of the project. This fact in itself influenced the decision to focus on horror in particular, see section 6.1.2.

However, it was still obvious early on the planning that additional help would be needed to create the audio and graphics design. This was to be investigated during the first development phase, as a polished presentation would not be necessary until the final experience was to be tested.

6

Execution

The development of Lykta and the experience running on it followed along the phases outlined in the planning chapter. However, implementation issues and the need to revisit basic features of the Lykta platform throughout the various stages of the project meant that the lines between the different phases was not as distinct as planned.

6.1 Prestudy

The prestudy focused on some basic Lykta system development, initial game design, and gathering technical background information.

6.1.1 Similarities to Other Systems

The literature prestudy focused on researching if similar systems had been developed and used for gaming applications previously. This was to make sure that the main research question had not already been answered elsewhere, and to position the Lykta system better in relation to other systems in preparation for the technical paper that was due in February for the SDeR conference. A couple of other research projects with mobile projectors, with most relating to similar systems but without the gaming context. These have been presented in section 2.1.

6.1.2 Initial Game Design

While much of the game implementation was planned to come during the second development phase, an overall game design was still needed before work started on designing and implementing basic interactions. Otherwise it would be more difficult to later on create a coherent whole. To gather inspiration for the gaming experience, a less formal prestudy was conducted during the literature prestudy and in parallel with Dev I, where a lot of previous experience was used to create guidelines for the overall design.

Choice of Game Type It was clear from the limitations of the projector technology that the field of view would be very limited for the player. Inspired by the notion of seamful design [45], work started on a design which would build upon this limitation, rather than try to cover it up. The author has a lot of previous experience with horror games, and it was in his personal interest to create an interactive horror game experience using this technology. Horror games can be analyzed using Gaver’s concept of ambiguity of information [43], where it is often used to make players feel uncomfortable and create a stronger experience (which in turn can be analyzed using the notion of uncomfortable interactions [19]). Monsters may have uncanny features that are blurred out or the daytime landscape may be covered in thick fog; a realtime digital application of the renaissance painting technique *sfumato*, “to evaporate like smoke” [53]. Of particular interest for applications of Lykta is that many horror games, such as the Silent Hill series and Slender, limit the vision of the player by forcing them to rely on a flashlight. By disguising the Lykta projector as a flashlight, the boundary between the real and virtual world is blurred, which is similar to the ambiguity of information present in the experience Desert Rain, which used fog curtains as display media [43]. Though many other games use flashlights, including the more action-oriented Half-Life, horror games are also a kind of interactive experience designed with the goal of eliciting an emotional reaction in the players. This may make them a suitable type of experience for gauging certain kinds of immersion, such as imaginative immersion. The dark environments could also help in requiring less detailed graphical assets.

These factors combined mean a horror gaming experience could be suitable for testing out the Lykta platform. By introducing interactive elements instead of having players watch e.g. a horror movie, it was hoped that players would focus less attention on possible shortcomings in the visualization of the prototype system, and also open up for the more game specific types of immersion such as challenge-based immersion (and the state of flow) as well as investigating the movement-based factors affecting immersion. (see section 3.3).

Platforming games were also briefly considered as a possible game type for the Lykta experience. These usually have the player character viewed from the side, moving left and right and having the ability to jump to get around a 2D obstacle course. Such a game could have been controlled by Lykta by moving the projector around to display a 2D obstacle course attached to the walls of the room. The character could have been controlled by following along the motion of the projection controller, or through the use of other, perhaps more traditional extra controllers.

Game Design Overview A core concept in horror games is buildup before release, e.g. a long scene where the players feel danger is approaching, followed by the actual danger. Benford et al. frame this in their theory of trajectories using the classic three act structure of Aristotle, Rising Action, Climax, Falling Action and Dénouement [44]. Sometimes the danger is delayed so give the player a false sense of security before suddenly springing the danger on them. An important factor in the design of the experience would be to allow for an emotional buildup. The limited physical space within which

the players could be tracked would pose a difficult challenge for this.

It was decided the game would be played around the corner of the room. While any kind of geometry could be modeled and used for projecting on, this simple geometry would be easy to find at almost any testing location and would provide four surfaces to project on; two walls, the floor and the ceiling. This also made it easier to cover all play surfaces with the limited field of view and range of the tracking camera. The common horror game theme of an abandoned building would be used as it fit well as an overlay of the room corner, unlike e.g. the forest setting in parts of Slender.

A number of factors influence how “fun” players find a game, see section 4.3, including a sense of progress and challenging goals. To create a sense of progress, and to vary the experience building up to the climax in accordance to trajectory model of Benford et al., the layout of this room would be varied by creating the illusion of players moving between several virtual rooms. How well this would work was unclear at the start of the thesis work, but the idea was to use darkness and surround sound queues to simulate the movement between virtual rooms.

Challenge would be created by having players need to complete a set of puzzles built upon the basic interactions supported by the Lykta system (designed and implemented in the first development phase) to unlock a door in the room and then progress to the next room. As the projection device would need to stay a certain distance from the wall to provide adequate vision, it was decided to represent this as a gun with attached flashlight; an item that may be familiar for players from games such as Resident Evil and perhaps through this recognition evoking the right expectations of danger. Meanwhile, another PS Move controller would be used on its own for another player to use while interacting with the puzzles projected on the wall by the gun light.

6.1.3 Unity Networking Model

An implementation-specific facet worth mentioning is that the wireless nature of the Lykta handset requires extensive use of networking. This was because it was not possible to receive the tracking data from the Move.me server on the smartphone directly, as the software required would not run on smartphones. This data was instead sent from the PS3 to a “server” computer and further over wireless network to the smartphone providing image to the projector. A positive upshot of this however was that more intensive calculations for the game scene could be done on the server computer instead of the smartphone, with mostly only position and animation data for the various objects in the game scene being sent to the smartphone.

However, this required learning the ins and outs of the Unity networking model. In this, data can be sent over the network in three main ways.

- State sync - Limited to certain data types
- Remote Procedure Calls (RPC)
- Manually with ports

A networking implementation was already in place at the start of the thesis project, a very rough implementation based off a Unity networking example project by M2H game studio¹. It was felt that some aspects of this implementation could be improved.

6.2 Dev I - Exploring Interactions

The first development phase was focused on implementing the basic interactions which would be the building blocks of the game. Some additional development of the Lykta system would be necessary to support additional features required by the game application, as previous applications running on the system had limited interactivity and only supported one handheld controller.

6.2.1 Assistance with Graphics and Audio

Even though a game spent mostly in dark, confined spaces can make use of sparser graphical assets than a brighter, more well-lit game taking place in a larger environment, external help was still needed with graphics and audio.

Anders Christiansson, a sound design and veteran of several larger game development projects such as *Terminator Salvation* (Grin, 2008) at the game dev studio Grin, joined the project through his interest in horror gaming. Aleks Molcanov, previously an intern at Paradox wished to expand his portfolio and joined as the graphics designer and modeler.

Visual and audio design was discussed regularly over Skype and audio files were shared online, to create as coherent a whole as possible even though the team wasn't co-located. The audio was delivered as uncompressed sound files in mono, so that Unity 3D itself could generate dynamic surround sound from the placement of the audio sources in the game scene. The graphics were delivered as 3D models (meshes) and 2D textures, many of them with built-in animations. Some animations were also created manually in Unity 3D by moving parts of the 3D models in relation to each other.

With the scene design not yet specified to a high enough degree (a task for the second development phase) focus was first on creating graphics and audio for the puzzle elements. Separate prioritized todo-lists were kept for graphical and audio assets, which were updated with any changes to the mechanics of the puzzles.

6.2.2 Lykta System Development

At the start of the project Lykta was still in an early prototype state. Performance would have to be improved and more robust physical prototypes built. Additionally, several modifications had to be made to better support the gaming application.

¹<http://www.m2h.nl/unity/>

Improvements to the Lykta System During the weeks leading up to the the start of the prestudy, Lykta had just been modified to take advantage of the Move.me software from a previous open-source solution which at the time was less robust, needing occasional recalibration. It had just been showcased at a local library to display non-interactive pieces of art on a white wall. During the prestudy and during the first development phase a large number of hours were put into creating a development environment around this newer system. This included making the connection procedure between server computer, PS3 and smartphone client as simple as possible. Debug player objects were also added, making it possible to develop and test puzzles without the need to connect to a PS3 over network and move real controllers.

The network implementation was also changed from the previous prototype in a way that made all objects take care of their own network sync, instead of having this centralized.

Though improvements to the Lykta system was the focus of the first development phase, additional improvements to the performance of the Lykta system would continue to be made up until final testing as issues appeared.

Gaming Modifications The Lykta handset in the gallery demo (see fig. 2.4) was reworked using the official gun attachment to the PS Move controller to resemble a gun in order to fit with the gameplay design and invoke the right expectations in the player. Fig. 6.1 shows the first version of this gun controller, with the smartphone attached on top and the projector attached to the gun handle.

An early requirement on the gaming experience was to make it possible to have two players cooperating to build upon the strengths of projected augmented reality, see section 2.1. This made it necessary to add support for tracking multiple PS Move controllers. The second controller would not be attached to a projector and first controller (together called “the gun”), rather would but would be used on its own together with button inputs to manipulate objects on the projected environment. This second controller was dubbed “the tool”, shown in fig. 6.1. A custom design was considered for this, but left to potentially be explored later if time allowed.

The Move.me API made it relatively easy to implement support for multiple controllers, as the data from the controllers were provided by the Unity plugin as arrays with length depending on the number of controllers connected wirelessly to the PS3. The input system and vibration (rumble) features from the Move.me system was also available.

6.2.3 Design of Interactions

While the overall game design was worked out on during the prestudy and the first development phase, the focus was on designing, and implementing the basic interactions that could then be evaluated in the first testing phase.



Figure 6.1: Left: Early version of the gun controller, with smartphone on top, attached to a Playstation Move gun adapter. The projector is taped to the bottom of the gun handle. Right: The move controller was used on its own for the second controller, the tool. For final testing all buttons except the trigger (underside, not shown here) were taped over to prevent accidental input and make the affordances clearer.

Ghost Hunt Even before the end of the prestudy, it was decided to create an early game implementation that would focus on the simpler interactions of the gun, before introducing the secondary controller. (the tool). These interactions were exploring the environment and shooting. This would be similar to the classic game *Duck Hunt* (Nintendo, 1984), where players use a light gun aimed at the TV and try to shoot ducks before they escape off the screen. Here, ghosts would be moving along the walls and the player would try to spot and shoot them using the gun controller. Developing this would allow for fine-tuning the tracking of the controller, create the basic room model in the game, and to create the basic monster pathfinding algorithms.

Development of this prototype got slowed down however as it became clear that the monster pathfinding was more complex than originally thought. This was a combination of several factors, chief amongst them being the need to create a good standard for networked objects and to set the standard for how the scene describing the room would be set up if the prototype was to be an aid in the later implementation of the horror experience. The ghost would not only need to find the player and calculate the correct trajectory in a standardized room model, but the ghost state would also need to be synced over the network. As the final implementation of the horror experience would require more objects moving through the scene, with their movements synced over network to the smartphone client, it was decided to scrap the simple ghost hunt prototype and create a more generalized solution for networked objects in the game. However, with this an early gun interaction testing opportunity was lost.

Movement interaction	Difficulty (dexterity)	Example action	Ingame object (ting)	Puzzle
Press	Easy	Push Button	Button (later: Lever)	Random button sequence
Grab & Rotate	Medium	Rotate Dial	Knob (later: dials)	Combination dial
Grab & Move	Hard	Move object to position	Blowtorch	Bar door and blowtorch
Grab, Move & Rotate	Expert	Fit object into hole	Electrical box	Electrical box puzzle

Table 6.1: Summary of interactions and ingame actions.

6.2.4 Formalizing Interactions Possibilities

With the decision to create a good base for networked-synced game objects it was time to categorize what kind of interactions these would support, primarily with focus on the secondary controller, the tool. For simplicity's sake it was decided to only use one button on the move controller, the large trigger on the underside. With that in mind, four basic interactions were decided upon. From these actions, items to populate the game world were selected. See table 6.1 for a summary of interactions, ingame objects, and puzzles.

A base class called Ting (object in Swedish), which took care of syncing it's own position and rotation across the network, was implemented and from which all puzzle objects inherited. The Ting class also provided overridable methods called when objects were grabbed, held, and released by the tool.

Objects were combined into puzzles, either by combining several of the same type of object (such as multiple buttons or levers that need to be activated in a certain order) or by combining multiple objects of different types. Though not all of these were designed right away during the first development phase, a work-in-progress table for categorizing puzzles can be seen in fig. 6.2. Rows denote what object type the puzzles consist of, with lower rows requiring higher dexterity to solve. Columns denote whether a puzzle consists of one object, multiple objects, or objects of multiple types. The first movable type, shown with a blue ball and hole, was worked into the blowtorch implementation, see the chapter on the second development phase.

All puzzles inherit from a base Puzzle class, which provides methods for checking if the winning condition of the puzzle has been met, and also takes care of synchronizing its cleared state over the network so that an appropriate graphical representation can be shown on the client.

The puzzles were designed to provide steps of increasing complexity as the game progressed, and challenging skills that would be difficult to use while under pressure. This included memorizing the order to activate switches or finding out the combination of a tumbler lock through trial and error. It was hoped that the teamwork aspects would emerge when the player with the gun would provide light for the player solving puzzles while at the same time keeping a lookout for dangers in the dark. To mix this teamwork up some interactions were considered where it would only be possible to complete them when hidden in darkness. This would require more communication between the players, instead of the gun player just having to keep the light on every puzzle the tool player

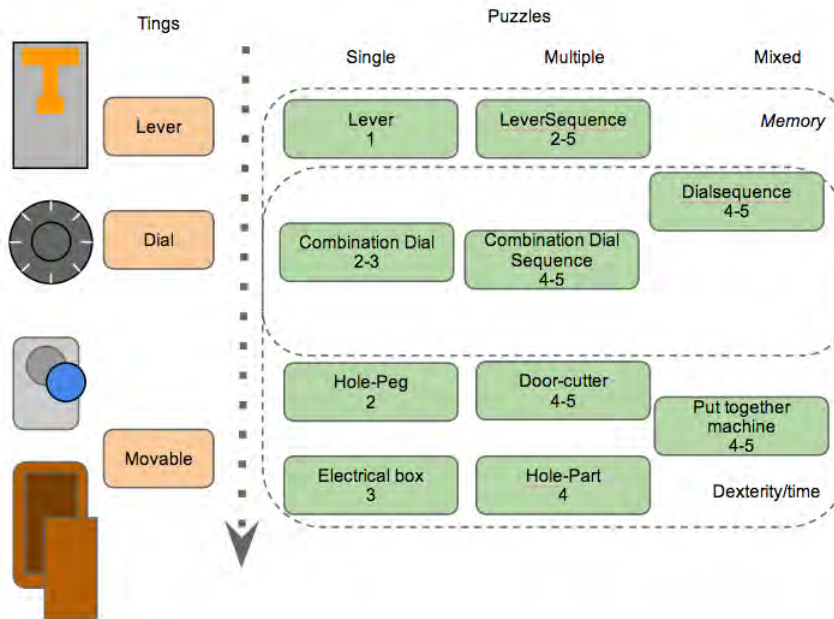


Figure 6.2: Puzzle types by what ting types they consist of (rows, lower rows requiring more dexterity) and the number of such objects in the puzzle (columns, increasing to the right).

attempted to solve. Iconography, audio and vibration feedback would be used to convey these kind of dark puzzles to the players, but these types of interactions were left to be explored later in the process. Sadly, there was not enough time to implement them during the second development phase.

Another question raised was how usage in large spaces should be represented in the game world. While most of the gameplay would take place near a corner, it would be fully possible to turn around and shine on a far off opposite wall and reveal content there (if the projector is bright enough and the ambient lighting dim enough). For basic interactions this was not necessary to solve at this stage of development and was left to solve during the second development phase

6.2.5 Time plan Deviations

During this phase more work than had been taken into account in the original time plan appeared for the author. This led to delays. A report on Lykta was created for the SDeR 2013 student interaction design conference², which together with other activities led to a delay of about 2 weeks by late February. However the contents of the Lykta report also acted as both a documentation and solidified the previous work research. From January to April the author also assisted in a course in Unity at the university, which took about 25% of full time.

²SDeR 2013 Conference - <http://sider2013.au.dk/>



Figure 6.3: Informal testing of basic interactions. Buttons represented by colored squares. An early prototype of the gun controller can be seen in the foreground.

It was also found that the Lykta system suffered from a delay of about 100ms from camera movement in the server to camera movement in the smartphone client connected to the projector. Nearly a week was spent troubleshooting this issue, mostly in parallel with testing. This was because high latency between controller movement being received by the server and the scene rendering changing may affect the sense of immersion negatively. Over local wireless network it should be possible to reach latencies of less than 10 ms. Perplexingly, this issue was finally resolved by the start of the second development phase by switching to a different smartphone of the same model.

6.3 Test I

The focus in this phase was understanding how users would interact with the Lykta system. However by the first interactions were ready for testing, early March, progress was already more than two weeks behind the time plan and the testing was carried out more informally than originally planned.

6.3.1 Testing Procedure

Informal tests were carried out with informed users, mostly interaction design students and members of the faculty. Over the course of about a month of development, from the end of the first development phase to the beginning of the second development phase about 5 short tests were carried out. Informed users were used due to easy

availability and the assumption that they would be able to provide detailed feedback [50].

The users were briefed that focus would be on the interactions themselves and not on the puzzle design. Since Lykta presents a novel way of interacting with digital media, there was little concern that testers would have prior experience with similar systems. During this informal testing, a white background was used. This made it easier for the video recording to pick up shadows from the multitool player to see what parts of the image were blocked out, and in general improved visibility. The interactions initially tested were those required to activate button and dial objects. Buttons require that the user holding the tool wand move it close to the position of the button on the wall and press the trigger button on the underside of the wand. Dials are to be turned, and require the user to keep the button pressed down while rotating the controller. The dial would follow the precise orientation of the tool controller, with an outline present to indicate the orientation of the controller (see fig. 6.4).

6.3.2 Test I Results

The video recordings did not yield any additional data. It was found for users to consistently activate the button a rather large “grabbing sphere” with a radius of about 0.3m was required around all objects. Buttons could not be placed too close to each other, or consistently hitting the right one would be difficult. This was partly due to calibration issues, but also seemed to have to do with parallax effects. Instead of holding the wand really close to the wall as if manipulating real wall-mounted objects, users were observed to hold it further away and use their own viewpoint to aim. Some would even use the shadow of the wand, cast by the projector, to aim at the wall, and a routine was implemented using ray casting [54], calculating a ray from the projector location through the tool location and seeing if it hits a piece of a puzzle, to deal with this issue. It was found however that this routine might interfere with picking targets for users that did not use the shadow technique. In the end, it was decided to not support the shadow picking technique as there was no diegetic explanation for why it would be possible to control puzzles using the shadow of the tool and not the tool itself. Instead users would have to be encouraged to go near the wall, either through ingame clues or a pre-game briefing.

In addition to sharing the distance problem encountered with the buttons, the dial turning had other problems. Some users would hold the tool wand pointing into the walls and rotate along an axis parallel to the length of the wand, others would hold the wand pointing along the wall, rotating around an axis perpendicular to the length of the wand. The initial implementation did not support both of these orientations. To solve this problem, an implementation was made where an axis perpendicular to the wall is calculated in relation to the controller the moment the player grabs the object. As long as the player does not change controller orientation completely apart from rotating it around this axis, a reliable rotation is achieved.

Additionally the first implementation rotated the dial to the absolute rotation of the wand, making it impossible to let go, rotate the controller back, and grab again. This

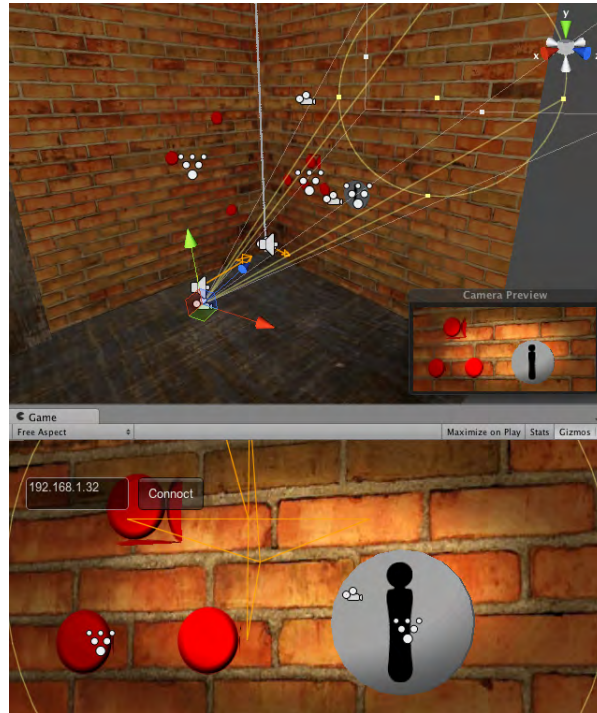


Figure 6.4: Button and knob representation during test I, using temporary graphics. Top screen shows the debug view of the scene, bottom screen shows the point of view from the camera in the controller. In the image projected from the gun the white icons, arrow and text input box would not be shown.

would mean that a 360 degree rotation would require a 360 degree rotation of the wrist. For a while it was considered to keep this mechanic as it this uncomfortable type of uncomfortable interaction (see section 3.4.2) may in some cases work well with the horror game aesthetics. As mentioned in section 4.4 many horror games employ controls that are not designed for optimum usability, instead creating some manner of discomfort for the player. In the end however the implementation was changed as it seemed to be simply too impractical for gameplay and was hard to give a diegetic explanation. Additionally the dials were reduced in size to make it appear more like a dial rather than a large wheel, to help players assume the right rotation movement.

6.3.3 Testing at Vetenskapsfestivalen

As a tangent to the earlier testing of basic interactions, drag and drop using the gun controller was extensively tested as Lykta was displayed at *Vetenskapsfestivalen* in late April as part of an exhibition on student projects at the Chalmers interaction design programme³. This occasion was used to showcase the Lykta technology to the public and to promote the Interaction Design & Technologies programme. However it also

³ *Vetenskapsfestivalen 2013 report* http://np.netpublicator.com/np/n25626097/VF_rapport_web.pdf

provided a good reason to improve on aspects of the implementation. It was decided to implement a number of ways to manipulate objects in the projected environment with the gun controller alone as the dual controller setup was deemed too complicated for a often unattended public showcase. Moving, rotating and scaling interactions with the gun was implemented and tested, and a “dress up” scene was made were users could move and scale pieces of clothing around, either putting them on a picture of a person, or shining them onto their peers.

While the new interactions were proven feasible, they were not implemented in the horror experience. This is because the projection device in those experiences was meant to represent a gun with a flashlight attachment, leaving these interactions without a diegetic explanation. They also risked breaking the clearly defined roles between the two players. However the code for moving, rotating and scaling was remade during the second development phase for the movable types of objects, which were to be used with the tool controller.

For this exhibition opportunity the Lykta system was reinforced in a number of ways. The ability to accidentally recalibrate controllers was removed by disabling that functionality through software. It also provided a opportunity to really test the long-term robustness of the system. Though the projector in the handset needed to be recharged regularly, recalibration of the PS Move system was never necessary.

6.4 Dev II - Design of the Experience

The idea of the second development phase was to focus on creating an overall consistent experience to maximize the potential for players to have an immersive experience. This phase began in March.

6.4.1 New Art Team Member

In April Aleks did not have more time to dedicate to the Lykta project. Simon Köhlström had assisted in a previous game development project by the author and joined to expand his portfolio. Aleks had not yet created the final textures for the models used in the game, and Simon provided new textures for some of Aleks models as creating new ones. Fig. 6.7 shows a comparison between the placeholder texturing and Simon’s retexturing later in the project. The latter benefits from updates to the lighting.

6.4.2 Game Design

The main focus of the design of the experience was the game design, specifically creating puzzles and laying out the game scene with its myriad of puzzle-filled rooms. Monster behavior was also a major design point. It was decided to call the game *The Rooms*.

A lot of game design theory was studied before the project and during the prestudy, and by the beginning of the first development phase an overall game design had already been planned. Not very much of the game design theory, such as the MDA framework (section 3.2.1 and 4.3), was actively consulted during this game design phase, but was



Figure 6.5: Top: Lykta being used at Vetenskapsfestivalen to play a “dress up” game. Bottom: Testing scene at Vetenskapsfestivalen, with objects to drag around to play “dress-up”.

rather used as inspiration together with experience from a long history of gaming. To gather inspiration from new sources another informal game and literature study was conducted.

Additionally, an Oculus Rift horror game, *Alone in the Rift*⁴, was playtested by the author. The Oculus Rift is a VR headset with head tracking. It gives players the illusion of being surrounded by the game world, but unlike Lykta it is an experience that cannot be shared between players in the same physical space (see section 2.1. It was noted that the game managed to convey an strong sense of being in the game world and experiencing fear, even though the art assets were rudimentary and the game design was very basic (following a path to a goal, then aimlessly trying to get away).

⁴Alone in the Rift Oculus Rift horror game <https://developer.oculusvr.com/forums/viewtopic.php?f=42&t=1539>

Layout of Rooms In the initial game design it was decided that only the room surfaces around a corner (two walls, ceiling and floor) would be used as active game surfaces to be projected on.

Adding gameplay to all the surfaces of the rooms would also be nearly impossible due to the limited field of view of the tracking camera. It was decided to limit content to the two walls, ceiling and floor around a corner.

The room layout was planned visually using an online drawing tool, see fig. 6.6 for a sketch from the design process. In order to give players the feeling that the experience was less linear and with the added bonus of increasing replayability and adding interesting choice (something Fullerton points out is important for the players to experience a sense of “fun”, see section 4.3), the room layout was constructed with branching paths. In many of the rooms, players have the option to try unlocking either the door on the left wall, or the door on the right wall. The overview in fig. 6.6 shows the first room is in the bottom left corner, and the last room in the top right. By choosing to go through the leftmost doors, players advance upwards in the room columns, with rightmost doors taking players further right along the room row. Generally, unlocking leftmost doors required solving tougher puzzles, but this would pay off in the end with having to go through fewer monster-populated rooms.

In the top left of the image, puzzles are categorized by type (rows) and difficulty (columns) in the same way as in fig.6.2. The numerals indicate the number of object making up a puzzle, while the letters signify type. L for levers, D for dials, P for pegs (never implemented, a type of movable object puzzle), C for cage (later known as the blowtorch puzzle) and M for machine (only implemented as the electrical box, where a single object had to be placed in its receptacle). These puzzles are placed in the rooms along the walls for the door they would correspond to. In the last column however all puzzles unlock only one door.

The yellow boxes correspond to combinations of puzzles, however such as system was never implemented.

The number followed by an M in each room indicates the monster danger in that room, originally thought of as having multiple monsters simultaneously. The rooms within the danger zone would have a different visual style, to signify the players traversing inside the space occupied by a great danger. This notion was further strengthened by placing blowtorch puzzles along the perimeter of the monster-inhabited danger zone, alluding to players breaking into a cage.

In the end it was decided to remove the fourth row, where players would be expecting monsters but no would come, as there was not enough time and puzzle variety to implement them properly. A longer delay before the monster would spawn in the final row of rooms was introduced instead.

Room Transitions A difficult part of the experience design was that the buildup (discussed in section 6.1.2) made it necessary to have players move between many virtual rooms, while still staying in the same physical room. It was hoped that this transition could be simulated by dimming the projector, moving the audio listener to the location

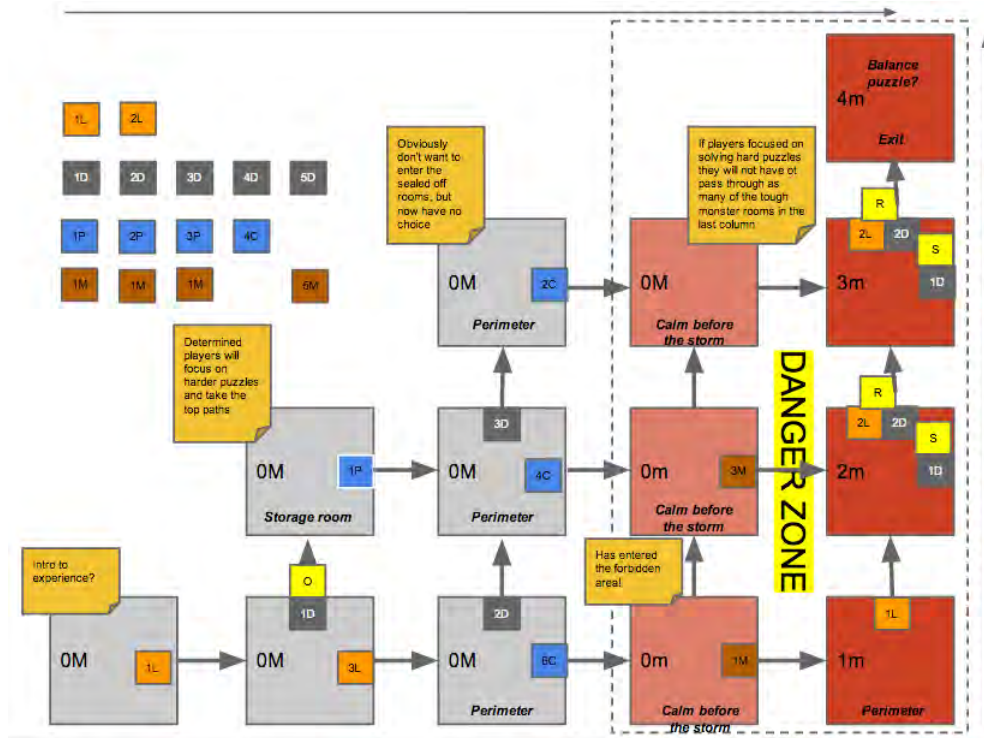


Figure 6.6: Sketch of the room layout as it was planned. The numerals indicate the number of object making up a puzzle, while the letters signify ting type. L for levers, D for dials, P for pegs (never implemented, a type of movable object puzzle), C for cage (later known as the blowtorch puzzle) and M for machine (only implemented as the electrical box, where a single object had to be placed in its receptacle).

of the new virtual room so that all room sounds disappeared off in the distance, and then playing a door shutting sound on the opposite wall of the door that the players went through. Playtesting would have to show if this approach worked or if the transitions would be immersion-breaking.

Lighting Design Another issue with mapping the virtual rooms to the physical spaces was it would be hard to dynamically change all the virtual rooms to fit a real room of a fixed size. It was decided to limit the active play surfaces to the area around a corner. It was decided to create the illusion of the light from the gun controller fading out to black when shining further out from the play area. That way, the walls that were not an active play area would stay veiled in darkness. This still left the problem of how to keep players inside the area covered by the PS Move camera, but it was decided to approach this issue once the testing area was known. An alternative approach, showing some weird supernatural and dangerous-looking effect on the surfaces outside the play area was considered, but this was abandoned as it would look strange in perspective if the 3D model of the room with this texture on it did not correspond to the physical

room.

The fading light effect could be achieved by attaching a directional light source to the gun player object in the game world, and varying the intensity of the light source depending on where it was pointed. It could also provide dynamic shadows radiating out from the center of the light, which could increase the sense of realism.

However this kind of dynamic light carries a performance penalty. Instead, a simpler solution was chosen. Each room would be illuminated by a light source originating from the corner around which the puzzles are focused, see fig. 6.7(bottom). This light source would fade to black along the play surfaces. Instead of attaching a light to the gun player object in the game world, the camera rendering the world from this perspective would have a vignetting graphic to give the illusion of a circular cone of light, see fig. 6.8.

Monster Game Design With the game having already served as inspiration in a previous project, articles on the Amnesia developer blog lead to an article on Gamasutra on antagonistic horror design [55]. Many of the most effective scares in horror gaming do not come from hordes of monsters, such as mindless zombies. Instead monsters such as Silent Hill's *Pyramid Head*⁵, who actively stalk the player, remain clearest in the memory of players. It was decided to forego the earlier design of having many monsters for the players to avoid and defeat to having only one, which would disappear but then reappear and continue stalking the players.

The earlier attempt create a monster that would follow walls was remade using a proper state machine implementation (see section 6.4.6 for details on this). The monster would spawn at a random location along one of the walls. From the initial idle state it would look for the nearest player (actually, the nearest move controller position in the game world). Once found, it would enter the Chase state and follow the player through erratic movements, trying to get into attack reach. If the player was close enough to a wall, the monster would try to attack it from the wall, otherwise either go to the floor or the ceiling and attack from there (though the ceiling was removed altogether later in the game design).

Once the player was in attack range, the monster would switch to the attack state and charge up the attack. This would trigger an audio queue, a monster scream, alerting players of the monster's imminent attack and giving them a chance of moving away as the scream would be played through the surround sound system. This was done since the limited field of view would make it hard for the players to keep track of the monster using only visual means. If the player was still within attack range after a short timeout, the monster would play an attacking sound and deal damage to the player. Once this was done the monster would disappear, only to reappear once a timer had counted down. This timer, as well as the initial spawn delay, could be set individually for each room to provide increasing levels of challenge as players got further into the game, potentially helping them stay in a state of flow.

Players could combat the monster in two ways. Rooms could be set to spawn monsters that would be sensitive to light. If the player with the gun shone on this monster

⁵Wikipedia - Pyramid Head http://en.wikipedia.org/wiki/Pyramid_Head

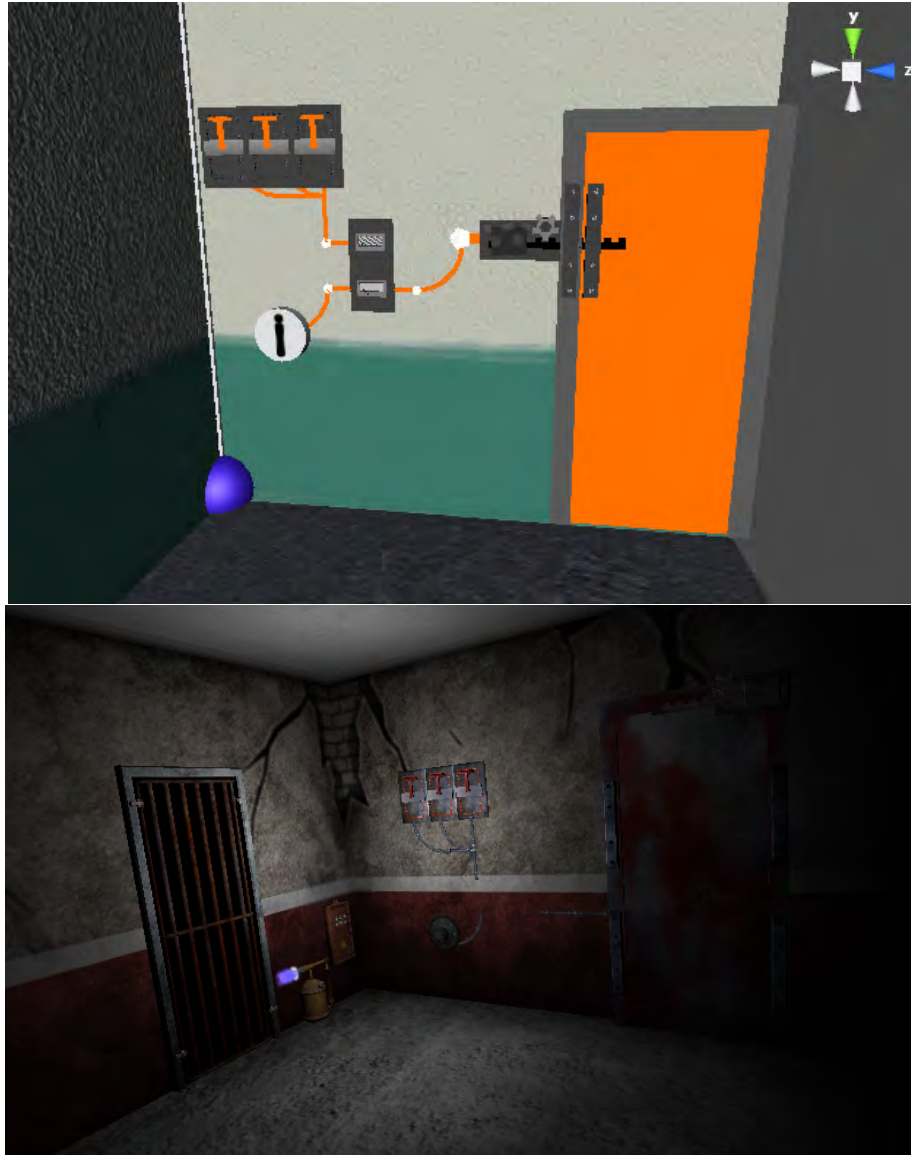


Figure 6.7: Older and newer room and item graphics, top and bottom respectively. The bottom image shows the light source centered around the corner, which together with a vignetting effect on the camera was used to simulate the flashlight effect.



Figure 6.8: View of a blowtorch cutting through a bar door attachment, one of the puzzles introduced during the second development phase. This is from the ingame camera providing the image to the projector. Here the vignette overlay can be seen clearly, creating a rounded look to the otherwise rectangular projected image.

for a short amount of time, the monster would scream and move even faster towards the player it was chasing. If the player with the light managed to keep the light on the monster for a certain amount of time, the monster would fade out. However, it would reappear again after a set amount of time. In the final room configuration, the last room was set to spawn a monster that did not disappear when shined upon.

Another way to temporarily make the monster disappear would be to shoot it with the gun. By simply aiming straight at the monster (using the “flashlight” as guide) and pulling the trigger, a loud gunshot would be heard, the monster would scream and then disappear. However, ammo was intentionally made limited (six shots in the testing version) with no indication of how many bullets were left. A clicking sound was added when trying to fire without bullets. It was hoped that if this happened in a very pressured situation, perhaps during a tricky puzzle with monster near, this would induce panic with further emotional investment as a result.

Win and Loss Conditions It was decided that players would complete the experience by managing to unlock the final door. Alternatives would have been to e.g. defeat some kind of boss monster or the monster that was chasing them, but there were not enough resources to implement the game mechanics necessary to make such a game mode a reality.

An effect was added to give players some satisfaction of completing this final goal. Once players opened the final door, a fade to white would be shown through the projector followed by a positive audio queue. Another way to end the experience would be to lose

all health by being attacked by the monster. It was considered setting players back a room if they lost, but ultimately and due to the short testing time it was decided that “dying” would end the experience altogether.

A health system for the players was implemented as a shared health pool between the two players. When attacked by a monster, the flashlight would briefly flash red and the player hit would have a certain amount of health deducted from their total. The image from the flashlight would turn redder and redder with lower health. These visual queues were inspired by HUD image filters which are common in many games [29]. If the total health for both players crossed below a threshold, the camera would fade to black, with an ominous audio queue played. The game would then be over.

Though time was taken to implement these transitions, none of these elements were felt to be essential for the research question. While Benford et al. talk about the importance of trajectories out of the experience as well as the concept of *dénouement* after a climactic (uncomfortable) experience in order to gain positive after effects of a potentially negative experience [19, 44], the focus was on immersion *during* the experience. It was also noted that time constraints during testing would most unfortunately make it difficult to create good experience out of the trajectory, as an interview or some other method to gather user feedback would need to follow shortly afterwards.

Puzzle Design To improve the visual representation of button state, the appearance and animation was changed to that of a large throwable switch, shown on the right wall in fig. 6.9. The button activation action was still kept at just pressing the trigger of the tool wand, with no switch-throwing motion necessary. Though there was little feedback from the first user test regarding this, it was felt that this made the object fit better with the theme. This change was done without additional user testing as it felt like a safe change. If users felt like adding a motion to the grab press, the switch would still trigger. Additionally, vibration feedback in the tool controller (from the PS Move controller) and positional audio feedback from the surround sound system was added.

The dial puzzle was tweaked so that it was possible to have combinations requiring either two positions or three positions when rotating it. Here too vibration and audio feedback was added, as well as lights that would light up to give feedback when the right combination was found. Earlier versions of the dials had used colored overlays to show this, but the lights were cleared and fit better with the game world.

Additional puzzle elements were added, borrowing implementation of simultaneous rotation and movement from the objects used at Vetenskapsfestivalen. This was used for the electrical box puzzle, but also inspired the addition of a new kind of puzzle; the blowtorch puzzle. In both cases gravity was added, so that objects would fall to the floor if players let go of them while holding.

Players would find certain doors blocked by a set of bars, see fig. 6.9. To solve this puzzle, they would need to find a blowtorch hidden somewhere along the wall. When the tool player picked it up, the blowtorch would turn on and follow the movements of the tool, as long as it was close enough to the wall. By holding the flame against a set of two to six attachment points for long enough (depending on puzzle difficulty), the

structure holding the bars in place would be removed and the bars would fall to the ground. Fig. 6.8 is a view from the ingame camera displaying to the projector, showing the blowtorch cutting through one such attachment point. Sometimes there would be an additional door behind the bars that had to be unlocked through other puzzles, but this setup was reserved for the very last couple of rooms. The bar doors were also used as a kind of storytelling element, symbolizing players breaking into a cage and entering the darker monster-populated rooms.

Meanwhile, the electrical box puzzle, shown in fig. 6.11 also required players to find a missing component (the rectangular electrical box) and fit it into a receptacle. Spark effects and audio was added to help convey that the two parts were meant to fit together, and also helped players locate the electrical box. This was added to make the difficulty of the electrical box puzzle somewhat easier than the blowtorch puzzle.

A puzzle was considered where players would grab hold of a small glassed-in maze attached to the wall and tilt it to try to get a marble or key to roll through it and fall out of a hole at the end of the maze. This object would then be used to open the door. Though a prototype was built, the physics simulation needed for this object was deemed too prone to bugs such as getting stuck or flying away and the puzzle was abandoned.

To provide clearer feedback as to what puzzles belonged to what door, especially when multiple puzzles had to be solved to unlock a door, a system of wires and gauges was introduced. When a puzzle was solved, the corresponding gauge (connected to the puzzle with a wire) would show activity and a electrical humming background sound would start playing. Gauges in turn connect to the door opening mechanism with more wires. These can be seen in figures 6.9, 6.10 and 6.11. It was hoped this would provide a useful guide for players to find the puzzles connected to the door, especially in later rooms where puzzles could be spread out over multiple walls.

Combinations of puzzles were considered, as shown in the room layout sketch in figure 6.6. The gauges showing puzzle completion, could have boolean operation icons giving hints if both puzzles should be solved, or if only one puzzle should be solved. However this idea was abandoned partly because it seemed too easy to miss this icon and a good way of providing feedback was not decided on in time, and due to time constraints.

The movable object code was considered to be reused for hanging objects on the wall, such as paintings, which could be moved and taken down to reveal puzzles behind them. However this was also never implemented, due to time constraints.

Difficulty Level To satisfy the criteria for both Ermi & Mäyrä's definition of Challenge-based immersion and Csikszentmihalyi's concept of flow, the difficulty level shouldn't be too easy nor too hard for the players [23, 31]. While this could be adjusted with the puzzles and properties of the monster, this was a major challenge as all players have different skills levels. Of particular concern was the fact that players could get stuck and not be able to advance to the next room, either by their own inability to solve a puzzle or by some software error. Larger game production have long had dynamic difficulty levels



Figure 6.9: A room in the game, showing three dial puzzles hooked up to a gauge, showing that neither are completed. The lights on the dial puzzles show that two positions need to be found while rotating to clear the puzzle. To the right is a blowtorch puzzle, requiring that the tool player picks up the blowtorch and

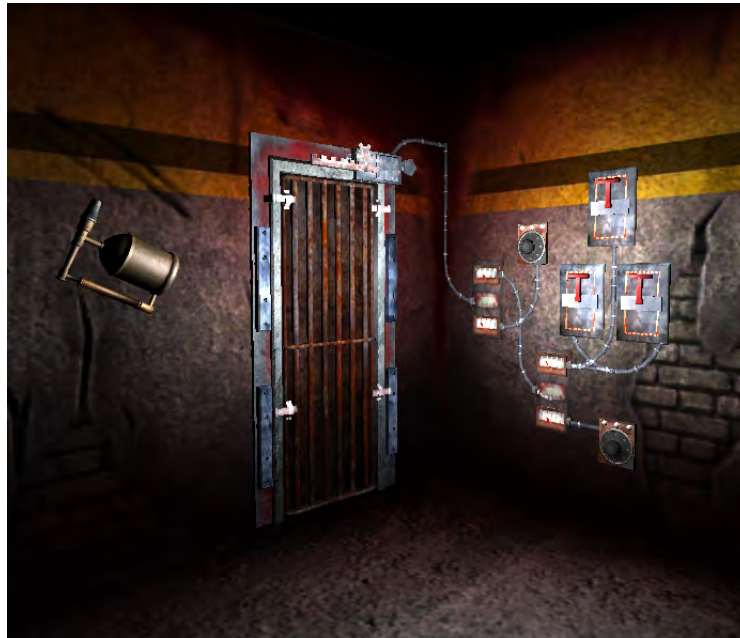


Figure 6.10: The final room, inhabited by the monster and with a door protected by a blowtorch puzzle (left wall), lever puzzle, and dial puzzle (both on the right wall).



Figure 6.11: The electrical box puzzle and the door it unlocks. The electrical box, lying on the floor, must be picked up and inserted correctly in the receptacle above it. Here the sparks coming from both the receptacle and the power box are not shown.

which adjust aspects of the game according to player skill level⁶, but implementing such a system was outside the scope of the project.

To solve this a method inspired by the Wizard of Oz [39] usability testing technique was implemented just before the final testing phase. Manual controls were implemented so the testing facilitator could advance players if needed, though care would have to be taken to not overuse this system. Additionally controls were added to be able to adjust player health up or down.

6.4.3 Graphic Design

During the second development phase a dirty, abandoned look for the walls and objects in the game was created, see fig. 6.7. Two different room textures were created, one for the initial set of rooms and another, darker and bloodier, for the later rooms that were populated by the monster, see fig. 6.10. This was done to drive the narrative and vary the look of the game. The transition would come after players used a blowtorch to escape from any of the rooms in column 3 of fig. 6.6, to give the illusion of entering a

⁶Destructoid - Good Idea, Bad Idea: Dynamic Difficulty Adjustment
<http://www.destructoid.com/good-idea-bad-idea-dynamic-difficulty-adjustment-70591.phtml>

sealed-off section, like a cage.

The game objects were all placed as close as possible to the walls to avoid parallaxing effects. If they were to be placed further out from the walls, they would appear to move when projected out from different positions in the room. To avoid this completely, the objects would have needed to be perfectly flat. However they were created with some depth, as this would make them look more like solid objects from the viewpoint of the gun player, with only a slight perspective error for the other player.

As everything shown through the display of the game, the projector, was to be seen as lit up by a flashlight, a traditional HUD was not to be used as it would not be a diegetic element. Most feedback would be from indicators directly on the puzzles and gauges on the walls (see 6.4.2). To indicate that players were being hit, the light would flash red momentarily. With lower and lower total health, the light would turn redder and dimmer. This type of image filtering is a very common technique in games, labelled as Meta-perception by Fagerholt and Lorentzon [29]. It falls in the middle ground between non-diegetic and diegetic HUD elements, and can be likened with giving players an extra sense.

The idea of diegesis was somewhat haphazardly abandoned when, near the start of the testing, was decided to give extra instructions to the start and end of the experience. The text “Pick up the gun” was added as white-on-black to give layers starting instructions in the event that the facilitators were not present. When the game started, this text would fade out and the game scene would fade in. When players died, the image would fade to black and the text “You are dead” would appear. These additions were not quite thought through, but added quite hurriedly near the end of the second development phase as it became apparent that there was not enough time to develop a more coherent trajectory into and out from the experience [44].

Monster Graphics A shadow monster was first envisioned, to play off the light and shadow aspect of the game, and to create a monster that appeared living without needing detailed modeling and extensive use of animations. It was implemented by Aleks using soft particles coming off silhouetted outline of a man. While this worked well in a dimly lit game setting, a dense particle cloud was needed to create a good outline, and in Unity this incurred a large performance hit on the smartphone rendering to the projector. There was finally time to redo the monster shortly before the second and final testing phase. Inspiration was taken from a design of a jawless ghoul, and Simon modeled a detailed 3D-model with animations for moving, attacking and screaming. See fig. 6.12 for a comparison between the original monster model and the newer one.

Many horror games employ a high degree of erratic movement and animation to creatures to make them seem more uncanny and unnatural. Additionally filters such as local blur may be used to make parts of the monsters unclear and ambiguous (see section 6.1.2). It was hoped that such effects could be added to the monster, however due to time constraints only the monster movement speed was changed to appear erratic and jerky.

The way the monster was implemented it would always face the player with the gun.



Figure 6.12: Left: First version of the monster, using particles. Right: Second and final version of the monster, as animated and textured 3D mesh.

This had the side effect of always making the players see the monster directly face on.

6.4.4 Sound Design

A deeper study of sound design was planned, but the previous experience of the sound designer as well as time constraints led to this idea being discarded. A very important part of any horror experience is sound and music (though often with moments of silence), and while music may be an non-diegetic element it can convey a powerful atmosphere [56].

Music An eerie, looping background track was created. On top of this more rhythmic suspenseful elements could be added, such as a drum sequence for suspense and a chilling monster wind when that was added. A state machine audio handler was implemented, which would adjust the relative volumes of these different pieces of music. The suspense drum loop would be added over the original music once players entered the monster-populated rooms, with only the monster wind playing once the monster entered the scene.

Additionally, small audio queues, variations on the main background track, were played when players either died or escaped.

Sound Effects Suitable sound effects were created for the mechanical objects making up the puzzles. Other sound effects added including humming to signify completed

puzzles turning on machines behind the scenes, and door opening sounds. Through a USB sound card and surround sound system, these sounds were used to strengthen the illusion of the players actually being surrounded by the game world.

6.4.5 Overall Experience Design

With a mixed media experience such as The Rooms, the game design is not limited to that which is implemented in code.

Trajectory Into Experience There were early plans to design a comprehensive trajectory into the experience (see section. 3.4.2 for an introduction on the topic). Testing would take place in a disused warehouse, with the testers being greeted by testing supervisors following a script and possibly wearing costumes, thereby making sure that the context around the test would fit well with the experience in the test. Benford et al. suggest using such “human orchestrators” to strengthen the experience [44]. However due to insufficient time this was not followed up on. In a way however, these human orchestrators took the form of the addition of test facilitator being able to affect the progress through the game through the debug controls, see section 6.4.2.

Handset Design A prototype gun type handset was designed during the first development phase, however this was rather fragile as only tape and blue-tack was holding the projector and phone to a PS Move gun attachment. In preparation for testing, supports for these parts were manufactured in a 3D printer. A window was left in the smartphone holder so that the screen could be manipulated. To prevent view of the screen and accidental input during testing, the smartphone could be placed in the holder with the screen facing down. Fig. 6.13 shows the gun handset that was used during final testing sessions.

It was considered to use Android’s capability for background video recording to use the smartphone to capture audio and video from the handset during testing. However this idea was not followed up on, due to time constraints and possible performance issues. It was also felt that the additional data that could be gathered did not justify the development time as there would be other ways to record video during the test.

For final testing the Galaxy Nexus was replaced with a Samsung Galaxy S4, by the time of testing the top of the line Android-based smartphone. The performance was great enough to provide smooth video rendering through the game at 60 frames per second, though the WIFI latency was slightly worse than the Galaxy Nexus, at around 70 ms. Additionally the Galaxy S4 was equipped with a much larger after market battery , making it possible to run the handset for the better part of a day. The video out (MHL) adapter had to be replaced for the new smartphone as the old one was not compatible.

With the expanded smartphone battery, it became clear that the battery of the projector would be a limiting factor for testing. An extra power pack was created using four 3000 mAH 3.7V Li-Ion batteries via a voltage step-down converter. This enabled the projector to run at about six times as long compared to using only the projector’s

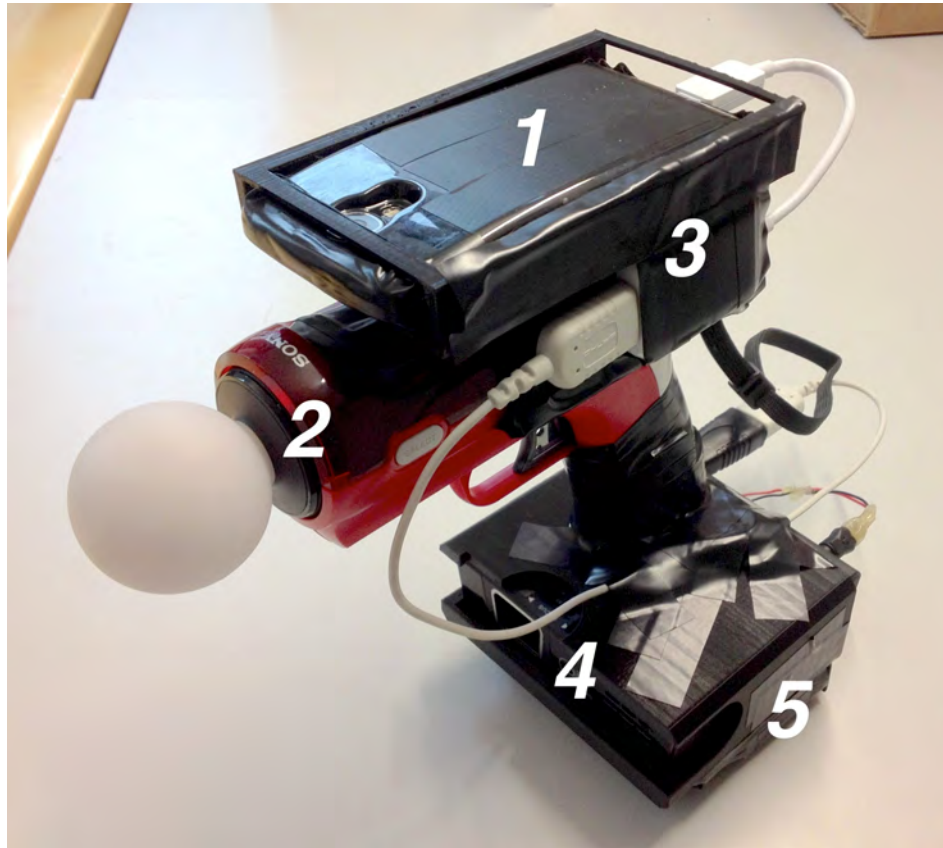


Figure 6.13: The gun handset part of the Lykta system used in the playtesting, with more robust smartphone and projection holder 1. Smartphone. 2. PS Move controller in gun adapter. 3. MHL video adapter. 4. Projector. 5. Projector power pack (under the projector).

built-in 1800 mAH battery, with the batteries easily replaceable if they were to run out during the testing session.

6.4.6 System Development

In addition to the development done during the first development phase, a number of to support the game that was designed during the second development phase.

Room Transitions The mechanic for transitioning between virtual rooms was both a design and implementation challenge. The game scene would be filled with a number of rooms, all containing various puzzles, requiring a large number of assets to be loaded at any one time. With the smartphone currently used this would have a significant negative effect on the frame rate and smoothness of motion of the projected. As it was important to have the projected image smoothly follow the motions of the projector a solution was

sought. Two approaches were investigated.

The first solution was that each scene, i.e. game level loaded into memory, would have only one room, and switching between rooms would trigger a change of scene. It would be very difficult to do this seamlessly as the music and sound effects would stop momentarily and then restart. A solution of dynamic scene loading could be achieved with the pro version of the Unity editor, but this was not available in the project. Additionally, switching between scenes would be frustrating when working in the editor to build and later adjust the game world.

The second solution investigated was to populate the room dynamically upon entering them. The room layout would be specified in special files and puzzles and other objects would be instantiated when entering the room, the removed again when moving out of it. This would require that all assets fit together with standardized dimensions so a coordinate system for the puzzle parts could be easily created.

Over a week was spent researching and testing these different approaches, but in the end it was realized that both these approaches were just too complicated to the implement for the scope of the project, and would make it much more cumbersome to adjust the scene in the editor. A compromise was chosen in the end; the most demanding effects would not turn on until the players entered the room, and to avoid bugs most puzzles would not switch on until the players had reached that room. Once the players left the old room it would be removed altogether. This freed up some performance for the more demanding later rooms, filled with puzzles and with the monster.

State Machine Implementation Some aspects of the gameplay was to switch between multiple different behaviors depending on other factors in the running game. Examples of this include the general game state, the monster, and the audio system. A classical approach to this kind of problem is to implement a finite state machine⁷, a set of defined states with defined actions triggering transitions between the states. An advanced Unity-specific implementation of such a state machine, provided by UnityGems.com⁸, was found and used in another game project the author was involved in in parallel to the thesis work. Simple network support was added to this for the sake of Lykta, so that object states would automatically sync over from the server to the client.

Network Model Unity is different from many other game engines in that the same codebase and game scenes are typically used for both server and client. However, this also means that Unity does not enforce any clear separation between the server and client code. The early implementation of Lykta was built upon the Unity code for a small multiplayer FPS prototype in order to speed up development. However this turned out to be counter-productive as the code between server and client was not clearly separated in this prototype, and development followed along this route due to inexperience and time pressure. A large amount of the bugs encountered during the implementation were

⁷UnityGems - State machine introduction <http://unitygems.com/fsm1/>

⁸UnityGems - Final state machine framework - <http://unitygems.com/finite-state-machines-3-final-state-machine-framework/>

network-related, and a lot of extra code had to be written to deal with synchronizing events between the server and client.

The state machine implementation used for the monster, audio system and some other objects, introduced later in the second development phase, simplified this greatly. State changes were synchronized from the server to the client automatically, each state then having it's own enter, update and exit methods. Within these the code for server and client could be neatly separated.

With 60 frames per second rendered by the more powerful smartphone, the movements of the projector were still jerky due to changes in move controller position and orientation only being synced over the network around 20 times per second. A smoothing algorithm was found and used, which increased smoothness of the projected image dramatically, but added a slight extra delay. A similar script as added to the monster, but when attempted to be used with the other moving objects some problems arose that were not solved in time for testing, so the older network code was used instead. This led to jerkier movement when moving these objects around using the tool controller.

6.4.7 Time Plan Deviations

This phase required a lot more work on implementing the game scenes than initially estimated. As such, much more time had to be spent on implementation than game design.

Though the time plan was adjusted once around the time of the first testing phase, it later became clear that it would not be possible to start testing the experience before summer. It was decided to take a break over June and July while the author started a part-time employment at the Interactive Institute and pursued another game project over the summer. This did however lead to the discovery of the UnityGems state machine, which simplified implementation (see section 6.4.6). During the summer the Automat Indie Arcade was rescheduled for early October, and it was decided that this would be the target for the second round of testing. Work in the Dev II phase would continue at around half time during August and October to meet this deadline.

6.5 Test II

The Lykta platform and the Rooms experience concept was exhibited at the Automat Indie Arcade event, arranged by Dataspelsakademin⁹ in Göteborg. This event was chosen as it would provide a good supply of visitors willing to test, had a darkroom that could be dedicated to Lykta, and could potentially lead to media exposure of the project. The theme of Automat, home built arcade games, fit well for Lykta and the Rooms, but this also meant that it would limit the playtesters to the kind of users who would seek out and visit the event on their own accord and pay the entrance fee. Therefore gamers would most likely be overrepresented in the testing group. It was not felt that this would significantly impact the quality of the research, as Lykta would hopefully be

⁹Dataspelsakademin website <http://dataspelsakademin.org>



Figure 6.14: Two playtesters receiving instructions and getting ready to play. They are carrying the two controllers; the gun and the tool.

a novel experience regardless of previous gaming experience and the research question was independent of target audience. Additionally, informed users may be able to provide more detailed feedback (see section 4.2).

6.5.1 Testing Setup

Two days were dedicated to setting up the system, the first a week beforehand to verify that the location was suitable and make adjustments if necessary. The venue provided a sound isolated blackbox type room for the experience. In this a 4.5x4.5m area by a 90 degree corner was enclosed by black curtains, and the PS Eye camera was attached to the wall in the corner 2.85m up and angled about 60 degrees down, see figure 6.15. The height and therefore also coverage was limited by wall mounted equipment. A camera holder was 3D printed to make sure the camera was positioned properly, since the tracking system as implemented in the software would not work properly if the camera was rolled along the forward facing axis.

A wireless router was connected by ethernet cable to the Playstation, with WIFI providing connection to the server computer and the smartphone client.

The play area was further fenced off to 1.8x2.3 meters limit player movement within



Figure 6.15: The camera placement in the blackbox used for testing. The camera was placed approx. 2,85m from the floor.

the PS Eye range, while still making it possible to project on walls further away. See fig. 6.16 for a photo of the play area. The camera placement created an additional dead spot closest to the corner where there was no tracking, but otherwise provided good coverage. The puzzle placement in the Rooms was adjusted to take this into account.

The 4 point surround sound system was placed with speaker in each corner of the area closed off by black curtains.

On location was realized that it would be possible for the testing facilitator to hide behind the curtains and easily observe what was happening without reminding the players of his presence. This inspired the addition of extra controls to the server software, the most notable being the ability to manually move the players ahead to the next room if they got stuck on a puzzle, either by their own inability to solve it or through bugs preventing completion.

During testing, the following functionality was available from the server computer. See fig. 6.17 for a screen capture of the main debug interface.

- Visual representation of the game, with movable camera.
- Connection to Move.me tracking software running on a PS3.
- Calibration of controllers.

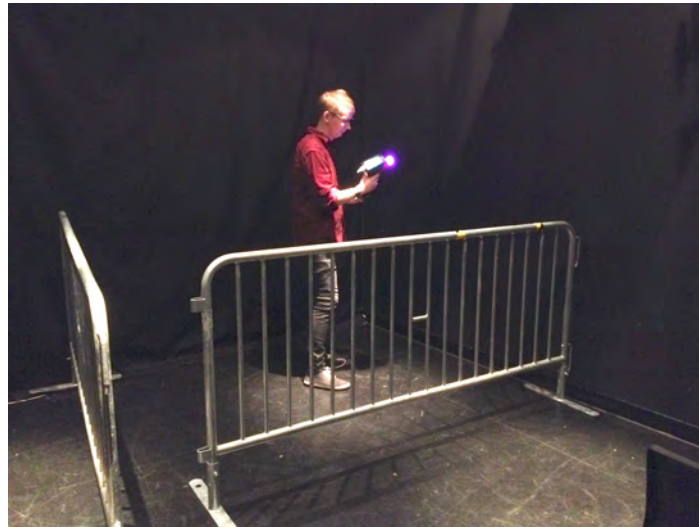


Figure 6.16: The play area within the curtained-off area of the blackbox. The camera was placed over the corner furthest in.

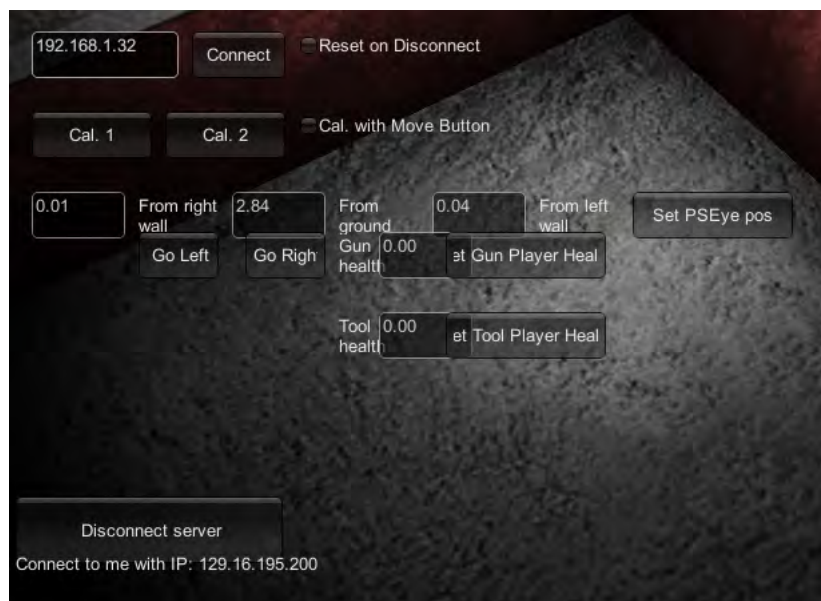


Figure 6.17: The server-side debug controls available during the testing.

- Adjustment of PS Eye position and orientation.
- Ability to move players to the next room through either the right or left door.
- Overview of player health.

6.5.2 Testing Procedure

The goal of the playtest was to perform observed playtest with as many participants as possible over the course of the day, following each playtest up with an interview. Nielsen notes that there are diminishing returns with a higher number of participants and that three iterations of 5 testers are more effective than one iteration with 15 [57]. However with only one proper testing opportunity a goal of 10 groups (20 participants) was set. The testing procedure was similar to the one suggested by Fullerton (see section 4.2), but modified to fit the context of the test. Most of the 5-minute warm up discussion was replaced with a questionnaire, and the game experience was usually shorter than 15-20 minutes. However the notion of only being a passive observer and not talking to the playtesters was adhered to. Exceptions to this happened two or three times when players got stuck for an extended period of time, in which case the debug controls were used to force an advancement. If the players seemed very confused by this they were told what had just happened.

Playtesters (players) were invited to try the experience. Before doing this they were required to fill out a short questionnaire, see section 6.5.3. This mainly dealt with their previous experience in games, their motivations for playing games, and how easily they felt they experienced different forms of immersion in games and other media as well as what factors they thought they were important for a sense of immersion in games and other media. They were also given a brief introduction of how to hold and handle the gun and tool. Fig. 6.14 is a photo of two of the playtesters, holding the tools and receiving a verbal introduction. This introduction was done by either of the two people assisting in the test, and had not been rehearsed beforehand. Below are the most common instructions given.

- “You wake up with a friend in an empty room. You need to get out”
- “You will be playing on the walls around the corner”
- “You have a limited amount of ammunition” (added after the first two games where it was observed that players would waste bullets, making it very difficult to survive the last room).
- “You need to be close to the wall with the tool, and some puzzles may require you to rotate your wrist” (added after the three first playtesters, when it was noticed that many did not go close enough to the wall for the tool interactions to register, or did not figure out how to operate the dials).

The test was recorded with video and audio, though due to the low-light conditions it was realized during the first playtest that the video would be useless apart from the audio recording. For the other tests, the camera was turned toward the screen of the server computer to film the digital representation of the game space.

Peter Holm, friend of the author, helped out during the testing. The author wished to conduct most of the interviews in person, he was also monitoring the playtest this created a bottleneck in that the interview had to be over before the next group could

start playtesting. This was used as an opportunity to recharge the gun controller, but during the second half of the day Peter conducted three of the interviews so there would be time for more playtesters.

A bug was introduced at the last minute which made the game crash when the ghost appeared. This was discovered when the first playtest group crashed out of the game at the second to last room. It was fixed after this, but the results from their test was still included as they had still experienced a majority of the experience.

After this, due to the hectic nature of the testing day, there was only one opportunity to make changes to the experience. At this opportunity the difficulty of the blowtorch puzzle was adjusted by removing some of the locks that players needed to remove. This was done as it was noticed that players thought the puzzle was tedious and had some issues controlling the blowtorch.

During the test, groups had to be helped to advance a total of three times. This was done when a group was stuck on a room for a longer period of time (not explicitly timed) and the testing facilitators felt that they were not making any real progress, or if a bug prevented them from advancing.

For the last group the respawn time on the ghost in the final room was increased, and though they quickly ran out of bullets, this helped them clear the puzzles before the ghost defeated them. They were the only group that “beat” the game.

After the test the two players were interviewed together, though their responses were recorded separately. Notes were taken during the interview in addition to the audio recorded.

6.5.3 Questionnaire Design

The questionnaire opened stating, broadly, the reason for the questionnaire. It is generally a good idea to state the reason for the questionnaire as it may make users more willing to cooperate [41]. A few identification questions about nickname (to match with interviews), contact info, age and gender were asked in order to more easily correlate the answers with the interviews and the memory and videos of them. The testers were also asked if they were game developers, as this could be indicative of a more technical approach to the game, with them perhaps more inclined to try to second-guess the designer. After this Likert scales (see section 3.4.1) were used to gauge player gaming and media consumption habits. It was felt that giving players statements they could either agree or disagree with would make it easier for them to answer.

Questions were asked in the following categories, see appendix B.

- Gaming habits
- Reasons for gaming
- Reactions to games and movies

The gaming habits questions were mainly to cross-reference any difficulties with the controls, the cooperative nature of the game, and to gauge the expectations and tendencies

to game the system (through experience with previous horror games). The reasons for gaming questions were asked to correlate interview answers related to the various types of immersion, such as challenge-based immersion, imaginative immersion, and sensory immersion [31]. Finally, the reaction questions were used to cross-reference to the interviews, while also being linked to the different types of immersion as suggested by Ermi and Mäyrä [31].

6.5.4 Interview Design

The interview was designed to bring in the majority of the research data, with experienced compared to the different models of immersion (see section 3.3). Additionally, players were asked about how they thought the experience could be improved in the future. Asking players about immersion directly was avoided. One reason for this was that players may exaggerate this metric if knowing they are asked directly by the designer of the game, as heightened immersion is strived for in many games and playtesters may wish to make the game designer satisfied with their answers.

Immersion Players were asked where they felt they had been during the game, which ties in to both sensory-based immersion and imaginative immersion, being transported into the game world. A point of reference used here was the Oculus Rift, where many players claim they feel like they have been transported into the game world. However few players participating in this playtest had used it previously. Players were also asked to compare the experience to other horror games.

Players were also asked to estimate how long they had been playing, to give an indication if they had been experiencing flow; another possible aspect of immersion [23]. In flow, time is often reported to either fly by or stretch out.

To gauge emotional reaction, players were asked if they experienced fear during the playtest, if they had reacted involuntarily, or (the opposite) played along voluntarily to maximize the experience for themselves or the other player. They were also asked if they during the game ever cared or were concerned how the other player was doing, in reference to their ingame health level.

Game Design Comparing to Brown and Cairns levels of immersion [30], players were asked about what specific aspects (such as audio and graphics) affected the experience most. Players were also asked if they had experienced any annoyances or other problems that took them out of the experience.

Co-op Players were asked about their experience cooperating with another player, and if they felt empathy towards the other player's situation. It was hoped that this could be compared to the deepest level, total immersion, of Cairn's and Brown's model of immersion [30].

Opinions of the Experience Finally, to get feedback on how the overall quality of the experience itself may have affected the sense of immersion, players were asked to put a price on the “attraction”, as if they had encountered it at an amusement park or arcade. For additional suggestions of improvement, players were also asked what needed improving if they were to pay twice as much for it.

6.6 User Testing

The testing resulted in 10 filled out interview papers backed up by audio recordings, and 20 matching individual questionnaires, see appendix A and B. Each testing session was also recorded, mostly by filming the server computer screen due to the low-light conditions making it very difficult to film during gameplay. Afterwards it was noticed however that the proximity of the server computer to one of the surround sound system speakers made it very difficult to pick out any player conversation from the recordings. The system was plugged in for recharging during each interview, which took 15-20 minutes. The smartphone battery held almost the entire day, with a charging break for the two last groups.

7

Results

Three types of results were obtained - Improvements to the Lykta system resulted in a more useable and polished system, open for more applications. The implementation created a game artifact which can be played repeatedly wherever Lykta is set up. Additionally a new horror concept was created, which to the author's knowledge is the first projected augmented reality horror game.

7.1 System - Lykta 2.0

Hardware-wise the result was a prototype augmented reality projection system consisting of the handheld projection unit (the "light"), a secondary controller (the "tool"), backed up the the tracking system, wireless network and surround sound system. Fig. 7.2 shows the system in use.

The existing Lykta system, using a PS Move tracking system, a miniature projector, a smartphone and a server computer (see fig. 2.5) was modified in the following ways.

- A new more rugged projecting controller was created using a commercial gun-shaped controller attachment, 3D-printed parts, and a more powerful smartphone.
- A second controller was introduced. This was not attached to a projector and smartphone to form another gun-like projecting controller, but can be used for other purposes depending on the software implementation. E.g. in the case of The Rooms, it was used to interact with objects in the game world through buttons and movement.
- A 4 speaker surround sound system was hooked up to the server computer, which provides surround sound to the experience/game software running on it.
- Additional controls on the server computer were introduced, allowing more a facilitators to control the scene more and turn off certain features, e.g. calibration

buttons, for added robustness.

- The network code and general stability was improved.

A wide-angle PS Eye camera connected to a PS 3 console captures images of the glowing sphere of a PS Move controller mounted together with a projector and smartphone. This visual data is combined with sensor data sent from the controllers over bluetooth in the proprietary Move.me server software on the PS3. A host computer receives the position and orientation data of the controllers and updates a 3D scene containing the geometry of the projection surface as well as the data that is to be overlaid on this surface. In this scene a virtual camera with the same field of view as the projector's display angle occupies the same position relative to the virtual scene as the projector occupies relative to the real environment that is to be projected upon. This scene is synced over wireless network with a smartphone client in the handheld projection unit. The image from the virtual camera is then output to the projector through an HDMI video adapter. See fig. 2.5 for an overview image, previously published in a technical report on the Lykta platform [1]. The software on the server and smartphone clients is developed in *Unity3D*¹ with a plugin for receiving data from the Move.me server software².

With Lykta successfully having been used for a full day of user testing, a practical application of the projected augmented reality design space has been verified. This opens up a way to practically explore the design space of projected augmented reality in more ways. However currently the software implementation of the rooms is closely tied the improved software of Lykta, and will have to be separated before other designs using the updated Lykta system can be explored. .

The project provided many good opportunities to showcase Lykta, including the SIdER conference and Vetenskapsfestivalen, and this PR can be seen as part of the results. The Automat indie arcade event was visited by a reporter and photographer from one of Sweden's major gaming magazines, *Level*, and an article with information about the event in general was published with details and pictures of Lykta and the Rooms[58].

7.2 Software - The Rooms

Apart from the upgrades made to Lykta hardware, the game that was created not only resulted in a software implementation, but also the creation of a new type of horror game concept, played through projected augmented reality.

7.2.1 Concept

The resulting horror game concept, played spatially in a real room using projected augmented reality, has two players who find themselves in a dark and strange underground facility. Using nothing but a flashlight-equipped gun and a multitool they must break

¹Unity - Game Engine <http://unity3d.com/>

²Move.Me Unity plugin <https://us.playstation.com/ps3/playstation-move/move-me/>



Figure 7.1: Overview of the improved Lykta system (Lykta 2.0), showing the components comprising the two handsets in the play area and how these communicate with the other parts of the system.

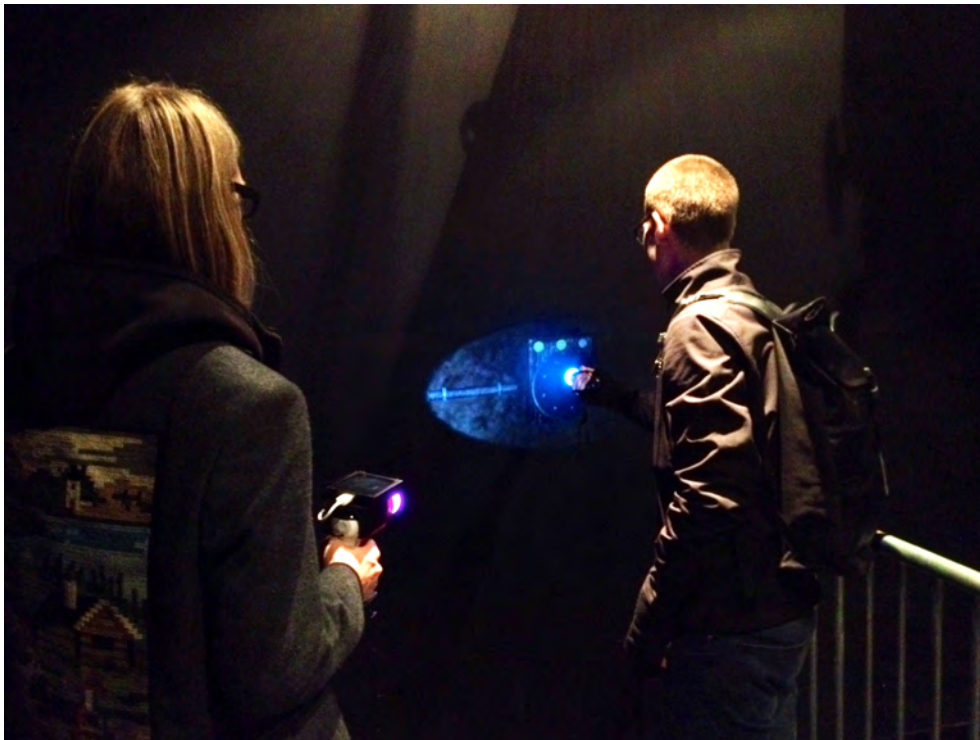


Figure 7.2: Lykta being used by two players to the The Rooms horror game.

through the old security system and open doors into new virtual rooms in the hope of getting out. On the way they break into the holding pen of something unknown, and need to fight off this monster while escaping from the last rooms.

7.2.2 Software Implementation

Software-wise the result was a horror game comprising two pieces of software, the server running on the computer in the Lykta system and a client running on the smartphone in the handheld projection unit. This horror game was called The Rooms. The game software is currently integrated with the rest of the Lykta software.

The final experience, or game, consists of 9 virtual rooms mapped to the physical room within the game is played, see fig. 7.3 for a sketch and fig. 7.4 for a screenshot from the game engine. Only two walls and the floor were actually used as play surfaces. The three first columns of rooms are populated with various lever, knob and power box puzzles, with passage into the “danger zone” requiring solving blow torch puzzles. Inside the three rooms of the danger zone, players face harder variations of the previous puzzles while being chased by the monster.

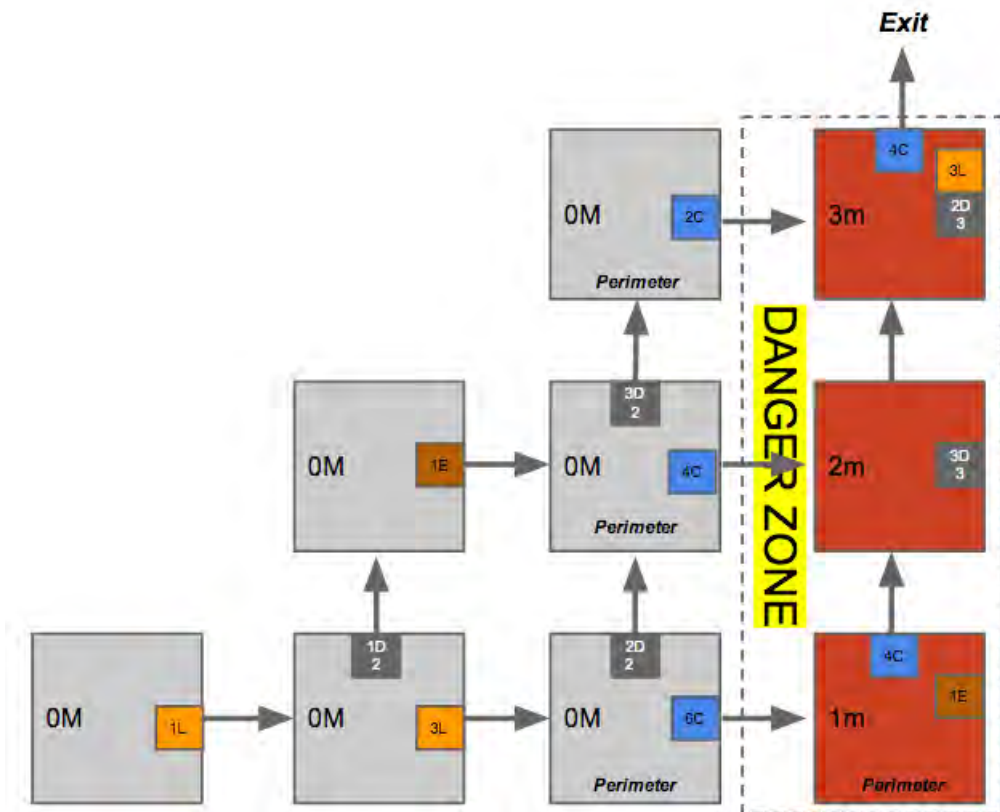


Figure 7.3: Sketch of the final room layout and puzzle distribution. L: Lever puzzles. E: Electrical box puzzle. D: Dial puzzle. B: Blowtorch puzzle. The first numeral is the number of objects making up the puzzle. For dials the second numeral denotes the number of positions in a combination.

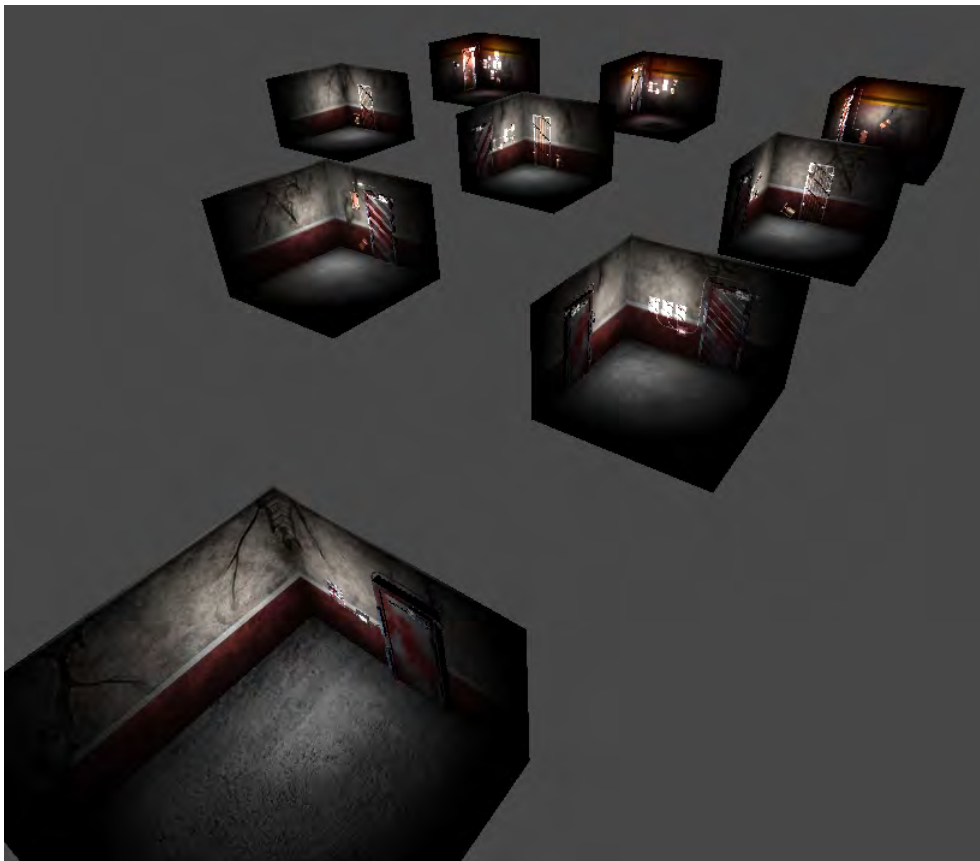


Figure 7.4: Screenshot of the final room layout as it appears on the server. The client only sees a very small portion of each room, that which would be visible through a “flashlight”.

8

Discussion

The results from the playtest and the methods used during development of both the enhanced Lykta version and the Rooms are discussed in this chapter.

8.1 Evaluation of Playtest Results

The most important results for the sake of the research question come in the form of the answers and observations garnered from the second testing phase.

Concerning the research question,

What possibilities exist for using the Lykta system for creating immersive gaming experiences?

the most relevant part of the results are the interviews, questionnaires and observations from the playtest at the Automat Indie Arcade. These will here be reviewed in relation to the immersion models presented in section 3.3, summarized as follows.

8.1.1 Evaluated Immersion Model

Several useful definition of immersion were found for the intents of this study, however it quickly also became clear that this is a somewhat nebulous term with many different definitions, much like the previously discussed word “play” (see the section on ludology and ludic activities 3.1). While it seems work is converging in this area, especially in the context of games as there seems to be an increasing desire to create these kind of experiences with new hardware such as the Oculus Rift and CastAR (see section 2.3 about AR and VR games), it may have been more rewarding to judge against a more well-defined term.

There are many different kinds of immersion, but in this work immersion is defined as players are to some extent experiencing any of the following.

1. Sense they have good direct control over the character or other avatar of the game (challenge-based immersion [31], engagement [30], movement factors [32]).
2. Feel that they are a part of the world presented in the game (imaginative and sensory immersion [31], total immersion [30]).
3. Dedicate their full attention to the task at hand and feel that their abilities match it (challenge-based immersion [31], engrossment [30], flow [23]).
4. Emphasize with the other characters in the world (imaginative immersion [31], total immersion [30]).

The idea of presence, which was discovered later but seems particularly well suited to the design of immersive games, would be a fitting subject for future work, see section 8.5.4.

8.1.2 Controls and Lykta Hardware

As noted by Brown & Cairns, it is important for players to feel they have good means to control the game, that the controls are good and that adequate feedback is provided [30]. Chalmers expresses a similar opinion, that immersion is related to be ability to enter the game through the controls, that tools should be “*ready to hand*” [45]. The movement-based immersion factors as suggested by Pasch et al. [32], are also relevant here as most of the controls in the experience are carried out using movements that in some way mimic real movements.

This topic was not covered as explicitly in the questionnaire or interviews. This error was due to shortage of time when creating this testing material. However some conclusions regarding this type of immersion can still be drawn from the interview answers, as there was a question where players could mention things that were annoying and took them out of the experience. Four of the groups were also asked explicitly about the physical tools/controls as a followup question. Nobody answered that they felt the tools were in the way, though many of them had problems with the movable objects (due to the current implementation, see section 8.1.4).

A lot of time was spent trying to minimize the delay between projector movement and update of the image, but the smoothing applied during the second development phase added to the delay. However, no groups said that they felt the flashlight action was too unresponsive.

Since the players do not see an onscreen avatar mimicking their movements, not all of Pasch et al.’s four immersion factors are valid as they do not get the extra feedback sense (see section 3.3.3). One gun player thought that holding a prop increased his sense of immersion, while another was reassured by holding what felt like a gun. This may relate somewhat to Pasch’s second factor, natural movement increasing the sense of being in control.

Two of the groups thought the dial rotation had really good feedback and felt real, and brought them into the game. Fig. 8.1 shows a playtester manipulating a dial using



Figure 8.1: A player using the multitool to manipulate a dial. The projecting gun controller is in the foreground. This is what is output to the projector. The vignetting effect (rounded corners) gives the illusion of a flashlight.

the tool controller. Pasch et al. note that while proper feedback is required to not disorient gamers, the movement does not need to mimic the real movement perfectly to still have an immersive effect [32]. That players still felt immersed though both the rotation axis and rotation position are completely free unlike with a real dial, can probably then be attributed the multiple types of feedback provided (controller vibration, audio and visual feedback).

8.1.3 Audiovisual Aspects

The visuals are an important part of the experience, particularly for sensory immersion [31] and according to Browns & Cairns both engrossment (visuals) and total immersion (atmosphere) [30].

The Monster While there were few negative comments about the graphics in general, nearly all the groups that encountered it said they thought the monster looked too flat and once the initial surprise was over said they did not find it particularly scary. Group 2 described it as looking more like a leather jacket than anything dangerous. Three of the groups did note that they felt genuinely frightened the first time they laid eyes on it though. Two groups wished for a more abstract threat (both in visuals and game mechanics), such as a dangerous fog or something briefly being visible when the door to a new room opens.

Room Transitions Three of the groups explicitly said that the room transitions were somewhat jarring or hard to understand, and brought them out of the experience. This could be due to the audio queues meant to convey the fact that a door was opened and then closed behind the players was not clear enough. It could also be that such a virtual transition in a physical room is simply impossible to do without breaking immersion, at least if the players are not familiar with it beforehand.

General Graphics Two groups expressed that they wished the field of view from the projector was wider. Four of the groups wished they could turn around 180 and use all walls, with two of them noting it felt strange (and possibly immersion-breaking) that they could hear sound from that direction, i.e. a door slamming shut, but not see anything.

Group 10 thought the graphics were a bit too clear and that an image filter such as blurriness, perhaps increasing as the player characters go insane, would be appropriate for this kind of horror experience (see section 4.4). They thought the cone of light effect from the projector looked really good and realistic, a lot like a real flashlight.

During testing it became apparent that the dial object suffered from a bug which would sometimes suddenly reverse the graphical model the player was rotating, exposing its transparent backside. Three groups explicitly said they thought this took them out of the experience, so it can definitely be considered immersion-breaking. This issue should be easily addressable and improve the general immersiveness of the experience slightly.

The tool player in group 5 answered that they did not think much about the graphics and sound as they felt so into the game world. However they also noted that they never reacted reflexively or emotionally as “they knew it was just a game”. This is along the lines of the argument that the notion of total immersion in games is a fallacy, as players will always be aware of the context of the game, see section 3.3.4.

Physical Tools and Ingame Graphics Group 1 and 10 thought the light from the Move controllers was too strong and affected their immersion in the experience negatively. Group 10, with previous experience of PS Move, noted that the light from the PS Move wands could be turned down significantly, at least with the API they were using. Attempts were made to adjust this during development, but the light level would instantly reset. Due to time constraints another solution was never found.

During the design process it was thought that the game image being projected on the back of the tool player could be immersion-breaking and that the shadow cast by this player could interfere with the gameplay (see section 5.2). It was considered to move the puzzles further up to reduce the risk of the tool player standing in the way of the projection. Group 7 did indeed find it immersion breaking when the tool player would step in front of the projector and have the game image projected upon their back. However three groups mentioned that the relative positioning between the players that was needed to avoid this actually increased their sense of immersion as it made them more aware of both being together in the game world. This seems to relate somewhat to the sensory immersion or Pasch et al.’s factors proprioceptive feedback and physical

challenge, but more in a larger spatial sense as players need to be aware of their positions relative to each other and relative to the game world. Though tentative, perhaps these results point to a new type of immersion, specific for spatially simulated environments.

Though the players that thought about their relative positioning seemed to enjoy this somewhat unique aspect of the game, other aspects of the design appear to have worked against this feeling, see section 8.1.4.

While not asked about directly, no playtesters remarked about dizziness or confusion in relation to the display technology. With head-mounted displays, nausea has long been an issue and plagues even newer technology such as the Oculus Rift¹ Lykta currently does not have the same responsiveness as the Oculus Rift for tracking movements, but relies on showing this information in a more natural way, projected upon real surfaces. Lykta can instead be seen as building upon Gaver's notion of ambiguity as a resource for design, specifically ambiguity of information (see section 3.4.2). The line between the real world and virtual world is blurred by the light cone from the projector while the real world is covered in darkness, leaving much to be interpreted by the user and possibly creating a more intriguing, mysterious, and delightful experience [43].

Audio As for the audio, many groups thought it added even more to the experience than the graphics, especially group 3 who thought the graphics were “just ok” but that the audio really made it feel they were surrounded by the game. Audio also allowed the players to be reminded that the virtual game world was present in the room even though it was not currently highlighted by the projector, by playing positional audio queues and loops. Two groups remarked that the gun shot sound and other loud noises surprised them and scared them. However about a third of the group said they did not really notice that there even was surround sound.

8.1.4 Game Mechanics and Puzzles

According to the MDA model, the mechanics of the game gives rise to dynamics and in turn aesthetic experiences for the player, see section 3.1. One such aesthetic experience that may be very applicable is fellowship, as the game was The results relating to the mechanics of the game and their implementation relate to challenge-based immersion and the concept of flow, but therefore also to imaginative immersion, see section 3.3.

The author thought that there was a big risk that players would find the puzzles too repetitive as there had not been time to develop all the planned puzzles. Having multiple rooms filled with more or less the same content may seem implausible and affect the imaginative immersion, perhaps even leading to boredom (and certainly not flow!). However this was not echoed in the answers to the interview, with most of the groups saying the puzzles were somewhat easy but still interesting and novel to try to solve.

¹OculusVR - VR Sickness, the Rift and how game developers can help
<http://www.oculusvr.com/blog/vr-sickness-the-rift-and-how-game-developers-can-help/>

Difficulty Only group 5 reported that they thought the puzzles were too difficult, while a majority of the groups thought the puzzles were somewhat easy. However many remarked that it was still fun and interesting to try out the different game mechanics. Group 8 said that they thought the monster was brought in at a good time, just when they were starting to master the existing puzzles and get bored of them. For longer experiences it would probably be necessary to increase the variety of the puzzles. A suitable difficulty level is necessary for both flow and challenge-based immersion[23, 31]. It seems very unlikely that a “perfect” difficulty can be found without prior playtesting, especially one suitable for all groups. The difficulty did not seem to be completely off however as a majority of the groups made it to the last room and were there defeated by the monster quite close to solving the puzzle. In this room it was essential to have bullets left, or the monster could not be defeated. If players did not solve the puzzles fast enough, their health would slowly wear down and they would be defeated. This occurred over a longer amount of time as the monster could only take away a fifth of their total health per attack, which made the actual mechanics of the monster more obvious, see section 8.1.4. A suitable difficulty level is necessary for both flow and challenge-based immersion [23, 31]. It seems very unlikely that a “perfect” difficulty can be found without prior playtesting, especially one suitable for all groups. The difficulty did not seem to be completely off however as a majority of the groups made it to the last room and were there defeated by the monster quite close to solving the puzzle.

Monster The monster attacks may also not have been transitory enough, which Benford et al. note is an important factor for the Climax stage of uncomfortable experiences [19]. Care was taken to create a long Rising Action phase where players would move through many rooms before encountering the monster. However once they were in the same room as the monster the mechanics were clunkier, with the monster hanging around for along time and feedback on attacks being unclear. This was due to shortage of time near the end of the second development phase when most of the monster was implemented. Though it may be difficult to properly convey the situation to the player due to the narrow field of view afforded by Lykta, it should still be possible to create an effective climax situation.

Additionally it was clear from remarks during playing and from the interviews that many players thought they were being attacked by multiple monsters, so the antagonistic horror design was not conveyed clearly enough (see section 6.4.2).

Branching Paths An attempt to create meaningful choice was done by creating branching paths (see section 6.4.2), but as Fullerton points out that to make this meaningful players should be aware of the consequences of such choices[22]. An idea was to audio to steer players towards the doors that would ultimately take them to the safer path but force them to solve harder puzzles, but this was not completed in time. However, none of the groups mentioned that they were bothered by having little information to go by when choosing doors.

Movable Objects Many of the groups mentioned various problems controlling the movable objects in the power box and blowtorch puzzles, and six of the groups explicitly said they had problems with the blowtorch puzzle, saying it was either too tedious or that the blowtorch was difficult to manipulate. Groups 4 and 9 however thought that the difficulty to control added to the horror aesthetic. Indeed, some horror do employ suboptimal controls to make the player feel more vulnerable, see section 2.4. Though the number of door locks that the players had to burn through were lowered about halfway through the testing day, two groups still remarked on this after the adjustment.

It should be noted that only a minority of the groups ever encountered and tried to solve the power box puzzle, which shared game mechanics with the blowtorch puzzle. This was due to it only being present in a minority of the rooms and even then being hard to spot, with many players simply missing it. The blowtorch puzzle was necessary to solve at least once to pass through to the second half of the game however.

One reason for the frustration expressed is that the movable object implementation suffered from a bug which could not be fixed in time, which made it necessary to revert back to a simpler implementation. This caused more erratic and less stable behavior, which was particularly apparent with the blowtorch since it required more fine movement.

Play Surfaces As mentioned the ceiling was not included as a play surface as this would require customizing the room model to take the ceiling height into account. It was replaced with a pitch black surface. However, the floor was a possible play surface and indeed the monster was designed to creep up on the players over the floor. However, no players were observed to utilize the floor as play space in any way. The light was seldom aimed at the floor, and while looking for the monster the floor was not checked. More play spaces around the players could help with a sense of immersion as the players are more surrounded by the gaming experience.

A possible reason the players never looked around the floor for the monster was that the game never gave them a reason to look at the floor before the monster appeared. No puzzles were placed on the floor. Due to oversight this was not part of the original room design. Near the end of Dev II such puzzles were considered but the high placement of the PS Move camera needed to cover the play space made it difficult to track the tool accurately near the floor. This made it unsuitable to place puzzles there.

Another reason could be that in the unrehearsed intro speech it was mentioned that the players would be playing on two of the *walls*, instead of saying a more generalized phrase such as playing on the surfaces by the corner. This most likely affected player expectations.

Player Fellowship A design goal was to try to elicit more emotional reactions by having two players cooperating and helping/protecting each other. A design scenario was that the tool player would be trying to solve a puzzle, while the gun player gets spooked and starts shining the light around to defend their teammate against the monster, to the relief (or chagrin) of the tool player. It was hoped that the players would emphasize with each other's roles within the game scenario to create a deeper level of immersion.

Tools such as the MDA framework could have been used to design for this kind of aesthetic (see section 4.3). However due to the limited time available for game design and implementation during the second development phase this part of the experience was not crafted as well as it could have been.

Over half the groups reported that instead of being in the game world as two separate people and playing themselves, they felt they played one half of the in-game character. Some reported feeling that their relative positions did not have much effect on the game-play, two groups noted that they appreciated having to take into account their relative positioning to not block the light. One group suggested adding more puzzles where the players would need to cooperate to carry out an action simultaneously, such as lifting off a heavy beam that keeps a door shut.

The fact that players had a common health pool and that an attack on either made the light flash red may have contributed to players feeling as one entity rather than two separate players. Group 2 said it reminded them that they were in a game as it was a commonly used damage indicator [29], but also thought that there should be more feedback on the attack. Group 10 also said that there was so little feedback that they were actually being hurt that they did not feel any time pressure to try to finish the puzzles. They said they never even considered that it would be possible to “die” (e.g. lose) in the game. The above issue with the floor not being used actively also made players miss who was being attacked by the monster, as very few players actually shone the light around on the floor.

A simple change that may have added to the effect of being two separate players would be splitting the combined health into two separate health pools for each player. When the monster attacks a player, their controller could vibrate and their PS Move controller light could fade with lower health. While relatively simple to implement, there was not enough time to try this out. Until actual playtesting it was not realized that players would even consider themselves as anything but two separate entities.

Group 6 did however say they had a good cooperative experience and felt their roles were clearly separated. They said that cooperating and trying to survive made the game feel more like a horror movie, where a group of people try to survive but are not always up to the job and make mistakes.

With more development time, tools such as game design aesthetics and game design patterns could have been used to build a better sense of cooperating. There is previous work for using the design aesthetics and the MDA to design for camaraderie [59], a form of fellowship, but this was not found until the game design was already implemented and evaluated.

8.1.5 Emotional Reactions and Overall Player Experience

The gun player in group 3 explicitly said he was holding back his reactions to the experience in order to not scare his girlfriend, who was the tool player. Group 7 however said it would have been more scary to play alone, a sentiment mirrored by group 8 (though in that group the tool player said they are too fearful to play horror games alone. The players did not know each other previously). In group 6 the tool player was

observed as being scared for real and somewhat panicked, and also admitted this openly afterwards. The gun player stated he was reassured by holding a gun. Meanwhile the tool player in group 5 said that they were ordinarily pretty scared of horror games but that this was not as scary as they had expected.

Group 8 seemed to have enjoyed the experience the most, with the gun player saying he loved it and could have played for another two hours. He said it was the most immersive (though the word he used was “present”) game experience he had ever experienced. According to the questionnaire, he is an experienced gamer and is somewhat prone to being immersed in games, with an appreciation of the gaming world being the most important factor for immersion.

Group 10 had themselves had been involved in developing a game played in the dark with move controllers, *Beacons of Hope* (Die Gute Fabrik, 2012²). This game is more reminiscent of an informal children’s game, but aided with digital game controllers, where players try to sneak up on each other in total darkness. The Move controller lights only occasionally turn on and the different colors signify different player roles in the game. They said the isolation in the blackbox together with the fences actually made them feel safer and less scared as they knew no person could sneak up on them and scare them.

It is difficult to draw any conclusions from the time estimates given by the players. Average playtime was about 12 minutes, with shortest 8:30 minutes (group 2) and the longest 16:15 minutes (group 6). All but three of the groups said they had played for a shorter time than they actually did. Three of the groups (group 1, 3 and 6) as well as the tool player from group 9 gave estimates that were more than 5 minutes less than the actual time.

When asked to set the cost, most groups set a price somewhere between an arcade game (10-20 SEK) and an amusement park ride (60 SEK), with the exception of group 3 and 8 who placed up upwards of 100-200 SEK. Group 4 made a comparison to laser dome games, another kind of experience played in the dark using all the senses. They were willing to pay around 80% of that price. To pay twice as much, players suggested projection on all walls, a tool and gun for each player, improved monster mechanics, the ability to move back and fourth between rooms, longer playtime, a fan blowing a cold wind, fewer bugs, and stronger trajectory into the experience.

8.1.6 Trajectory into Experience

As mentioned in section 6.4.5, there were plans to create an elaborate trajectory into, and perhaps out of the experience by utilizing a creepier testing setting, acting and testing facilitators in costume.

The properties of gas masks when designing for uncomfortable experiences is brought up by Benford et al. as it is used to to increase uncomfortableness for participants in the experience *Breathless* [19]. They also note that as donning the mask takes time it may heighten the sense of anticipation for the experience. Similar suggestions were voiced by one the groups in the interview after the playtest. This group, 10, who had

²<http://gutefabrik.com/blog/?p=1100>

a lot of previous experience with pen and papers RPGs, had several other suggestions for a trajectory into the experience such as blindfolding players before leading them into the play space, and using actors to create a narrative around the experience. Group 4 however enjoyed the fact that the story started “in medias res”, as they could then themselves weave a narrative around the experience. These playtesters were from a theatrical background, which could have influence over their preferences.

Group 6 suggested an experience could have two entrances so that players were teamed up randomly with unknown players, for more tension.

8.2 Hardware Result Discussion

The improvements to the Lykta system are detailed in section 7.1. However, due to time constraints many of these new features are integrated with the current software, The Rooms. Replacing the specific game elements with empty scenes should not be a big undertaking however, which would leave a blank canvas for other experiences to be created while still having the improved codebase in the background. During the testing at *Vetenskapsfestivalen*, drag and drop of movable, projected objects was tested using only the projecting controller. This kind of interaction turned out to work well and be easy to use. Apart from the gaming application which was the focus of this investigation, Lykta may therefore also possibly be suitable for other tasks such as visualization and data manipulation.

8.3 Process Discussion

Though initially planned to make extensive use of design tools and methodologies from game design and interaction design, the time-consuming implementation issues meant that actual design work took a backseat. Much of this work was instead done drawing from the author’s previous experience with game and interaction design, and the other methodologies were not consulted as explicitly as previously planned.

8.3.1 Structure

Overall, the approach taken was somewhat more of a bottom-up rather than top-down approach. Though the overall game design was sketched out during the prestudy (see section 6.1.2), focus of the first development phase was on what interactions work in the experimental system and testing these,. It wasn’t until there was a good idea that these interactions worked that the overall game design was set and implemented. This worked out well and indeed Fullerton recommends prototyping and testing the core gameplay first [22], but another design iteration with the full game experience would have been preferable to create a better experience. However, already from the beginning this was seen as outside the scope of the project, and is instead a candidate for future work.

8.3.2 Planning

The planning was optimistic in that it did not allow for enough time for other activities, some of which were unknown but others which could have been foreseen. While some of these activities, such as demonstration of Lykta at SIdER 2013 and at Vetenskapsfestivalen led to hard goals and a temporary increase in development pace, they were also stressful and increased fatigue in the project. This contributed to lower activity later on in the project as summer neared and other activities started demanding attention. An external deadline for the testing disappeared as Automat was cancelled (before being rebooked after the summer), leading to lower prioritization of the project before summer and the decision to take a break until August. However, Automat proved to be a truly excellent opportunity to test Lykta once it took place on the 6th of October.

Talent for creating the aesthetic elements of the experience was brought in early but work ramped up slowly, partly due to the physical distances between team members. Aleks needed to move on to other activities and Simon took over 3D modeling in May. During the summer he and Anders delivered many core assets which made the project more inspiring to work on implementing, and activity increased in the end of the summer as a suitable testing opportunity presented itself with the Automat Indie Arcade the 6th of October 2013.

8.3.3 Playtesting

Given the limited amount of time to get ready for the test, as there were many implementation details and experience development issues that still remained right before the testing, it can be considered successful. The data gathered from the test was very relevant to gauge the level of immersion the players had experienced during the test, and much constructive feedback was provided. This will certainly be useful when creating future experiences to be run on the Lykta platform. However there are aspects of the testing that could have been better prepared.

The instructions that were given to the testers were not rehearsed beforehand. Schell notes that a few misplaced words can affect or spoil the entire test[52] and more consideration should have been taken to this. However as he also notes, it is common to trim and modify the instructions given to players when running several tests in sequence.

The fact that all the testers were interested in games, some even being game designers themselves, was not seen as a major issue as the focus of the research was not highly dependent on the user group. In fact, many game designers, such as Jackson & Schuessler and Fullerton, advocate the use of informed users (e.g. other game designers) in testing as they can provide feedback on a more detailed level, see section 4.2. Additionally, given the novel nature of the Lykta system, even experienced gamers were unlikely to have prior experience with anything similar to The Rooms. It was hoped though that the Rooms would be accessible even outside core gamers as the movements required to play mimic real movements, and do not use e.g. a game controller as a proxy to control an onscreen avatar.

The questionnaire was not very useful when analyzing the results, and would perhaps

be more suitable in a more quantitative analysis where more comparisons can be made.

8.3.4 Implementation Issues

The original project time plan was greatly delayed due to implementation issues and projects by the side, pushing the final testing phase to after summer. It is obvious that the work needed for implementation was underestimated. At first look, the game design did not seem much more complex than that of a typical 48 hour game jam game³, which the author had a lot of experience in. However a number of factors made implementation of The Rooms more difficult than anticipated.

3D Gameplay This was not a source of much delay, but inexperience with the way Unity handles coordinate systems of objects in a hierarchy led to a number of bugs that took some time to work out. The author's previous experience was mostly with 2D games, which are simpler in this respect.

Size of the Project This was the first time the author worked alone on a larger game project, and would sometimes not remember exactly how a system implemented months before worked. Better documentation would have helped, but overall keeping a tighter focus during implementation and trying to not spread it over a longer period would have helped this particular aspect.

Inexperience with AI The monster and other events in the game that were not absolutely reactive to player input required their own behavior systems. An example of this would be the monster, that would periodically search for the nearest player, but also the sound system and the puzzles. After an initial implementation attempt that became too unwieldy (see section 6.2.3, it was realized that a finite state machine (FSM) would need to be used to make these systems work reliably, and the one provided by Unity Gems worked very well, see section 6.4.6. Once this was introduced, the remaining implementation went much smoother.

Networking The greatest source of implementation issues was the reliance on networking. Player movement and input was all handled directly on the server, which received it directly from the Move.Me system. The corresponding player objects in the game world were moved, and the puzzles were affected. Any changes to these objects was then sent as either position and rotation or state information over the network. Due to how Unity promotes using the same build for both server and network, all objects in the game had to contain both server and client code. With more foresight a better separation could have been used, but many of the networked objects would come to contain numerous checks throughout to determine if server or client code is to execute. This in itself caused a lot of issues that had to be debugged.

³Global Game Jam - Basic Questions <http://archive.globalgamejam.org/wiki/basic-questions>

A breakthrough came when automatic syncing of states over network was added to the state machine implementation from UnityGems. This formed the basis of the game state switching, monster behavior, and sound system. Not only did it provide more reliable networking sync of objects, it also allowed for better separation of client and server code as well as a very streamlined framework for implementing game logic.

That networking was required in the first place was due to the requirement of having a wireless projection unit. While this requirement could be somewhat motivated by allowing for less restricted movement and possible greater immersion due to greater diegetic consistency (see section 3.2.3), it was mostly a remnant from the previous project which had kicked off development of the platform. In this concept, multiple handsets were to be used in a larger gallery setting, making wireless handsets with their own rendering hardware (i.e. a smartphone) necessary.

A much simpler solution would to only have had the server software and send an image to the projector through wired, or perhaps even wireless HDMI, but it was not considered until implementation of the experience on the server-client wireless system was already fully underway.

8.3.5 Risk Analysis Follow-Up

There were many implementation issues, but very few of them actually related to the performance of the Playstation Move tracking system from Sony. Looking back at the risk analysis (section 5.2), most of the risks concerned potential shortcomings of the tracking system. Indeed, previous iterations of Lykta had fallen short due to issues with the Wiimote tracking system and a brief attempt to use an open-source PS Move tracking solution 2.2. Network latency was an issue, but this was mostly from the Unity server to the Unity client in the smartphone and not an issue with the Move.me system itself. The limited coverage of the camera, made worse by the hard limit of 3.5 m in tracking distance, affected both the game design and tracking system. However once this had been taken into consideration it was never a problem during the playtesting, though the camera setup used during playtesting did not have coverage all the way down to the floor.

Another risk that did not have a serious impact was delay in update of the projected image when the projector was moved. This could potentially ruin the illusion of projected objects being “stuck” to the wall, but as noted in section 8.1.2, most players did not mind the slight delay.

8.4 Generalizability

The development process was focused on developing a new platform, and through this a new design space is opened. Through its affordances for manipulating aspects of a virtual environment, which were demonstrated in the game application, Lykta may not only be suitable for other game experiences but also productivity tasks in which digital content is to be manipulated. Examples may be photo manipulation, 3D modeling, and

desktop applications, some of which have been demonstrated on other systems utilizing the flashlight metaphor [10, 11]. An example of such an applications using Lykta is the “dress up” demo shown at Vetenskapsfestivalen, see section 6.3.3.

As for the process, this did not deviate far from the standard practices of interaction design and game design (see the planning chapter, 5), and should be usable for other types of projects.

8.5 Future Work

The findings themselves show that users of the Lykta system may indeed experience immersive gameplay and emotional reactions when using the platform. Though a horror game was used here, future work could explore using projected augmented reality for other experiences as well as productivity tasks, see generalizability above.

8.5.1 Possible Modifications and Uses of Lykta

With a more modifiable PS Move-based tracking system or new technology for indoor positioning the currently limited area of tracking could be extended. If a whole room could be covered and modeled, Lykta could be used for more than just exhibitions and small games. Immersive exploration experiences in large spaces would also be possible, such as exploring a jungle with the flashlight metaphor.

One additional possibility would be to mount the projector and *PS Move* wand closer to the eye of the user for a CAVE-like system [3], thereby tracking the movements of the head. CAVE systems create the illusion of depth further than the walls by simulating parallax. However this breaks down from other viewpoints and is therefore not very suitable for open environments with many visitors. During this thesis work it became clear that such a system was under development. CastAR uses glasses-mounted 3D projectors for both parallax effects and 3D, and is set to reach the market in 2014. See section the section on other AR and VR games, 2.3, for more details on this system.

Though perhaps not practical for home gaming as a dedicated space is more or less required for use, Lykta may have commercial potential for installations in e.g. video arcades or amusement parks. Perhaps it could also be used for artistic effect in e.g. theatrical performances. If the tracking area can be enlarged significantly, the possibility is opened of using Lykta for visual and audio guides in galleries and museums.

8.5.2 Building upon The Rooms

If continuing with the same game design as in *The Rooms*, the monster mechanic and shared health pool of the players should be the primary aspects of the game design to address. The monster attacks should provide individual feedback, and the monster itself should be redesigned or made more indistinct, e.g. by using filtered effects and more erratic animation (visual tricks used to great effect in the *Silent Hill* series of games). Image filters or vibration could also be used to signify that the monster is near, to make players more aware of it.

A greater variety of puzzles could also be implemented, placed on the floor and sometimes utilizing positioning of the two players (to emphasize space) and some that cannot be solved while “shined upon” (to emphasize that the projected objects are still “there” when not projected on). However, the codebase should be improved before adding these features. The author recommends first separating the base Lykta code from the experience implementation, and refactoring the Ting and Puzzle base classes to use the UnityGems finite state machine with the network modifications.

8.5.3 Comparative Study

As noted in the planning chapter (chapter 5) there was not enough time and resources to create a separate version to carry out a comparative study. If planning such a study, inspiration for such a study could be taken from Mueller et al.’s study of a competitive, physical telepresenced breakout game, *Breakout for Two* [18]. Two versions of the game were made, one where players used a physical ball thrown against a wall with projected video feed from the other player, and one where all inputs were made over a keyboard with the ball throwing visualizations overlaid on the video feed. The results were compared to experienced camaraderie between the players. By creating versions of The Rooms played cooperatively over network on regular computers a similar type of study could be carried out.

8.5.4 Presence as a Design Tool

Thomas Grip of Amnesia developer Irrational Games presents another view of immersion in games in his Game Developer’s Conference (GDC) 2012 talk *Self, Presence & Storytelling*⁴. He argues that the strongest source of immersion through narrative in a game is affecting the players’ sense of self and transferring it to that of the character they control in the game. He calls this *presence*. This is not a new concept, but has previously mainly been used in the context of virtual reality [30]. Key guidelines in achieving presence are, according to Grip, transparent controls, the ability for the player to foresee the outcome of actions in the short and longer term, avoiding repetition and crafting a consistent world. Some of these factors correspond to what Fullerton argues makes a game “fun”, e.g. meaningful choice (see 3.2.1).

This seems to focus mostly on what Ermi and Mäyrä refer to as imaginative immersion, while other suggestions may be counter productive for, say, challenge-based immersion and flow (see section 3.3). *Tetris* (Alexey Pajitnov, 1984) may create a strong challenge-based immersion, may induce a state of flow and is addicting [60], but relies heavily on repetition, with no variations except in speed over the course of a game.

⁴Game Developer’s Conference - Self Presence & Storytelling (video)
<http://www.gdcvault.com/play/1016433/The-Self-Presence-and>

9

Conclusion

The prototype projected augmented reality system Lykta was used to investigate the immersive gaming capabilities of projected AR. To accomplish this a horror game was designed and implemented, drawing design methods from the fields of game design and interaction design. A approach with two design iterations was used. The first one focused on implementation and testing of what basic interactions were suitable as core mechanics in the game. In the second iteration the main game design was finalized building on this core gameplay, which was then implemented and tested in a playtest. In this interviews and questionnaires were used to gauge the amount and type of immersion in the experience provided by the game.

During the design phases game design principles and inspiration from other horror games were applied for the more traditional gameplay elements, while interaction design perspectives such as seamful design [45, 46], ambiguous design [43] and uncomfortable interactions [19] were used as inspiration. The design was also influenced by several different views of immersion [30, 31, 32] as well as the concept of flow [23]. The notion of trajectories in and out of experiences [44] was considered in the design and would have included an atmospheric testing setting, acting and props, but were not used as much as originally planned due to time and resource constraints.

To investigate the immersive possibilities of the Lykta projected augmented reality system a lot of implementation had to be carried out to make the system more suitable to support the game. This detracted from the game design. As such, the conclusions are colored by both the process and the prototype hardware.

The results of the thesis work is twofold.

- A refined Lykta system supporting two players, surround sound, and which is capable of providing a repeatable, rich game experience.
- The Rooms, a horror game played on Lykta, featuring 10-15 minutes of gameplay, multiple paths and with a moderate difficulty level.

9.1 Answering the Research Question

The research question,

What possibilities exist for using the Lykta projected augmented reality system for creating immersive gaming experiences?

was the main focus of the thesis work, and the aim of the development and playtesting was to answer this.

The immersion factors summarized in section 8.1.1, drawn from the immersion models presented in the theory chapter, were the main focus of the playtest and the evaluation of the results. That the project resulted in an arguably weaker game design than was initially hoped for most likely affected the immersion-related results. To give a few examples, the difficulty to control the moving puzzles such as the blowtorch appears to have affected player's sense of control (immersion factor #1). The low puzzle variation and poor monster attack feedback appears to have affected their attention to the task at hand (immersion factor #3). There were no other characters to emphasize with in the game world (immersion factor #4), but it was hoped players would feel threatened by the monster and try to protect each other in the game context. However poor monster attack feedback and unclear separation of players in the gameplay mechanics seems to have affected this immersion factor negatively.

Additionally hardware issues appear to have affected immersion. Interview answers indicate that the low field of view and limited play space may have affected players' sense of being in the game world, immersion factor #3 in section 8.1.1.

With these criticisms of Lykta and The Rooms in mind, the results of the playtest still indicate that individual players experienced various immersion factors. Exactly to what extent is difficult to judge without a more comparative and quantitative study, but interview answers indicate that all immersion factors apart from #4 (empathy for other characters) were perceived by various players. Several playtesters said outright that they appreciated the experience, with at least three of the playtesters saying they some time during the experience felt genuinely scared. Other feedback suggests that a new type of immersion, *spatial immersion* may complement Ermi and Mäyrä's SCI-model of immersion for projected augmented reality systems. This could be a suitable subject for future study of projected augmented reality systems.

Overall, most critique of the experience was aimed at the software and game design, such as the monster mechanics, health system, and bugs in the puzzles. Fewer concerns were raised against the hardware implementation. Knowing that the issues with the game design and its implementation were due to time constraints and that these can be addressed in future versions, and taking into account that players did experience different kinds of immersion regardless, the functionality of the current Lykta system can be deemed sufficient to create acceptable immersive projected augmented reality gaming experiences.

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A

Questionnaires

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Philip och spelar med Jacob R

Jacob kan nå mig på mailen willon-philly@hotmail.com

Jag är 24 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☒ Ja ☐ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet					X
Jag spelar ofta tillsammans med andra i samma rum			X		
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna				X	
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story		X			
					VGW --->

1.1

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt			X		
Snygg grafik är viktigt för att jag ska leva mig in i ett spel	X				
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel			X		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

1.2

1.2

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Jacob och spelar med Phille

Jacob kan nå mig på mailen jacob.rippe@gmail.com

Jag är 23 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet		X			
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel			X		
Varför spelar du?					
Jag spelar för att vinna				X	
Jag spelar för att uppleva bra gameplay					X
Jag spelar för att uppleva en annan värld och/eller en bra story			X		
					VGV --->

1.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel			✗		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt		✗			
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		✗			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				✗	
Bra story är viktigt för att jag ska leva mig in i ett spel			✗		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				✗	
Jag kommenterar och tipsar mycket när jag spelar med andra				✗	

2.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Dimmy W. och spelar med _____

Jacob kan nå mig på mailen _____

Jag är 32 år gammal och male (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel				1 X 5	
Jag spelar ofta tillsammans med andra över nätet		X			
Jag spelar ofta tillsammans med andra i samma rum			X		
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna				X	
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story		X			
					VGV --->

2.7

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel			X		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt		X			
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X 2/4			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel	X				
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden		X			
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

2.2

Jag med andra
Jimmy

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Jimmy och spelar med _____

Jacob kan nå mig på mailen jimmy.helansson@gmail.com

Jag är 30 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet			X		
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel			X		
Varför spelar du?		X			
Jag spelar för att vinna		X			
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGW --->

2.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer				X	
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel			X		
Bra story är viktigt för att jag ska leva mig in i ett spel			X		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra			X		

3.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Logbr och spelar med Mad-ellen

Jacob kan nå mig på mailen kristian.linde@gmail.com

Jag är 30 år gammal och MAN (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

<u>MILLA</u>	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet				X	
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna		X			
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story				X	
					VGW --->

3.6

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel					X
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt			X		
Snygg grafik är viktigt för att jag ska leva mig in i ett spel			X		
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel				X	
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Mad-Ellen och spelar med Log3r

Jacob kan nå mig på mailen madelene.laisiney@gmail.com

Jag är 30 år gammal och kvinnor (kön)

Jag är själv dataspelsutvecklare

☐ Ja

☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel		X			
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay	X				
Jag spelar för att uppleva en annan värld och/eller en bra story			X		
					VGv ---->

3.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel					X
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel					X
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel				X	
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden					X
Jag kommenterar och tipsar mycket när jag spelar med andra	X				

4.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Max och spelar med Robert

Jacob kan nå mig på mailen Max@fabel.se

Jag är 34 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel		X			
Jag spelar ofta tillsammans med andra över nätet		X			
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna			X		
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story					✓
					VGV ---->

4.1

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel			X		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt		X			
Snygg grafik är viktigt för att jag ska leva mig in i ett spel	X				
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel			X		
Bra story är viktigt för att jag ska leva mig in i ett spel				X	
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden					X
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

4.2

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Robert och spelar med Max

Jacob kan nå mig på mailen robotych@gmail.com

Jag är 42 år gammal och Man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel		X			
Jag spelar ofta tillsammans med andra över nätet			X		
Jag spelar ofta tillsammans med andra i samma rum	X				
Jag spelar ofta och gärna skräckspel		X			
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay			X		
Jag spelar för att uppleva en annan värld och/eller en bra story				X	
					VGV ---->

4.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel			X		
Bra story är viktigt för att jag ska leva mig in i ett spel			X		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra		X			

5.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för carromyran och spelar med skrellen

Jacob kan nå mig på mailen caroline.carlfors@gmail.com

Jag är 25 år gammal och haj (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel			X		
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum	X				
Jag spelar ofta och gärna skräckspel		X			
Varför spelar du?					
Jag spelar för att vinna				X	
Jag spelar för att uppleva bra gameplay			X		
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGV --->

5.6

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				X	
Bra story är viktigt för att jag ska leva mig in i ett spel					X
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden					X
Jag kommenterar och tipsar mycket när jag spelar med andra			X		

Compare
answers
in interview

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Skrellen och spelar med Carromyran

Jacob kan nå mig på mailen gurgelin@gmail.com

Jag är 25 år gammal och ♀ (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

Timmy?

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel		X	X		
Jag spelar ofta tillsammans med andra över nätet		X			
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel		X			
Varför spelar du?					
Jag spelar för att vinna			X		
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGV --->

5.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel					X
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel				X	
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				X	
Bra story är viktigt för att jag ska leva mig in i ett spel					X
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden					X
Jag kommenterar och tipsar mycket när jag spelar med andra		X			

6.6

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Barrie och spelar med 54if

Jacob kan nå mig på mailen barrie@gmail.com

Jag är 30 år gammal och M (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel	X				
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum	X				
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story				X	
					VGV --->

6.6

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer			✓		
Jag har lätt att leva mig in i filmer, böcker och/eller spel			X		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel	X				
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				✓	
Bra story är viktigt för att jag ska leva mig in i ett spel			✓		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				✓	
Jag kommenterar och tipsar mycket när jag spelar med andra			✓		

6.2

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Stifo och spelar med Barry

Jacob kan nå mig på mailen stefan.eric.holm@gmail.com

Jag är 21 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet				X	
Jag spelar ofta tillsammans med andra i samma rum			X		
Jag spelar ofta och gärna skräckspel				X	
Varför spelar du?					
Jag spelar för att vinna					X
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGW ---->

6.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel					X
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				X	
Bra story är viktigt för att jag ska leva mig in i ett spel					X
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden					X
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

7.2

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Leila och spelar med Mathias

Jacob kan nå mig på mailen leila.swartling@gmail.com

Jag är 20 år gammal och ♀ (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel	X				
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum	X				
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay			X		
Jag spelar för att uppleva en annan värld och/eller en bra story			X		
					VGV ---->

7.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel		XXXX	X		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt			X		
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					
Bra story är viktigt för att jag ska leva mig in i ett spel	-	X			
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra	XXXX				

8.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Tim Gremalm och spelar med Love

Jacob kan nå mig på mailen tim@gremalm.se

Jag är 27 år gammal och Man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet			X		
Jag spelar ofta tillsammans med andra i samma rum	X				
Jag spelar ofta och gärna skräckspel		X			
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay					X
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGv --->

8.1

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt			X		
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel			X		
Bra story är viktigt för att jag ska leva mig in i ett spel		X			
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra			X		

Provspelning av The Rooms

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Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Love och spelar med Tim

Jacob kan nå mig på mailen lovehulten@gmail.com

Jag är 29 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor			X		
Jag spelar ofta dataspel			X		
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum		X			
Jag spelar ofta och gärna skräckspel					X
Varför spelar du?					
Jag spelar för att vinna		X			
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGv --->

8.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt					X
Snygg grafik är viktigt för att jag ska leva mig in i ett spel			X		
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel					X
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

9.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för DEV och spelar med THOM

Jacob kan nå mig på mailen DEV.K.FRIDEN@GMAIL.COM

Jag är 29 år gammal och MAN (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet	X				
Jag spelar ofta tillsammans med andra i samma rum			X		
Jag spelar ofta och gärna skräckspel			X		
Varför spelar du?					
Jag spelar för att vinna	X				
Jag spelar för att uppleva bra gameplay					X
Jag spelar för att uppleva en annan värld och/eller en bra story					X
					VGV --->

9.1

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt					X
Snygg grafik är viktigt för att jag ska leva mig in i ett spel			X		
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel			X		
Bra story är viktigt för att jag ska leva mig in i ett spel			X		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden			X		
Jag kommenterar och tipsar mycket när jag spelar med andra			X		

9.2

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Thom Kiraly och spelar med Dev

Jacob kan nå mig på mailen thom.kiraly@gmail.com

Jag är 26 år gammal och man (kön)

Jag är själv dataspelsutvecklare ☐ Ja ☒ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet		X			
Jag spelar ofta tillsammans med andra i samma rum				X	
Jag spelar ofta och gärna skräckspel		X			
Varför spelar du?					
Jag spelar för att vinna			X		
Jag spelar för att uppleva bra gameplay					X
Jag spelar för att uppleva en annan värld och/eller en bra story		X			
					VGW --->

92

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel					X
Bra story är viktigt för att jag ska leva mig in i ett spel		X			
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden			X		
Jag kommenterar och tipsar mycket när jag spelar med andra			X		

10.1

Provspelning av The Rooms

Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för Pyjameds och spelar med Joan

Jacob kan nå mig på mailen pyjameds@gmail.com

Jag är 28 år gammal och Mans (kön)

Jag är själv dataspelsutvecklare ☒ Ja ☐ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel					X
Jag spelar ofta tillsammans med andra över nätet			X		
Jag spelar ofta tillsammans med andra i samma rum					X
Jag spelar ofta och gärna skräckspel	X				
Varför spelar du?					
Jag spelar för att vinna					X
Jag spelar för att uppleva bra gameplay					X
Jag spelar för att uppleva en annan värld och/eller en bra story		X			
					VGV ---->

10.1

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel			X		
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel	X				
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				X	
Bra story är viktigt för att jag ska leva mig in i ett spel		X			
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden		X			
Jag kommenterar och tipsar mycket när jag spelar med andra					X

Provspelning av The Rooms



Hej!

Det här är ett spel jag utvecklat som en del av mitt examensarbete. Det spelas med en medspelare på en ny typ av projektorbaserad plattform, Lykta, och för att kunna utvärdera plattformen och spelet bättre skulle jag vilja veta mer om dina spel- och filmtittarvanor. Efteråt kommer jag ställa lite frågor om eran spelupplevelse.

Jacob

Lite om dig själv

Jag kallar mig själv för JOON och spelar med MADS

Jacob kan nå mig på mailen JOON@JOON.BE

Jag är 27 år gammal och M (kön)

Jag är själv dataspelsutvecklare ☒ Ja ☐ Nej

	Håller inte alls med 1	2	3	4	Håller helt med 5
Spelvanor					
Jag spelar ofta dataspel				X	
Jag spelar ofta tillsammans med andra över nätet	X			M	
Jag spelar ofta tillsammans med andra i samma rum				X	
Jag spelar ofta och gärna skräckspel			X		
Varför spelar du?					
Jag spelar för att vinna		X			
Jag spelar för att uppleva bra gameplay				X	
Jag spelar för att uppleva en annan värld och/eller en bra story				X	
					VGv --->

10.2

	Håller inte alls med 1	2	3	4	Håller helt med 5
Reaktioner på spel och filmer					
Jag har lätt att leva mig in i filmer, böcker och/eller spel				X	
Filmer, böcker och/eller spel påverkar mig ofta starkt känslomässigt				X	
Snygg grafik är viktigt för att jag ska leva mig in i ett spel		X			
Bra gameplay och kontroll är viktigt för att jag ska leva mig in i ett spel				X	X
Bra story är viktigt för att jag ska leva mig in i ett spel			X		
För att jag ska leva mig in i ett spel är det viktigt att jag gillar spelvärlden				X	
Jag kommenterar och tipsar mycket när jag spelar med andra				X	

B

Interviews

Spelade inte så
mycket

Frågor, spelare Philip (Lampa) och Jakob (Verktyg)

Spontana kommentarer

Frökt, arbadhall?

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Kinda
vissa
atmosphere

Melancholic Room - (vans actioner bryter i 17 min)
av plöts.

Verktyg:

klack. Lite konstigt av var man var

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

Verktyg:

8:35

3 min?

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

Inte så mycket skräck, lyssnade ögon sedan
dörr.

Verktyg:

Tidspress? Inte gömma sig, annorlunda.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Inte speciellt

Verktyg:

gud

När han sköt. Mycket ambience, nåt på en
mark.

1.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa: Shot mer än annars

Verktyg: Drog mer i speln.

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa: Vår jag sköt.

Ljud

Verktyg: Vår hen sköt

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa: Om man ser allt som händer, ingen idé att begränsa det.

Inke runt hela.

Verktyg: Begränsad vy. Tänkte inte direkt på surroundljud

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa: Bugg med rolande Kraschen

Bugg
rolande
Blowboch
kontroller
light

Verktyg: Lyser en del, kontroller. Blowboch över kontroller

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa: Inke intuitivt med skärmanlet.

Rotating
Bettlar
instruktioner
labb

Verktyg: Lågupplöst, såg ut som högtalare

Verktyg: Japp.

Hur var svårighetsgraden?

Lampa:

Vi var så bra, men kan tänka oss att det var
svårt, fastän på snurrskivan.

Verktyg:

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

Hade förgävt ensamt.

Verktyg:

Kunde men ville för lyst ~~lampa~~ inte ströcka ut
hunden

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Han stod vägen ibland! Sanna

Verktyg:

No
expanding!

Slog mig inte att det kunde påverka individuella

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

20

Mycket betalt. 10-30

Verktyg:

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

More
walks!

Fler vägar, plant belysning, vill vända sig om 180
Mer utmanande, gå fram och tillbaka.

Verktyg:

Monsbet.

3.

1.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Vill se slutet

Verktyg:

Tyr 5 skumme

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Gör det inte

Verktyg:

Väger inte.

Drag mig inte för att prova, visste inte vad det var.

4.

Frågor, spelare Jimmy (Lampa) och Jimmy Hölander (Verktyg)
Spontana kommentarer

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Hide top of controller Fullen, or power, one weird thing. See top of controller

Verktyg:

30 In the room. A bit simpler. 3 dimensions! Something

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

5. No more than 10

8:30

Verktyg:

5-10

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

Many games. Little feedback on attack.
No feedback.

Verktyg:

Not frightened by the creature. Plotting rather
jumpy. What was it doing? Just focused on how
after a while.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Scary Red clearly attack

Verktyg:

Not People surrounding, not feeling distress when others around

People
around

1.

2.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Nepe. Moved light quickly at me ~~Hope~~ - n

Verktyg:

Nepe.

Dad D, not me

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

Verktyg:

Speldesign

Not common light

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

X Felt more like real than actual light

Verktyg:

X Creature was very tiny

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud?)

RUMSBYTEN?)

Lampa:

Not 360 even though sound

Display, Dark behind though sound

Verktyg:

Got stuck Creature. Lag

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Verktyg:

2.

2.

Hur var svårighetsgraden?

Lampa:

Puzzles not so tough

More
mechanics
than
game

Verktyg:

Trying out the mechanics.

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

"Turn left and right"

Gameplay

Verktyg:

After done. Felt like we were co-op, "follow the water"

No

"↓"

"Rumble"

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Couldn't tell who was attacked

Left hand
right hand
in
empathy?

Verktyg:

I thought we were playing some chess, felt hard right hand

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

Described -

Verktyg:

20

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

More distinct roles

↑?

Verktyg:

Show flash using as flashlight with
sensors

3.

2.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Next game we have, we have been

Verktyg:

Sure. Much.

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Not really

Verktyg:

Not often, a real whizz, Ten curious, we
boy. Can play Resident evil.

4.

3.



Frågor, spelare Lager (Lampa) och And-Elle (Verktyg)
Spontana kommentarer

Jättebra, jättespännande, lite läskigt, villade pöskel

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:
Absolut helt fantastisk

Verktyg:

Absolut!

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:
5 minuter

10:40

Verktyg:

Intressant

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?) helt olika!

Lampa:
Bra spelat Amnesia. Bättre inlevelsemässigt. Inte hoppskräck. Men när det blir blyg
Missade vad monster var, saurade karbi
Men när det blir blyg

Verktyg:

Reverber. Ahh i spelet i helt annat st.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:
Inte jät

Verktyg:

Ja, när jag såg monster, 'skräck det!'
Inte så, när det var det.

1.

3.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Helt igen, ville inte släppa upp

Verktyg:

Försatte interagera med varandra, mer verklig värld i läsa än jag hade fått vara kunde

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

När monstret kom ryckte till i hela magen trots att jag sett det tidigare

Verktyg:

Good
knut
förfärlig
beut
Smy
monster

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

Ja till surround. Ja Men upphörde att det var beaktat ljudmest från bogen.

Verktyg:

Ja till surround. Ja. Dörren bakom.

Helt ok
gryt.

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Buggade ur skurplan. Monster släpper sig ner från väggen. Ornament mer feeling utan kameran

Verktyg:

Tacksamt. spelar ingen roll.

Ink
våg
Mer pipp
ok

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Nä. Det kändes som att jag höll ficklampa

Verktyg:

Nä. Det kändes viktigt bra, bra responsivt.

Fluorlytt

Good
tool
feeling

2.

3.

Hur var svårighetsgraden?

Lampa:

Jag
lyste

Legem.

Verktyg:

Legem, lykte jag. Inu nya grejer hela tiden sådant, om det kändes bra bara till repetitiv, lyktes inte

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam? ^{bländade upp}

Lampa:

Var roligare. Men hade velat ha fler uppgifter

Verktyg:

Var roligare.

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

More
fun in
co-op.
Though
not usually
up

still just
one
ingame.

Nej, ihop

Verktyg:

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

100 kr

Verktyg:

100 kr om nytt, någon berättar om det,
60-80 kr Men inte senare.

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

Ta med hem! Betala mer.

27:00

Two Actions

Verktyg:

Vred Att se mer hade varit bra Men inte mer än!
och längre,
se mer.

Kinda want see
more

3.

3.

Skulle ni spela det här igen? Varför/varför inte?
Lampa:

----- Ja, vill bli del,
Verktyg:

Belöben

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

28:00, Om man bara förstår att man kan g...
----- vill igenom, inte fått se mycket negativt.

Verktyg:

För upplevelsen, man får kroppslig reaktion, vissa gillar
att bli skrädda, det här är logisk tidning!

4.

4.

Frågor, spelare Max (Lampa) och Robert (Verktyg)

Spontana kommentarer

Interaktion
behåller.

Tecken väldigt tydligt, tydligt med samarbete, musiken

Inlevelse märkt, begriplig av varandra, står i rörelse förvarade

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Vi hade beaktat och velat uppgå på den här platsen
Där och det är i media res.

Verktyg:

Immersio
Atmosfär

Kännt var ett löslös, vändet blev mer en
perspektiv för lampa.

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

8 min

10:35

Verktyg:

10-12

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

Inga skräckspelskonst

Verktyg:

08:00
Mer som
slut, helt
Hoppsch

Barn rollspel call of cthulhu.
Resident evil. Silent Hill, Perfect Zero.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Ja. Roligt Dörrarna.

Imagination

Verktyg:

- Claustrofobisk, instängd. Frustrerande när den kontinuerliga
känns som skott i?
på beaktat sett. "nej."

Sound

Ljuden gottvibrerande. Därr, vad ska händer nu. Blavlock. l.

4

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Rollspel. Började mer rollspela, blev sen mer produkt.

Verktyg:

Hitta mer produkt i illusionen. Annars blev rollspela bra

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

När någon öppnar

Hurtigt: Första gången när vi blev skadade.

Verktyg:

Droppe objekt. Första - li - När jag tappade blodbrödet.

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

14:00 Stereo? Sedan scenen mer physikalisk. Föregående på förbete slut på skott.

Relisten ↑
Verktyg: Ljudet i kombination... Kommer igen ljudet från Resident Evil ex.
Nu sett jag i pannan. Konstliga ljudet + men om spel?

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud?)

RUMSBYTEN?)

Lampa:

Intensitet: Bekräftelsen förbättrade stämningen.

Verktyg:

Hörbara → OK with budskapet
Mordet, skada? Skylt. Skräckkännet hjälpte när det var svårare att höra.

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

of monster? Ett eller flera monster?

Verktyg:

Transition: Oskert om man tittar med skott

rum
kända Eller ett öppet område stämningen, otydligt om i nytt rum
Dörren glider upp.

2

4.

Hur var svårighetsgraden?

Lampa:

labbstarkt

----- Lätt.

Verktyg:

Kuligt att det blev vanka marginaler på labbstarkt

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

Att man var brödelad och kluriga.

Verktyg:

Bygger utspillet och strömen

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Prövade inte så mycket hur vi vände oss i vinnare.

Verktyg:

VI studerade, inte enskilda spelare. Östern på "You are dead"

Asikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

80% av priset av Lasterdane

Verktyg:

20

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

En karta med AE-lyla. Tabell 76. Hitta verk

Verktyg:

Monstersituationen. Där blev det spelmechanik ist. För realupplevelse.

*** Små slömsgräper.

3.

Skulle ni spela det här igen? Varför/varför inte?
Lampa:

Verktyg:

Absolut.

(Bonusfråga) Varför spelar man skräckspel?
Lampa:

Verktyg:

4.

4.

5.4

Frågor, spelare Cammyron (Lampa) och Shelke (Verktyg)

Spontana kommentarer

Multikoncept, spännande upplevelse, Mysthem.

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Först höll sig

50

Verktyg:

konstnärskonst. Mycket mer än bara på skärmen

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

10 min

9:40

Verktyg:

10 min

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

Tänker på Sbert 4,71

Vissa skräckmoment i andra, bex. Last of us

Verktyg:

Annesia. Lite lite med utveckling. Inget mer.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Reaktioner: Achanbar när kugghjulet, djurhund. Hoppade till
do.

Verktyg:

Guinness: nej. Hoppade inte så mycket (Guinness var viltad.)

h.

5.

Relater

Tech
in the
way?

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Men kanske jag blir felaktig.

Words
hook.
Or
not?

Verktyg:

Ljud som ligger omdirikt, hade nog en på spel.

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

Alltså bli skakad.

Men inte hyperaktivitet.

Immersion
or not

Verktyg:

Visste att det var ett spel.

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkta ni på surroundljudet?)

Lampa:

Spelade med ljudet.

Tänkte mer på ljudet.

Immersion

Verktyg:

Lade i spel, tänkte inte så mycket.

Relater Och?

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Blev lite stressad spelaren.

Verktyg:

tekniken var den inte förbättra.

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Pussel
som inte
funktionerade.

Verktyg:

Hade det funktat hade det varit ok.

2

5.

Hur var svårighetsgraden?

Relativt

Lampa:

härdes svårare än vad det var. ?

Verktyg:

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Felt
like two
people

Lampa:

Jag gillar samarbete i spel. ~~Att~~ men gillar kooperativ.

Verktyg:

Religjort att ha någon med sig, men för lita upplevelser
när man har sölv. Du var bra med Achillean!

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Tvåk inte på det

Verktyg:

Asikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

40 kr.

30.

Verktyg:

Itoller med.

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

Mer achievement, lite mer styrkraft.

Verktyg:

Mer upplägg som det var, mer eskalering

3.

5.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Ja! smakupprov.

Verktyg:

Vad händer.

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Får en stark känsla, stämning, inte så lättvindig

Verktyg:

Not Interest. Berörda. intressat.

as
scary? Trodde det skulle vara mer lättare. Lättare

Asks what
they expected?

u

4.

6.

Frågor, spelare Barne (Lampa) och Stuko (Verktyg)
Spontana kommentarer

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Dungeon, Doom, Claustrophobic.

Verktyg:

Park room. fence was bad 4 walls would be better.

Unknown monsters. No ammo

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

6 mins longer for home

16:15

Verktyg:

Scared! 10 mins - just right 10-15 aka fair ^{length} (Liebig).

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

A horror movie helplessness. (two players people trying to hide)

Verktyg:

kinda Amnesia, powerless. (got same feeling as Amnesia)

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

not much because of gun

Verktyg:

Definitely, coward

1.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

immersed, not very mechanical, tools help
"Use imagination to feel I was there. Felt ↑ natural"

Verktyg:

Scared for real

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

shooting instinctly. sometimes wrong aim at ghost.
Turned around for sound from back. Went 4 walls. It wasn't through the door, more dangerous

Verktyg:

Tried to hide when scared, turned around for sound

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

Sound immediacy felt like a flashlight
wasn't a

Verktyg:

Sound graphics effective. "I wish these walls were further back"

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Graphical glitches, unresponsive controls
Get more analytical. Expand to more tools and movement.

Verktyg:

glitches. torch was hard. Not so responsive, would blink.

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Blind torch, too many hinges. balance stress/terrorism
game length affects

Verktyg:

Blind torch

6.

Hur var svårighetsgraden?

More stressed

Lampa:

light was the main difficulty. 12:00 Trajectory. Could see more of a scene, tell us more: are less. Myster, but time limit.

Verktyg:

Bullet discussion

Quite easy. Not hard problems. "Not seeing, limited view".

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

good. simple enough to coop.

Had to work together

Verktyg:

good. multiple entrances so you never know who you play with. Saw.

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

The difference in tools made it feel important. What would happen if one died?

Verktyg:

Mixed →

with positioning, it could be better. Attacks from different directions. Tank.

Asikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

80 kr "Everything is more expensive at a fair"

Verktyg:

Oh...

50 kr

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

4 walls.

Verktyg:

longer less glitzier, 4 walls. not too long people outside

3.

6.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Yes

Verktyg:

Yes

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

~~Adrenaline~~ Explore. Another space

Verktyg:

Adrenaline, does anyone else.

~~Adrenaline~~

In the way.

Focus too much on the project,
adjust placement in room.

4

7.

Frågor, spelare Mathias ^(Lejla) (Lampa) och Leila (Verktyg)
Spontana kommentarer

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:
kallare, när bilden var bra kändes det bra ^(i spelvärlden)
Bräts var man var framför projektorn

Verktyg:
Bunker,

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:
15min Oklärsl

12:45

Verktyg:
5min BK nästan klara

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:
^{att lyfta upp}
Snart tekniskt men annars bra.
Atmosfären

Verktyg:
Inte spelat
ensam, mörkt hjälplös

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:
Första fienden var läbbis, övermålad

Verktyg:
förvirrande, lite farligt. "Det där är inte bra!"

1.

7.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Nyfiken

längesen RPG

Verktyg:

mer mekaniskt

längesen RPG

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

Första fienden, tre skott direkt *instinktivt.*

Verktyg:

Första fienden = när oväntade saker hände

07:00" blev antagen första gången"

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

Ljud, subtilt obehagligt

subt.

Verktyg:

Ljud, stämningen

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Tekniska fel, svårt att röra

Verktyg:

— 11 —, blåslampa

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Mer stressen än vinsten



Verktyg:

Stadiska monster, platta.

Kunde blivit mycket lugnare om de var mer bildade i något avseende

8.

Hur var svårighetsgraden? *lukt så svårt när man listade ut.*

Lampa: *löst sig själv ibland.*

Det måste finnas en tråd i urjen

Verktyg: *mersmak för pussel, vridgrejen*

Kul att lista ut.

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

Bättre, blockera projekten var knepigt

Reaktion →

Men testat att vara som, 03:35

Verktyg:

Mer väldigt aktivt, frustrerande men bra

Lika frustrerande att man inte kunde göra allt själv.

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Kändes som en person

Verktyg:

Ja - "

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

20kr

Verktyg:

20kr "hur lång tid spelade vi?"

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

Finslipa tekniken, bättre monster tydligare när man skjuter

18:00

Verktyg:

mer information, feedback på handlingar

50 press

7.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Ja

Verktyg:

Ja, spelaknart fast bättre

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Orärfade upplevelser, intervelse

Prövningen att man kan leva sig in i så mycket att man blir rädd

Verktyg:

för att bli rädd, i film kan man blunda
inte i spel, måste vägen
driva handlingen.

4

8.

Frågor, spelare Tim (Lampa) och Love (Verktyg)

Spontana kommentarer

Underbart spel, hur högtig som Cda. Lovendomschullea.
Grymhet baserade när man inte beg beg

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Lite som saw, väldigt närvarande, bra skräckstämning

konstigt väldigt durr, mest närvarande spelupplevelsen jag varit
stämningen var bra men inte så skrämmande maskin.

Verktyg:

Det mekaniskt, sten, borg, nere i jorden.

"Abodet"

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

20 min, lite för kort Hade kunnat bli några timmar.

14:00

Verktyg:

15 min, tråkigt när man dög, kunde varit tydligare att man dög.

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

07:30 Inte det bästa, men mycket inlevelse. tydligare ljud från monstret.

Verktyg:

Formatet var bra. Liknade Amnesia i rumsspelet, tema setting känslan. kunde varit mer ljud, mindre monster
När man gör sig. Lärde sig gå närmare.
Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)
Känsla att det var något som var på golv.

Lampa:

Inte direkt, mer äventyrsspel, pussel.

Lara Craft-utbud!

Verktyg:

Kändes som parkänslan tog bort alla faror.

Men inte spela skräckspel själv. Nånstund att spela ett själv.

Men man delar den. Grillen som en del.

1.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa: *Levde in mycket, tänkte på att fly, för mycket nej*

*Vardags
kontroll
bättre*

Verktyg: *Efter två rum blev det mer mekaniskt, enformigt. Fantastiskt mycket
teknik.*

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa: *Ficklampa var helt naturlig, monsterreaktion var bra.*

000

Verktyg: *Lite mer tänka pga den tekniska svårigheten. Frustration etc*

Speldesign: *ven bid, "set kulturen", stod långt från i bryggen*

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänk ni på surroundljudet?)

*Control
Reaktion
baserad*

Lampa: *"Att hitta i något brygga var
kändes bra som en lampa med perspektiv. Kändes ut som brygga
Mer det fysiska. Tänkte 2 var ena*

Verktyg: *Blatt maten grafiken bra mer dynamiskt på surround.
Wishul var 360° Norra, avseende*

Translucens

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud?)

RUMSBYTEN?)
Lampa: *Rumsbyten var knepiga.*

*Cellulosa
vs
Inmersion*

Verktyg: *Brytpunkten mellan golv & vägg var konstig
Eldosan hamnade konstigt i rummet.*

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Control

Lampa: *Ingenting. Inga direkta lagg "hell acceptabelt" bra
ficklampakonst*

Verktyg: *Plömsaker var svårt. Speciellt första gången*

Taggade o taggade borta.

Hur var svårighetsgraden?

Lampa: — 11 — spökena distraherade bra. Bra deklarerat
synlighet
prosedur vs spöken

Feedback

Verktyg: Man visste inte vad som hände ibland. pusslen var lätta.

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa: Hellre co-op. Helt naturligt, kände inte varannsen
Spela tillsammans under ett kändis tidigare.

✓

Verktyg: Samarbetet var bra

var jätteroligt.

Brydde ni er om hur den andra spelaren klarade sig?

Skulle
hålla
vibration!

Lampa: Kändes som att man blev attackerad
samtidigt.

Verktyg: Tänkte inte mycket på det.

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse? "Ange helvande"

Lampa: 200kr iom att det är nytt, 50kr senare
"lektaland!"

Verktyg:

100 kr

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa: Två lyktor, två verktyg. Co-op-problem som kräver prida.
lykta borta ut dörr

32-30

Verktyg: 360° projektion. Kändes mer som ett spel.

8.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Ja, det var skitbra!

Stor, intressant upplevelse.

Verktyg:

Afterschool
immersion

Ja, göra om göra rätt, klara spelet

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Tänjgränsen

Verktyg:

Första man är dumm. Utsätta sig för cybernalin.
Gäkrare än extrem sport.

Vitlockes spel
Är dig en tro
att det är större.

Dagligen villen van
den vattas
Mer samarbete
Laserlabyrinth
Leave each other

PS

Lycka!

Fler olika verktyg, större labyrint, fysiskt.

Spel med bra koncept som inte bara The Room.
Inläst, vardag.

Verktyg:

mer om samarbetet vore bra.

Andra teman.

9.

9.

Frågor, spelare Der (Lampa) och Thea (Verktyg)

Spontana kommentarer

Nat är de coolare man sett, mindre med rummet.

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

Verktyg:

Men inte lilla baks, brögl.

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

15 min

Verktyg:

5-10 min

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

Verktyg:

Närmast Annasie in SH. Ganska gott brögl,
lite stora stora av den dag för.

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Jaa, men mest för att jag vetade att var

Verktyg:

Mycket man inte brögl.

Man tecknade monstern. Vad hände när jag och i
spåren, var är jag på väg.

1.

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

Utländsk mer ord, inte direkt rollspel. Behöver inte säga så mycket!

Verktyg:

Bara försöka spela med de som var en bra spelare. Ja rollspel

Reagerade ni nångång helt kroppsligt, utan att tänka på det?

Lampa:

— 11 —

Verktyg:

Mycket till en ljudet när det varde smg.

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

Ljudet i 3D. Musiken gjorde mycket. Fint med de blodiga dörrarna.

Verktyg:

Trångt jobben med eltr enk? ?

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Gått i propellern.

Verktyg:

Alla problem med behållaren. Vatten monster. Dälig feedback.

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lag etc)

Lampa:

Blåslampen plippade

Verktyg:

— 11 —
Starkt spelat ut med brygghet

→ Roligt att se nybörjare bli mer brygghet 2

9.

Hur var svårighetsgraden?

Lampa:

Likheter ut myttset kort.

Verktyg:

Kann inte bli riktigt svårt.

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

Mycket snabbt, kan svepte snabbare

Ditt spel
playstyle

Verktyg:

Kunde inte velat spela ensam.

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Tänkte att vi var en och samma. Både lika utseende.

Verktyg:

Enkel
hela
Not 360?

Tre personer som skulle hjälpa åt. Måste lysa för att
Många med det?

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

15-20

Verktyg:

-1-

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

Att man visste att man fick en oredlighet helhetsmeny.

Verktyg:

Långt. Man kan se andra spela när man är borta

3.

9.

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

Caroline

Ja absolut

Expedition

Verktyg:

Vad är vägen? Låda upp med fruktbar jord.

(Bonusfråga) Varför spelar man skräckspel?

Lampa:

Skräck och veta att man lever

Verktyg:

Stort på ett kort

Relevanta

08:00

Detta är en stor utmaning. Går det

Thom: Plöja upp, mer tänkt! Blame yourself? Små som y
sag borta 1/2

10.

Frågor, spelare Mads (Lampa) och Jon (Verktyg)

Spontana kommentarer

Mads: Loved the technical

Jon: Suchs you can only have two balls

Inlevelse

Var kändes det som att ni var under spelets gång (jämför med Oculus. Hur var atmosfären?)

Lampa:

More than
projection

Turn
down
console
lights
Rift
Interactions

There was

Not just flat, 3D world. Shore from side,
I want, round large things

Verktyg:

There together conting to visit. Intense in
different way. Good fidelity in Mads.

Hur lång tid spelade ni? (Hur var uppbyggnaden, för lång, för kort? Hur långt kom ni?)

Lampa:

15

12:20

Verktyg:

0 15 20

Hur var det jämfört med andra skräckspel? (Nämn gärna nåt det var sämre och bättre än, och varför. Nämn tre bra (om tid finns). Vad associerar ni med skräck?)

Lampa:

I don't play horror games. A bit more like
Amnesia with longer build up.

Verktyg:

A tiny bit of Amnesia, but it was gone soon.

Creeping into the light?

Fick ni någonsin en känsla av fara? (Kändes det mest bara obehagligt? Inte obehagligt alls?)

Lampa:

Other
hands of
monsters

Verktyg:

Too much into the tech, not too much sense of

Isolated
in play space,
safe

Just. Alone and safe. Bears of hope would be I
work with the amount of light.

1.

10.

Director

Hur mycket spelade ni egentligen med för att maximera upplevelsen? Överdrev ni medvetet för att göra en bättre upplevelse för er själva eller er medspelare, eller blev ni helt medryckta? (Har någon av er spelat rollspel?)

Lampa:

No. Blindfold people outside. lead them int.

Verktyg:

Lots of DnD.

No. More intro, reason. The narrative was ~~strong~~ missing, other actor.

Lampa:

Fired a bunch of bullets at the wall. shake to reload.

Verktyg:

Good Flashlight many

Speldesign

Bidrog grafik eller ljud mest till upplevelsen? (Såg det ut som en ficklampa? Tänkte ni på surroundljudet?)

Lampa:

Super good flashlight effect, having to move.

Verktyg:

Var det något som förstörde stämningen och gjorde att ni föll ur upplevelsen? (grafik, ljud? RUMSBYTEN?)

Lampa:

Monstr just 2D, Alt.

Time, worse. Feedback

Verktyg:

Couldn't see it half of the time. Scary scream? Should we kill it. Didn't feel any fine pressure

Var det något som funkade dåligt eller var onödigt frustrerande? (pussel, feedback, controls, lagg etc)

Lampa:

Verktyg:

Have it be a leg, or smoke. Give feedback over time.

2.

10.

Hur var svårighetsgraden?

Lampa:

Belisk / 7:00

Verktyg:

Twist

Reasonable. Twisting good tip. Hold trigger and twist head.

Co-op

Hur funkade erat samarbete? Gjorde det upplevelsen bättre eller hade ni hellre spelat ensam?

Lampa:

Used to working together

Got mechanics

but no
anything?

Verktyg:

I was blocking the light, need to wave, so cool.

Brydde ni er om hur den andra spelaren klarade sig?

Lampa:

Two different people did. Esp. self shadowing

Not really.

Verktyg:

But we got into our teamwork.

Åsikt om spelet/upplevelsen

Hur mycket hade ni betalat för en sån här upplevelse?

Lampa:

Lowest price.

Verktyg:

Vad skulle behöva läggas till eller ändras för att betala dubbelt så mycket?

Lampa:

Trapdoor

Immerion level, Gas mask, blindfold.

Verktyg:

Hunted house with lights on,

missed Audio.

Belisk



Didnt consider dying on ophn.
Just wanted soluy. Didn't know
there was a monster. Blod mikr

3.9

Skulle ni spela det här igen? Varför/varför inte?

Lampa:

puzzles core mechanic. Horror not as important. Doesn't have to be there.

Verktyg:

Bad? Good? Relisten. But want to try the different role. Fin puzzles the hybrid stuff was super cool. Shitty to drop the console too. (Bonusfråga) Varför spelar man skräckspel?

Lampa:

I don't wanna be scared, And we were

Verktyg:

Relisten ☺

Not a bad prop. Not in the way. But have to use both hands,

Missing audio feedback for steps of rotating thing

Not really in the way of the game except when rotating

Blurry vision intensity. Especially with numbers.

Find the numbers for each look for answers

The projector guy gets to experience the horror a bit less.

No horror at all in a big room.