Combining Storytelling Tradition and Pervasive Gaming: Props
Abstract

**Background:** Stories told are becoming more immersive and a new type of storytelling has been emerging during the last two decades with the rise of digital media and Web 2.0. What is perceived as gaming and the span of gaming events are expanding with pervasive gaming and possibilities brought by technological convergence and ubiquitous computing. Maybe there is room for slight shift back to the old charm of a more intimate storytelling event where everyone is present in one form or another when the story is told.

**Context and Objective:** During this master’s thesis work pervasive gaming and storytelling were fused in a game called *Props*. It is a storytelling pervasive game that spans between two realities of 3D virtual and real environment. The game is located in a stage that has representation in two cities, the one in real life and the one in virtual reality.

**Method:** This thesis describes the design science research development and empirical evaluation of *Props* storytelling pervasive game. *Props* was evaluated by staging game play events on different occasions. Data gathered varied depending what game event was in question. *Props* was tested on four occasions in total. First two tests were during the early development. These test events were audio taped. *Props* was introduced during children’s story hour, where the event was observed and small questionnaire was dealt to the participating performers. The third game event was during six workshop sessions with adolescent school kids who were guided by amateur performers. During that event the participating adolescent were dealt qualitative questionnaires. These events were also videotaped. Related exploratory literature review has been concurrent during the yearlong development and has been revisited whenever new topics have arisen.

**Results and Conclusions:** It is possible to combine storytelling tradition and pervasive gaming. Setting of the game, numbers of participants and guidance have a big role in how adolescent throw themselves into storytelling and improvisational acting when it is mediated by a game like *Props*. 
Foreword

The author would like to acknowledge the contribution of the students who took part in creating the game Lasse Annola, Tomi Taipaleenmäki and Xiaori Hu, thank you. Also our client for the project course Daniele Zanni, thank you for co-writing the paper from this project, your wonderful photographs and taking part in further development of Props alongside with Jarkko Luukkonen who helped in adjusting Props to be used in the CAVE. Thaks to my thesis supervisor Burka Turhan, opponent Jouni Markkula and Toni Alatalo for your feedback, which helped in making this thesis heaps better.

Thanks to my family Leo & Marko and my sisters Eija & Piia for your support and for my parents for the small grant I got from their funds for aspiring not-so-young-anymore students to get the related paper published.

Paula Alavesa

2.11.2013 in Tuira City
## Glossary of Terms and Abbreviations

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D Internet</td>
<td>Internet content in usually realistic virtual 3D environment</td>
</tr>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>AR</td>
<td>Augmented Reality</td>
</tr>
<tr>
<td>ARG</td>
<td>Alternate Reality Game</td>
</tr>
<tr>
<td>CAVE</td>
<td>Cave Automatic Virtual Environment</td>
</tr>
<tr>
<td>Digital Storytelling</td>
<td>Storytelling by digital media</td>
</tr>
<tr>
<td>DIS</td>
<td>Digital Interactive Storytelling</td>
</tr>
<tr>
<td>ECA</td>
<td>Entity-Component-Action</td>
</tr>
<tr>
<td>Gamification</td>
<td>Bringing game features into real life context</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
</tr>
<tr>
<td>HCI</td>
<td>Human Computer Interaction</td>
</tr>
<tr>
<td>IS</td>
<td>Information Systems</td>
</tr>
<tr>
<td>LARP</td>
<td>Live Action Role Playing</td>
</tr>
<tr>
<td>MMORPG</td>
<td>Massively Multiplayer Online Role Playing Game</td>
</tr>
<tr>
<td>RL</td>
<td>Real Life</td>
</tr>
<tr>
<td>RPG</td>
<td>Role Playing Game</td>
</tr>
<tr>
<td>OSS</td>
<td>Open Source Software</td>
</tr>
<tr>
<td>Pervasive Gaming</td>
<td>Umbrella term for expanding the scope of gaming</td>
</tr>
<tr>
<td>QR code</td>
<td>Quick Response code</td>
</tr>
<tr>
<td>VR</td>
<td>Virtual Reality</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>wireless local area network</td>
</tr>
</tbody>
</table>
Contents

Abstract ................................................................................................................................. 2
Foreword ................................................................................................................................. 3
Glossary of Terms and Abbreviations ................................................................................. 4
Contents ................................................................................................................................. 5
1. Introduction ....................................................................................................................... 6
2. Research Questions and Methods .................................................................................... 8
3. Background ....................................................................................................................... 11
  3.1 Implications of Storytelling .......................................................................................... 11
  3.2 Pervasive Gaming ......................................................................................................... 11
  3.3 Digital Interactive Storytelling ..................................................................................... 12
  3.4 Role of Storytelling and Narrative in Pervasive, Mixed and Augmented Reality  Games and Environments ........................................................................................................... 13
  3.5 Possibilities of Improvised Narrative and Storytelling in Games and Research ................................................................................................................................. 14
  3.6 Real Life Based Collaborative 3D Environments as Settings for Games and Stories ................................................................................................................................. 15
  3.7 Future of Storytelling: Combining Pervasive Gaming and Timely Storytelling 16
4. Game Development, Design and Play .............................................................................. 18
  4.1 Development Tools .................................................................................................... 19
  4.2 Game Design and Play ............................................................................................... 19
  4.3 Early Test Sessions .................................................................................................... 21
5. Case 1: Props in Improvised Theatre and Storytelling .................................................. 23
  5.1 Modification of the Prototype to fit the Storytelling Event .......................................... 23
  5.2 Description of the Event and Game Setting ................................................................ 24
  5.3 Gathered Feedback and Results ................................................................................ 26
  5.4 The Stories and Observations ................................................................................... 28
6. Case 2: Adolescent School Kids and Game Mediated Improvisational Theater .......... 30
  6.1 Description of the Event and Data gathering ............................................................... 30
  6.2 Results: Questionnaire .............................................................................................. 31
  6.3 Results: Observations from the Video Footage .......................................................... 34
7. Discussion .......................................................................................................................... 38
  7.1 How Is This Still a Game and What Makes Props Unique? ........................................ 38
  7.2 What is the Use of Having People Tell Stories for Each Other – Props as a Serious Game? ................................................................................................................................. 39
  7.3 Role of Interaction in Props ....................................................................................... 40
  7.4 How Setting Affects Level of Engagement in Game Mediated Storytelling? ... 41
  7.5 Future Development Ideas ....................................................................................... 41
  7.6 Shortcomings and limitations .................................................................................... 43
8. Conclusions ......................................................................................................................... 44
9. References .......................................................................................................................... 46
Appendix A. Transcripts of the Early Test Events ................................................................. 53
Appendix B. VS-GAMES 2013 ............................................................................................ 56
Appendix C. Questionnaire for Science Day Event ............................................................. 62
1. Introduction

Storytelling is a way of conveying a message by speech, movement, images or sounds. The message can be fictional or factual or a mix of both. What makes the message a story is the way the speech, movement, images or sounds intertwine to create a connected story line. In this thesis the word storytelling usually refers to conveying a fictional story unless it is otherwise mentioned. Also the word game usually refers to a computer or a console game and is otherwise defined. Although storytelling has purely sociological and folkloristic i.e. humanistic implications, the following background and literature review has been collected and written with a perspective of human computer interaction (HCI), computer mediated communication, game development and gamification, giving the thesis a cross scientific flavor.

Visual repartee has become more popular with the possibilities brought on by Web 2.0. Digital storytelling is becoming more and more favored way for people to share their life events with instagrmas, collages, conceptual images and picture diaries. The aim is expression in social media where acquaintances may represent various language groups and nationalities. Consorting with the described phenomena, visual representations for stories and digital storytelling are becoming also ways of timely communication, where they formerly were forms of expression with limited audience and high delay. Change in how stories are told does not concern only medium and means but also the scope of the audience and the available storytellers. More and more people are telling their stories this way (Yu et al., 2010; Weilenmann et al., 2013). Shift from oral and printed media to digital media in storytelling also offer possibilities of greater immersion into the story world and to create stories collaboratively (Lugrin et al. 2010; Robinson et.al., 2012).

Pervasive gaming is not at all a new thing. It has been around for a while and many forms of gamification, media and social gathering actually fall within the definition. It is a subordinate term that withholds alternate reality, mixed reality, ubiquitous, location-aware and location based games just to name a few (Montola et al. 2011). Pervasive games are often influenced by traditional forms of social games, popular board games like Scotland Yard (Schuster et al., 2012) or classic arcade games like Pac Man (Cheok et al., 2004).

The idea of a story box, an item that has collection of images and objects to remind people of story content or just to give them visual focus on something when the story is told is old. Traditions like these are present in many cultures like kamishibai in Japan or kavat (Figure 1.) in India (Rukmini Bhaya, 2012; Orbaugh 2012).
In interactive performance and improvisational theater actors convey a story inspired by cues given by audience. It is an inherently playful and creative way of telling a story and there are already many games for this, very few that utilize the use of digital media and technology though (Johnstone 1999; Baumer & Magerko, 2009; Wirth et al. 2011; "Encyclopedia of Improv Games", n.d.).

The following thesis describes a game development and evaluations of a storytelling game, Props, that tries to span the scope of both pervasive gaming and storytelling event. Props mediated storytelling is improvisational and timely.
2. Research Questions and Methods

Starting point of the work described in this thesis was a student project, where the goal was to create game content for 3D representation of a city. Much of the preliminary research was done to define and create a construct, a game prototype, for that purpose. This thesis work became a research into the potential of small scale storytelling game to pervasive and serious games.

During the early development of the prototype game design science research approach was not intentional, this approach was though chosen later as it fit the game development phase as well as the later evaluation phase of the work. Phases of design science research: design, building an artefact and evaluation (Figure 2.) (Hevner 2007), are quite recognizable from the work. Writing this thesis is considered part of the latter “rigor cycle” of the design research cycle framework.

When creating the construct of pervasive game content to an existing 3D environment the background research done was mainly on the field of pervasive gaming and the development tools. Since uniqueness was an important requirement for the game and on everything else we had free hands, the relevance of the game was mainly evaluated with more research into extant literature later as part of this thesis work.

The development of the Props prototype was done in collaboration with three other students, the main contribution of the author of this thesis being: the game idea, much of the design elements, graphic design and project management. The game development and thesis work had two rotations on design and rigor cycles. The game was twice improved and adjusted for slightly different kind of use and then tested on the field. First game event was during children’s story-hour at the Oulu improvisational theatre festival and second was during a Science day event at the University of Oulu. The second event was conducted in collaboration with the Department of computer science and engineering and significant aid was received in adjusting the game scene onto the CAVE environment and fixing the client server issues of the original prototype of the game. Following graph clarifies how development of Props fits design science research a (Figure 3.). In the graph
the student project phase of the thesis work is separated from what was done independently.

Figure 3. Development and testing of Props embedded into the Hevner’s design science research cycle framework for IS. There is an approximate division in the image to display the student project part of this thesis and the mostly independent thesis work.

There were two open research questions during the development of the game.

- Can storytelling be made into a game that encourages people and even inspires them into telling fictional collaborative stories?
- Does a game developed for this purpose have further possibilities and potential uses for research and as a serious game not just recreational addition for a 3D environment?

Answers to these questions were sought out by testing the game Props in lab and on two occasions with audiences from different demographics, adults, children and adolescent. Before each event the game design was improved or enhanced and the game was somehow adjusted to fit that particular setting. Data was gathered with audio and video tapes and questionnaires to empirically evaluate how the game was received during those events.

Material gathered during the lab tests were observation, photos and audiotapes. The tapes were transcribed (Appendix A) for this thesis to demonstrate how fluent the storytelling can be in a small test setting between strangers. From the first game event, children’s story hour, the material gathered consisted of observation, notes and an eleven question qualitative questionnaire dealt via email to the attending performers. Based on the material gathered a short academic paper was written and published (Appendix B; Alavesa & Zanni, 2013).

Material gathered from the second game event was thirty question qualitative questionnaire dealt to all the 88 participating adolescent. Answers to the questionnaires were collected separately from two differing event locations and analysed with Mann Whitney U-test before combining the datasets. The questions where the answers were
different depending on location were kept separate. The second field test was also videotaped.

Literature on extant knowledge on development tools, virtual environments, serious games, storytelling, digital storytelling and pervasive games, just to name a few topics and search phrases, was conducted in an exploratory fashion on few occasions during this research to focus relevance of what was done and also to find new perspective as the research and development brought new insights. In the early literature review and background one of the perspectives was to embed Props game idea into what is known and has currently been done on storytelling projects and pervasive games. This is also to enlighten how Props differs of those projects.
3. Background

Storytelling is in fashion for research in sociology and as means to map the silent information and complicated networks that span through and within the strata of an organizational hierarchy (Polletta et al., 2011). Storytelling to aid creative processes is too in a rise, with storytelling being a buzz word in content marketing today (Pulizzi, 2012). Timely storytelling events, where the story in current and observed as it happens, have not been revived as a pastime although there has been attempts of a revival even an arduous will of combining technology and storytelling (Heywood, 2004). What can though be said about stories in modern days is, that they do not exist or belong solely on paper anymore (Lugrin et al., 2010; Szilas et al., 2012).

3.1 Implications of Storytelling

Storytelling is subconscious taken-for-granted everyday thing in communication and entertainment. Timely storytelling is an age old traditions that has an echo of familiarity to most (Georges, 1969; Manning & Rhymes, 2005). Storytelling is elemental in interactive drama, tourism guides and many games where there are altering plot-lines and endings like live action role playing games (LARP) (Jonsson et al., 2006; Zigkolis et al., 2011).

A story is rarely told so that there is not even an imaginary audience present, it is a form of informal communication, a binding element in many social groups and organizations. Factual stories or narrative are held in high regards in research in social sciences, but whether a story is fiction or factual it can have a meaningful content to it and especially to the narrator an improvised story is always personal (Polletta et al., 2011; Vinogradova et al., 2011). It can be considered that all stories are both fiction and factual in the sense that we have multiple stories representing multiple truths of the multiple representations of ourselves. It is more important to understand what is the truth behind the story and the fears and hopes it represents if fictional stories are to be used as material for research (Davis & Warren-Findlow, 2011; Watson 2011). When a narrative is recognized as fiction to begin with, it can be also excluded from the deductions made of the interaction, especially when the story is constructed in collaboration (Couldry, 2008; Speedy, 2011) or only the elements of the story that get a reaction may be picked from the story as one would when provoking people to tell a story during a therapy session or using the shelter of fiction to aid people to reveal their thoughts (Brosnan et al., 2006). Collaborative storytelling is established as a powerful tool for bringing people closer (Robinson et.al., 2012).

3.2 Pervasive Gaming

Imagine a situation where you may have installed a game application on your smart phone just a week ago and even forgotten it. You are strolling in a park and a silent chirp in your pocket beckons your affirmation for attending a game event just there and then. Informed by the global positioning system (GPS) signal or triangulation of wireless local area network (Wi-Fi) hotspots, your cell phone app knows that have arrived to a game location. You scan the area and notice a sticker on a tree trunk, a Quick Response Code (QR code) tag, which leads you to the website holding the first clue to a treasure hunt or an epic game event that is planned to last a year or so. This is an imaginary situation of how one
might start a game that is pervasive. In this example the game swoops you in unexpected or previously planned and is entangled with your daily toils. From this example it is easy to see that pervasive gaming is an emergent phenomenon of technological convergence and gamification.

There have been and are attempts to set boundaries to the pervasive gaming paradigm (Nieuwdorp 2007). Some features like the expansion of social, spatial and temporal aspects of a game situation, are such that they have become established as common denominators for a pervasive game. These expansions can also be considered when assessing or defining the level of pervasiveness of a game (Montola et al., 2011; Gielkens & Wetzel, 2011).

Though new media technology and technology in general are often included into pervasive gaming they are not necessary. In addition most pervasive games are set in urban environments because there one can find inclusion of modern technological infrastructure, social abundance and availability. This still does not mean that a pervasive game needs to be urban. What might be at first difficult to understand is just how blurry the boundaries of the definition of the term are and how many forms of play can be included into it. The expansion of the definition of gaming itself is in fact an intrinsic part of the phenomenon. It can be said that in pervasive gaming the keyword is expansion, not just the expansion of gaming but also all the social, spatial and temporal elements the gaming event is comprised of (Montola et al., 2011).

3.3 Digital Interactive Storytelling

Combining stories and imagery in digital form is these days widely used by students, teachers and enthusiasts of all age groups. It is a powerful way of expression in a world where much of communication is done through Web. Digital storytelling also has a possibility to convey a message across language and cultural barriers. Although associations by imagery varies in different cultures and visual messages cannot fully replace verbal ones, it is safe to say some things in visual are universal and visual chatter has less slang, dialect or unfamiliar vocabulary that raises no conception at all. In this sense digital storytelling can have binding and democratizing effect on small scale but also globally (Jamieson, 2007; Couldry, 2008).

Despite some augmented reality experiences being only about superimposing virtual reality (VR) content to real life (RL) environment, there are also broader applications like GENTORO, where handheld projectors and robots are used by children themselves when stories are told. Digital interactive storytelling (DIS) is a combination of the possibilities of gaming, digital media and interactive drama or to put it more simply a combination of gaming and storytelling. Many point and click adventure game classics like Escape from the Monkey Island and Grim Fandango are a good examples what DIS can be when it is polished and packaged (Lucas Arts, 1998; Lucas Arts, 2000). In text based games branching storylines have been around for as long as the games themselves, but in visual PC games and point & click games fairly late with Blade Runner released 1997 as an example (Westwood Studios, 1997). In many of the old games of the same genre the plot of the games are set and the advancement of the story's sequential events is just determined how fast you solve puzzles and click, click away. Digital storytelling and augmented reality projects usually do have storytelling as an elemental building block. The target audience of these usually are children and often-times the stories are set in one way or the other. In other words the tales embedded are timely or improvisational but
rarely both (Cassell 2001; Toshitaka et al., 2008; Sugimoto et al., 2009; Gîrbacia et al. 2013).

3.4 Role of Storytelling and Narrative in Pervasive, Mixed and Augmented Reality Games and Environments

One could view all games as narrative in broader sense. If the plotline is separated from the other game content one can see that all games have a story, but not all games are about conveying a story. The role of stories and narrative in game development stems usually from the need to create a plot for a game (Adams, 2010). Improvisation can be important at the stage when the stories are created by the game developers. Augmented reality and mixed reality content is becoming more and more relevant due to the advances made in portable display devices, like smart phones, tablet PC:s, head mounted displays and portable projectors that make it possible to view VR content superimpose reality. Simple example of augmented reality content would be virtual restoration of a damaged heritage object and having people view the restored virtual object side by side on the location with the damaged artefact (Gîrbacia et al., 2013).

Alternate reality games (ARGs) differ from interactive storytelling only so that ARGs are more grounded to reality. They are also on most cases considered pervasive games. In interactive storytelling and ARGs there is the difficulty of creating interesting branching plot lines with coherence to the settings and the possible endings of the story. There is need for different ways of coming up with stories and controlling the multifaceted structure of an interactive drama (Dörger & Geisler, 2008; Szilas et al., 2012) in some cases so that the story is related to its surroundings in a way that makes sense i.e. the plotline is location based despite of being branching (Gustafsson et al., 2006). Here again for the game player the story and the outcome are set albeit differing. Although interactive drama and stories are concurrent, the game player is often at the receiving end when the story is told. The stories are there but the players’ choices determine the path the story takes (Adams, 2010).

Location based storytelling pervasive games or augmented reality experiences have an important role for narrative. These displays are often linked to cultural heritage targets like in the case of creating VR contents for the site of Pompeii or short narratives as contents for virtual museums (Papagiannakis et al., 2005; Zignolis et al., 2011; ). In Egyptian Oracle project a historical setting is taken away from the museum and spiced up with elements of improvisation, audience participation and even having a puppeteer remotely direct the movements of the 3D representation of the priest conducting the ceremony. In this example a 3D creation of a site for a ceremony is created and projected on a screen during a re-enactment of an ancient ceremony. Actors prewrite a script for the play and much of the improvisational content of the play is determined by the interaction between the participating audience members and the performer (Jacobson & Gillam, n.d.).

Fictional stories can also be used to augment a city map (Kjeldskov & Paay 2007). A game can be used as a means to encourage and record factual stories like in the pervasive game Rider Spoke where cyclists roam around the city to find their own spots where they can record their stories and link it to that location for others to hear (Rowland et al., 2009). Or Urban Tapestries that is not a game in and of itself, but a project where people’s stories are bound to locations in a city to create a tapestry of local history (Thelwal 2006). A map
can become so saturated with stories that it can be considered a collective memory of the region where the stories are fixed. As an example of a story collecting project becoming this big one could mention Mediamatic’s storytelling Web site, which collects stories related to the city of Amsterdam (Vriesede & Nack, 2011). Routine travel can be augmented with fictional story like in creating interactive story elements to coincide with a road-trip in a location based Backseat Playground game, where children solve a detective mystery from the back-seat of a car while on their way to their daily toils (Gustafsson et al., 2006).

3.5 Possibilities of Improvised Narrative and Storytelling in Games and Research

Studying improvisational theatre settings and improvised narrative can give an insight into creativity, also computational creativity. Though improvisational theatre games are a rarity as such, when artificial intelligence (AI) driven interactive narrative are studied these are somewhat commonplace. They may have varying degrees of interaction with audience and actors but part of the improvisation relies on an AI agent who represents an important player in the game. For instance Party Quirks is a game created, not to be played by people in recreational setting, but to study computational creativity by having part of the story told by an AI agent (Baumer & Magerko, 2009; O’Neill et al., 2011: Magerko et al., 2011).

Behavior of a player is always somewhat improvised depending on the degree of freedom and unpredictability determined by the game-world. The role of audience and the gamers in creating the story varies in many games where the setting is immersive for instance in a pervasive LARP or augmented reality experiences. Especially in LARPs the encounters between players are very improvised yet important to the way the events of the game unfold. Dialogue between players is heavily improvised and often the outcome of encounters too so that the plot of the game is quite unpredictable. To put it in another way the game-play is immersive and the story emergent. In augmented reality experiences like Egyptian Oracle there is a prewritten script and a predetermined setting for the play, but the interaction between the participants brings in an element of improvisation to the show (Jacobson & Gillam, 2012).

For children improvisation is naturally present in play. They often imagine settings and characters with just a little material to aid their imagination. They are natural target audience for fairy tales, natural storytellers and imaginative stories are often an important outlet and form of expression for them (Toshitaka et al., 2008; Sugimoto et al., 2009; Zehetner, 2013). Many serious games have been made with this notion in mind. Serious games are games that have other than recreational purpose. They may be simulations of real life events or storytelling support systems that are created to aid in children’s therapy or games that have been developed with research purpose in mind. Taikamatka (transl. Magical Journey) is a storytelling game to aid children to tell their life story in a playful way. It has been piloted and is in development with the child welfare needs in mind ("Taikamatka", n.d.). Similar games are in use or in development. They all use digital imagery to aid children in telling their stories or help them share experiences they might otherwise have trouble telling in “narrative aid therapy” (Brosnan et al. 2006; Baceviciute et al., 2012). Some serious games involve simulating angst causing real life events, like job interviews, to help people face their fears also sometimes it is more acceptable to expose people to simulation of the cause of their fear than it would be to expose them to
the real thing. Simulations in VR or augmented reality elements can be better controlled, shut down at the moment they get too intense (Rothbaum et al., 2012; Corbett-Davies et al., 2012). Creating a safe environment that encages the target, audience or a patient, may again be the very thing that works with children (Baceviciute et al., 2012).

3.6 Real Life Based Collaborative 3D Environments as Settings for Games and Stories

3D environments that also have a RL equivalents can be an ideal settings for alternate reality games, interactive drama or just a plain storytelling event. In the case of VR-contents for historical sites or museums it is easy to see the value of having a scene displayed in a reality corresponding place. In a virtual museum that can be accessed at the site of a real live museum, the digital content is made location specific and it has information value that is inherently specific to the history of that location, which expands the temporal context of that location i.e. brings past to the present day. Google art project for instance brings RL museums to your browser. One can stroll through a museum, without having to peak over the shoulders of other visitors and if necessary look closer at the pieces of art, closer than would be possible in a real museum. Bringing the displays to be viewed like this gives one a different experience that just flipping through images by clicking arrows on a menu (Papagiannakis et al., 2005; Zigkolis et al., 2011; Google Cultural Institute, n.d.).

In some recreational first person action games like Grand Theft Auto (GTA) series and post-apocalyptic Fall Out the game world is influenced on RL locations that in turn helps to make the game experience more encaging (Rock Star Games, 1997; Interplay Entertainment, 1997). In addition scooping the influence from a RL location that is globally familiar, for instance the city of Los Angeles or New York, like has been done in GTA, gives the game designers an abundance of material from where to start the design of the game world. Massively multiplayer online role-playing games (MMORPG) are set in imaginary 3D environments, but they have oftentimes a large user base and from their requirements emergent infrastructure that spans beyond the game realm. 3D game realms and realistic 3D environments created for 3D Internet can have joint agendas (Kaplan & Haenlein, 2010).

3D Oulu (Figure 4.) is a partial realistic virtual representation of a city located in northern Finland. It has been created and maintained by Oulu University department of computer engineering’s Media Team and their partners. It is a springboard for creating augmented reality and game content that spans two realities. The city itself is possibly not in global awareness and the city model is developed with realistic approach. It is a small town that is though big enough to have variable urban niches which makes it is a good source of influence ("NIMO - Nordic Interaction and Mobility Research Platform", n.d.).
3D Internet has been envisioned for a while now and realistic 3D environments like Oulu 3D are appropriate for this. What sets 3D Internet apart from traditional Internet is not the easy of finding the information one is looking for, since much of the content in 3D representation of a restaurant located in a virtual city would be just portraying that restaurant’s web page on the virtual display window. What sets 3D Internet apart is the possibility to engage the audiences in a different way. Not just by bringing closer real and virtual environments, but by creating game contents and surprises into the environment to engage the users. Content creation and how to portray the factual content in 3D Internet are key concerns in further developing it and also in moving it to the direction of a virtual social media where people would have a real presence in the game world much like they have in many MMORPGs (Kaplan & Haenlein, 2010; Walczak, 2012; ”NIMO - Nordic Interaction and Mobility Research Platform”, n.d.).

3.7 Future of Storytelling: Combining Pervasive Gaming and Timely Storytelling

Since pervasive gaming is seemingly all encompassing it is not at all impossible to think of fusion of age old traditions like storytelling into pervasive gaming scene. In fact both phenomena could benefit from the fusion. Storytelling has deep social significance where social aspect is an important element in most pervasive games. In addition attempts to modernize storytelling events have been unsuccessful (Georges 1969; Polletta et al., 2011; Heywood 2004) and pervasive gaming usually has inclusion of either modern urban environments or technology or both.

Stories and improvised situations and story-content are an important elements in many pervasive games. One way of making a storytelling game pervasive would be to examine the game in the light of the three expansions mentioned by Montola: social, spatial and temporal (Montola et al., 2011). Social and spatial expansions to a storytelling event could be easily achieved by placing the settings into a 3D virtual environment and real life locations where audience could enjoy visuals of the game and hear the story anywhere. Audience’s participation and the usual role of the audience in a storytelling event would be further expanded by bringing an improvisational element to the storytelling and letting the audience participate. Obvious target audience for a storytelling game are children, so further social expansion could be achieved by having also adults play and tell fictional stories with and to each other. Temporal expansion being the hardest to achieve when
going after a game that is about timely occurrence of storytelling, making the event set in
time. For a game to be pervasive it is not though required that it is expanded in all possible
ways.

In the context of this thesis it is chosen to view that a game does not need to have
competition or reward system to make it a game. Oftentimes games are just pass time,
they can be just simulations or means of inspiring people into doing something. In games
like this competition is not required for one to see them as games. One can argue that
SimCity, or any simulation game, is not a video game but a video toy (Wright, 1989;
Alvarez et al., 2011) in a way one could argue that Props is a storytelling toy and not a
game. For now the liberty to call Props a game has been taken since definition of
pervasive gaming (Montola et al., 2011) is so all embracing. The purpose of Props is to
socialize by creating a collaborative story and the main reward is the story itself, the game
can be better described as a game of performance.
4. Game Development, Design and Play

Development of the game prototype of Props (Figure 5.) was done in collaboration with three other students from the department of Information Processing Science at the University of Oulu. Author of this thesis was one of the designers in the group, responsible of part of the visuals and assets of the game. She was also the project manager and the game idea originated from her. The project was part of a course work. It took roughly 300 h per student to create the prototype of the game. The requirements set for the project were original pervasive game content for 3D Oulu. On everything else the development team had free hands with.

The thesis work itself is constituted of two parts – the collaborative part of developing the game prototype and second more independent part where the prototype was slightly modified to fit the purposes of using it during a children's storytelling hour and Science day event for participatory improvisational theater with adolescents. Literature review was revisited during this thesis, since the little background research done during the student project was related to tools used and pervasive gaming in general the main goal for that was making a working prototype. For this thesis a more thorough research into the field was required. The second game event took place at the facilities of the Department of computer science and engineering. Significant aid was received in adapting the game visuals to the cave automatic virtual environment (CAVE) and fixing the client server issues the early prototype had. New props i.e. 3D assets, have been added to the game inventory always in between tests and game events.

It was requested by the client of the project that the game would be pervasive. Hence Props was not developed to be just content to a 3D environment or a visual storytelling support system. The full game experience requires more than just the game software and a laptop. It requires participants including audience, a careful set design and an occasion for the game to take place.

Figure 5. Action shot of the Props. At the right hand corner there is the main menu that provides the prop master the options for staging the scene.
4.1 Development Tools

Several open-source software (OSS) tools were used during the development of Props. Apart from Photoshop used in creating texture slides all the development tools and the game engine were OSS. In fact Props is an example of how it is possible to create polished game content using OSS tools only. The game engine, RealXtend, was the engine of choice since Oulu 3D runs on it. It is a game engine that uses Entity-Component-Action (ECA) paradigm in game design and allowing extension of the game world. ECA means that the game components are modular and one can import them into the game world without disturbance to the existing structure of the game setting (Alatalo 2011).

Development tools ranged from mature open source software like Blender 3D (Blender Foundation, 2012) to small, not so actively developed tools like Blender2Ogre (Brett et al., 2012), that was used for exporting 3D models from Blender to Ogre. Object-Oriented Graphics Rendering Engine i.e. Ogre 3D is the engine that RealXtend uses for graphics only. Some Ogre specific tools were therefore used during development. These included OgreMeshy (Goldberg, n.d.) and Ogre Particle Lab (Roussel, 2011). Ogre Meshy was used in previewing the models and animations. Ogre Particle lab was, at least initially, used to generate particle system script templates. Qt creator (QT Creator, 2013) and JavaScript were used to implement GUI for main menu of the game and Mumble client (“Mumble” n.d.). Mumble was there to provide in-game audio connection between players. The author of this thesis was responsible of co-designing the GUI, writing the particle scripts, creating many of the 3D assets and almost all textures. Props prototype has a wide selection of 3D assets and graphical user interface (GUI) that were designed and produced in concert with the programmers with the limited time that was there for the project. The possibilities of the game are enhanced by the fact that it was decidedly made easy to add new 3D assets to the game inventory. When creating a new asset all one needs to do is export an ogre 3D model into the game inventory and add the name of that asset into an array in the code for the main menu of the game, which then updates also the game GUI to contain that item. It was a conscious decision from all the members in the development team to design a small functioning prototype that would also have future use.

The game Props (“Props repository”, 2013) can be freely uploaded and is available to all. In the referred Git repository there are two development branches of the game. The master branch holds the English version of the game and the branch named FIN is the Finnish version and the version that was used during the storytelling event with the improvisational theatre group. Props is still in development, so the game available already slightly differs from what is described in this thesis. The game starts when one opens the Oulu_test.txml from the game folder with RealXtend Tundra 2.5.2 (RealXtend Tundra, 2013) or the commercial version of it Meshmoon Rocket Client (Meshmoon Rocket, 2013) on Windows XP or 7.

4.2 Game Design and Play

Props is a game that spans between the representation of a real stage and its portrayal in the 3D version of a city of Oulu, located in Finland. The location of the stage is such that it is a social hotspot where people meet and pass by daily (Figure 6.). It is familiar to most city dwellers, at least the local ones, and has therefore cultural annotations too.
Props has two active players at a given time: a prop master and a narrator. In the original game idea it is envisioned that there also is audience on both RL and VR locations. Prop master selects the scene and props to either support the story or nudge it to a new path. The game has a selection of backgrounds, scenes and movable individual props and effects for the stage and a graphical user interface (GUI) for the menu intended to be used by prop master when handling the content at the stage.

The original game content was an eclectic mix of items. From there on the game inventory has expanded, since during every test it is also acquired from the users what they would like to see in the inventory. One of the design objectives was to have game content that has high visual appeal and also to work well together. The painterly textures and their uniform color pallet, created by the author, were there to bind together the models that were produced by two different designers with slightly differing esthetics. Also the design of the main menu was such that it would blend into the setting but still stand out with its unrealistically turquoise color. Later the same color was chosen for the icons for the particle effects in the game as it bound the main menu and icons together as something that was interactable.
Possibilities to participate in the storytelling event are myriad both in the number of the players, audience can be brought in to participate as prop masters or storytellers and they can be located anywhere as long as the communication between the participants is taken care of. Thus far the Props has been tested and tried out only so that everyone participating is situated in one location. The possibilities for the attendees or players to collaborate in creating the story are also numerous (Figure 8.).

![Figure 8. Possible interactions mediated by the game between players and the two realities, VR and RL, in a total Props game event and how they all collaborate in creating the story.](image)

The simplest way to play the game is to locate all the players and audience into the same room and take care that everyone are situated so that they can hear the story and see the visual aids i.e. the game content from a projection or a screen. Originally it was envisioned that the narrator would be situated at the RL location, while the Prop master might be anywhere in the audience or in the comfort of his or her home. It was also envisioned that audience could enjoy the visuals and audio i.e. the whole story from any location in VR in 3D Oulu viewer on their PCs or through the interactive touchscreens that are scattered all around the real life city of Oulu. So far the game event has not been tested in a manner where all the possibilities of expanding the audience of the game event would have been used, but the possibility is there.

### 4.3 Early Test Sessions

Game-play and the prototype were tested twice by bringing in people to the lab to play the roles of a prop master and a narrator (Figure 9.). Three people attended the test sessions that were held two weeks apart. They were not familiar to each other and knew in advance only one member from the development team. All three were female. Both testing session resulted into improvements for the game. As an example of one improvement, the icons for particle effects were added based on the first test event, when
the prop master stated that they cannot be chosen and individually deleted like other items
on stage. During the next test session the prop master independently noticed the icons and
realized how to use them. Some observations were also made on the storytelling
(Appendix A). This was especially notable in the first test case where narrator and prop
master had not met before. After initial hesitations the story telling became quite fluent.
During the first test case the story even had a structured beginning, middle and ending,
mainly because the narrator used a warm up story and it affected the storyline. During
second test event it took a while for the narrator to get fluent with her story but the tale
was more improvised and more effected by the selection of props and settings.

![Figure 9](image)

**Figure 9.** Test sessions were conducted at media lab. (A) Prop master was seated in front of a
laptop to set the scene on virtual stage that was projected to the narrator who told
her story behind the screen. (B) Narrator's story complemented the selection of
props. Here there was a restaurant that had a Christmas theme. The waiters were
dressed up as snowmen. (C) “Elephants in the jungle had developed a symbiotic
relationship with cows with whom they jealously guarded a pirate treasure.”

Both lab test session were taped, but nothing was done to that material during the project
work. The taped stories (Appendix A) became relevant while writing this thesis. Based
on these stories it can be concluded that people previously unknown to each other can tell
a collaboratory story mediated by Props. Also that Props has potential uses with adults
and not just children or adolescent.
5. Case 1: Props in Improvised Theatre and Storytelling

Although Props could be used purely as a storytelling support system, like was done during the initial testing of the game. The game has potential to be used with improvised theatre where the story is conveyed in a more vivid way, by having performers at the set and a more open disposition towards the audience affecting the story content or participating in general. Having the game used in a setting where there is audience participation included offers more intricate network of interaction for observation. Furthermore it is an expansion of the social aspect of the game not just so that there are more people present but also because the created story is more collaborative.

5.1 Modification of the Prototype to fit the Storytelling Event

The original prototype of Props is in English, for the children attending the story hour to be able to understand the GUI it needed to be localized i.e. translated into Finnish. Some cosmetic changes were made to the GUI and additional props, a princess and a pink unicorn (Figure 10.) to represent the mascot of the performance group who were acting as narrators during the then forthcoming storytelling event. It was fairly simple to make the modifications since adding new elements and props were purposefully made easy by taking the code reusability into account during the development. The most significant design element of the game to be improved at this point though was expansion of the setting.

![Figure 10. Mascot of the Oulu based improvisational performance group Unikki Unikorni (Transl. Unique Unicorn) as can be found from Props' selection of props. This picture was taken during the Children's Story hour during the Oulu Improvisational Theatre Festival 2013 (Photo: D.Zanni).](image)
5.2 Description of the Event and Game Setting

Uniikki Unikorni is a small local, to Oulu, improvisational performance group that does improvisational theatre targeting both adults and children. They hold storytelling hours for children at city library on regular bases and originally they were contacted to see if they would like to try Prop out in the library, but they were looking for program ideas for an event, Oulu Improvisational Theatre Festival 2013. They were kind enough to agree to try out Props at the very end of a children's storytelling hour, as long as the technical issues and the extra arrangements required would be taken care of.

Seven members of the performance group were present at the event, four of them took actively part in playing Props. One was the narrator and three others performed in front of the set scene that was projected to a makeshift screen from behind. Game scene was projected from behind the screen so the actors could parade in front without disturbance to the visuals. Prop masters were situated at the side of the stage with back against the whole scene and an adult sat beside them to guide in the use of the game menu and laptop. Narrator as well as the audience were positioned so that they could easily see the whole scene of the event. There were nine people in the audience four of whom were children. In addition there was one person doing the photography and the author of this thesis, who was there to observe and aid the children in the use of the laptop that was used for staging the scene. Two children got to try the game out as prop masters. Setting (Figure 8.) was simple and Props took place at the very end of a story hour that in whole took roughly one hour. The game event took about fifteen minutes, not including the time it took to set it up.

![Figure 11. Setup of the stage during the storytelling event.](image)

Children responded to the story and the game calmly despite being tired since the event was almost an hour long (Figure 9.). Menu had been adapted to the younger children’s skills by having the text written in upper case and adjusted so that there was no need to scroll up and down the menu to see all the items there. It still was necessary to have an adult there to help in the use of the laptop and the game menu, since at least the other Prop master was not so fluent reader or familiar with the use of a mouse.
Figure 12. Children played as prop masters taking turns. Two kids got the chance to be prop masters (Photo: D.Zanni).

Narrator had possibly the most stressful role during the role since he had to react on the cues given by not just the Prop master but also other participants, the actors and audience members, while telling a story. The actors patched the story’s short silent moments by their acting though. Narrator was situated on a chair at the side of the stage (Figure 11., Figure 13.) to have the clear view on what was going on all around.

Figure 13. The narrator (at the left) was situated at the side of the stage so that he could see what was going on the screen, stage and in the audience. Actors played in front of the projection of the stage (Photo: D.Zanni).
In the end the only difficulties met during the event were technical and could have been avoided with better preparation or more time to prepare. Because of other festival programme the stage was in use all the weekend making early preparations difficult.

Take home conclusion of the event was that the game can be used to complement and enhance a storytelling event where the story is improvised. Unique Unicorn performers were experienced in throwing themselves into unexpected situations so they had no trouble in using the game, but it was nice to see that also the audience were engaged in the storytelling and the game event, despite one seemed to be sleeping (Figure 9.). As a note though, sometimes that is the goal of telling a story, get them to fall asleep. Material gathered from the storytelling event and the early tests of Props are described more detailed in the next subchapter.

5.3 Gathered Feedback and Results

Material gathered during the testing of the game and the storytelling event vary. For this thesis work the author has the stories and observations gathered during the student project work, including the taped stories told. From the storytelling event with Unique Unicorn performance group there are notes written down right after the event and answers for questionnaires presented to the performers via email after the event. The material was analyzed with the potentials for fusion of technology and pervasive gaming into storytelling and some observations were also made based on the story material regarding how Props mediates creation of co-written stories, interaction between the participants and interaction between participants and the game content.

The main plot of the story and few observations were written down straight after the event. The performers were presented a questionnaire via email. The questionnaire (Table 1.) has a short set of questions that were in part influenced by the doubts and of success of storytelling survivalist movement (Heywood 2004). The performers were also advised to share their opinions on how they felt the event went and what improvement ideas they might have for the game by open questions (Table 2.) at the end of the questionnaire.

Questionnaire is short and to the point since it was known there would be only few people answering it, the small size of the event. Also the author hoped that having a questionnaire that would take only roughly five minutes to answer would help to get replies from all participants. In the end one performer though left unanswered. The questions were targeted at how the game event was received by the performers and the issues concerning playability and usability were not concerned, since the game prototype still has many obvious issues especially if Props is intended to be played by all age groups and across language barriers. The answers reflect only the opinions of three people, those people are though all experienced performers and storytellers, so their opinions have significance when evaluating the use of Props in improvisational storytelling.
Table 1. First part of the questionnaire. On Likert scale where 1=Disagree, 2=Somewhat disagree, 3=Cannot say, 4=Agree somewhat, 5=Agree.

<table>
<thead>
<tr>
<th>Question\Answers</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Game content brought a positive addition to the story-hour</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>2. I would like to try the game again in similar situation</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3. I preferred the story-hour without the game</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4. The game had a positive effect on the content of the story and how the story flowed</td>
<td>5</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>5. The game idea was easy to grasp</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>6. The game affected the story too much</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>7. What was on the screen had no significance on how the story went</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8. I don't like that storytelling is mixed with technology or games</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9. The game suit this situation, but I would not like to use it on every story hour</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>10. I think the audience had a positive reaction to the game</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>11. Playing was too difficult for the kids, that made the event unpleasant</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Two performers thought that the influence of the game to the event and story content was positive they also agreed that the game had an influence to the story. So Props was not just an embellishment. Just to quote: “It was great fun to improvise in front of a changing scene, but the best part was the enthusiasm of the children as they got to affect how the story went”. The third performer had differing view on how Props affected the story hour. Even this performer though was willing to try the game out again and evaluated the audience’s reaction positive. At this point it is good to note that though it is very subjective from the performers to evaluate audience’s reaction, they have had many story hours with child audiences and are in this sense experts in making this evaluation.
Table 2. Answers to the open question at the end of the questionnaire. Question 1. How would you further develop Prop to fit this kind of event? Question 2. Do you have any other thought you would like to express related to the event?

<table>
<thead>
<tr>
<th>Performer</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1.</td>
<td>Not that many children can play the game at once. Playing with a laptop was a difficult approach, because it suits only into situation where there are few children. Some sort of table or a surface to play might be better, because it was difficult to play seated on the floor.</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>It was a great fun to improvise in front of a changing scene, but the best part was the enthusiasm of the children as they got to affect how the story went.</td>
</tr>
<tr>
<td>2.</td>
<td>1.</td>
<td>The game would work better if the background would be bigger, preferably the size of the stage background. This would bring out the pictures/animations out better. Few rehearsals would make it easier to utilize the game and this would also help the interaction between performers, storyteller, game and of course children</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>The technical difficulties in the beginning made it harder for me to concentrate, as there was so much adjusting and tinkering going on. Also because of this we did not have time to warm up.</td>
</tr>
<tr>
<td>3.</td>
<td>1.</td>
<td>That game content could be changed by request (as is done in improvisation), the elements should be precisely categorized. Children who cannot read should be able to play.</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Having audience participate with visual aids to the improvisation is quite unprecedented. If you like to try the game out again or would like to ask anything else don't be afraid to contact me.</td>
</tr>
</tbody>
</table>

Encouraging was that none of the three performers had a problem with technology being mixed into the storytelling event. They were not unanimous on using the game on every story hour though, suggesting that they might still consider Props a peculiarity fit only for some occasions.

5.4 The Stories and Observations

This is the story told during children's story-hour game session with Props, as it was told by the participators and written down by the author with sparse notes right after the event (Appendix B.). The dialogue between the participants is not included, because the notes were done after. The full story took roughly fifteen minutes to tell.

Children were very fond of easy options and "Random" button, hence the starting scene was a sunny beach and a cow. One of the performers became a mermaid who was whisked away to an arid city scene by the "Random" button, swiftly named as "time vortex". The skin of the mermaid began to dry and crackle. She hoped for a change in the weather. Prop master heard her wishes and was able to conjure snow fall from the prop selection. Snowflakes melted into drops of water on the lower arm of the mermaid who was caught in a time vortex and travelled through a forest into a room scene. The prop master was changed without much disturbance to the storytelling. In the room there was a snowman... (This amused the children in the audience greatly)... and an elephant. It was noticeable from the children in the audience that they were exhilarated of the fact that they reacted
to the elephant before the performers and the storyteller noticed it. Mermaid got whisked away back to the beach where other performers where already waiting her, acting concerned parents, welcoming their daughter home with open arms. Our tiny prop master had just gotten the hang of it and whisked the end scene into the room. Narrator acknowledged this by noting: “They lived happily ever after in the snowman’s pad”.

One can tell from the adjoining story when we had seasoned storyteller as narrator the plot was fluent and had obvious start, middle and ending. Without much experience into scenes like this it is difficult to tell how well the feedback loop between the audience, performers, narrator and the prop master worked, but although the game event was brief all the participants had some effect to the story. In the end the technical difficulties were the only ones met.

During the initial testing of the game play we had grownups co create a story in a setting where grownups were acting as prop master and narrator and we the developers were in the audience. The setting here could be described as storytelling karaoke amongst the adults. The transcripts of the stories told can be found from the Appendix A. Transcripts of the Test Events.

When it comes to showing how interaction could be mapped in small groups where a game like Props is used to mediate and help people tell collaborative stories it can be said that this part of the development and research was somewhat inadequate although showed promising start. Props displayed at this point that storytelling and technology can be fused in to a pervasive gaming experience so that people are inspired to tell stories aided by the game content and audiences enjoy the end result. An academic conference paper for Games and Virtual Worlds for Serious Applications (VS-Games) was written and publisher based on these findings (Alavesa & Zanni, 2013; Appendix B). From here it was easy to move to a bigger scale of presenting Props for a larger audience.
6. Case 2: Adolescent School Kids and Game Mediated Improvisational Theater

Science day at the Oulu University September 2013 was one day event where people could visit play minded workshops at the campus area to get acquainted with the ongoing research. Props was introduced during a workshop called Fake on Stage. The workshop took place on two locations at the University of Oulu, department of Computer Science and Engineering.

At this cycle of evaluating the game, possibly the most significant design improvement was having the server client issues fixed so that the game run on a server and Prop Masters could move around items on the stage, so that the other participants could see only the movement and the items, but not the selection or the main menu of the game. This allowed for more detailed observations of people’s reactions to the game content. During the first test events was the issue of the narrator reading from the projection of the main menu instead of coming up with more improvised story. Also new props and scenes were again added to the game inventory. Collaboration with the members of Unique Unicorn performance group was continued by having them instruct the participants on improvisational acting.

6.1 Description of the Event and Data gathering

Fake on Stage workshops took place on two locations during six events. There were 88 school kids whose ages varied from 14-16 attending. Gender deviation was even amongst the elementary school kids who made up roughly 75% of the attendees. The events were also videotaped, permission for this was asked prior to the events. The setup of the locations differed slightly (Figure 14, Figure 15). Hence the data from the gathered questionnaires (Appendix C) were handled separately and compared before combining the datasets. The slight differences on the results from the questionnaire are brought to your attention.

Figure 14. Fake on Stage setting at the Robotics lab CAVE setting.
One event was roughly 50 min, where few about ten minutes at the beginning was reserved for introduction and a short warm-up play. Most of the programme consisted of improvisational play and few minutes at the end of gathering feedback from the participants. From the video footage it was noted that there were only small differences in the program itself on both locations. On one location music was used during the warm-up and the role of narrated stories was smaller. On the other location the students had more determining role in how the event went and how they participated.

Figure 15. *Fake on Stage* setting at a conference room with projectors and two screens.

Although it would be easy to evaluate from one’s own observation from the events that they were more in the lines of improvisational theater than storytelling or a game event. An evaluation of this was also asked of the audience (Figure 16). Most did not see this as a game event, but saw that it was an improvised theater setting.

Figure 16. How participant viewed the game event on both locations. The upper limit of the scale is 88 representing the number of participants and the received questionnaires.

### 6.2 Results: Questionnaire

The results from the questionnaires were divided into three categories, what were the ways of participation and the role of the game in it. The third category concerned general gameplay issues. Participants were also asked what their role was during the event. They were offered varying roles (Table 3), prop master, actor, narrator and audience. First three were asked from the participants in the questionnaire directly and the role of audience assessed from one of the Likert scale questions so that the question “I participated as an
“audience” was translated to: 1-2=no, 3=absent or both, 4-5=yes, hence there is a big share in not known category. Almost all participants saw themselves as participating as actors. It would have been better to give the students a short description of the parts to help them distinguish them better. Also differentiating the warm-up part of the event from the actual play might have changed how they evaluated the event. Nevertheless, this categorization does give an insight on how many roles the students had a chance to adopt during the event. It would have been interesting to assess, how the views of people who took part in different ways would have varied, but for now, the roles are too overlapped for comparison. Following table does though give an inkling on how broad the participation to the roles during the event was.

Table 3 Roles the participants had a chance to try

<table>
<thead>
<tr>
<th>Role</th>
<th>Prop Master</th>
<th>Actor</th>
<th>Narrator</th>
<th>Audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>68</td>
<td>77</td>
<td>36</td>
<td>30</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>0</td>
<td>37</td>
<td>16</td>
</tr>
<tr>
<td>Unknown</td>
<td>11</td>
<td>11</td>
<td>15</td>
<td>42</td>
</tr>
</tbody>
</table>

Data from the questionnaires evaluating the adolescent’s subjective assessments on both of the game locations were first compared by Mann Whitney U-test before combining the datasets. Based on that analysis, there were six questions where the opinions differed. Two were discarded from the later comparison based on the high level of indifferent answers. The four significantly differing questions were: The event was a story hour, Had no time to follow the event, Enjoyed the event and Enjoyed following the story. Data from those questions is handled as a part of the overall assessment of the event presented here, but they are introduced to you also separately in the chapter where the events are compared.

Almost third of the questions in the questionnaire dealt how the adolescent participated to the event (Figure 17).

Figure 17. Subjective assessment of how the adolescent participated during the game event. The upper limit of the scale is 88 representing the number of participants and the received questionnaires. Answers were on Likert scale 1= disagree, 2= somewhat disagree, 3= cannot say, 4= agree somewhat, 5= agree.
Most of the participants felt like they found a way to participate to the event that was suitable for them. The adolescent felt that time was more of a constraining factor in the role they took than courage. There were still small minority of people who felt like outsiders, nine in total, but fifteen reported they do not usually participate in common activities, which might suggest that we were able to reach them by offering them an additional way to participate by attending as prop masters.

What was the way the adolescent affected the event’s progress was assessed with another set of questions (Figure 18).

**Figure 18.** Subjective assessment on how the participants collaborated during the event. 1= disagree, 2= somewhat disagree, 3= cannot say, 4= agree somewhat, 5= agree. The upper limit of the scale is 88 representing the number of participants and the received questionnaires.

What can be deducted from their assessment is that they felt the game and themselves had an effect to the event and the content of the improvisation or the story. Gameplay issues were also addressed in the questionnaire, *Props* being still in development.

**Figure 19.** Subjective assessment on some game play and content related issues. 1= disagree, 2= somewhat disagree, 3= cannot say, 4= agree somewhat, 5= agree. The upper limit of the scale is 88 representing the number of participants and the received questionnaires.

Encouraging being that most enjoyed the event and most albeit a little less would also like to have retry of a similar event. Most also recognised the stage that the game was set, this was inquired since Props was designed to be a part of a 3D city and not just a standalone storytelling support content. One class attending was not from the core area
of the city in question, which might explain the relatively high number of people who did not recognize the stage. They did not think the situating the game content had significance though. The significance and effect of the game to the event was assessed high. There is no need to further improve these numbers since the role of the core game, Props, is supposed to be just one part of the whole setting.

6.3 Results: Observations from the Video Footage

A boy lies on the floor in front of a screen. He is requesting aid and his friend asks him what is going on. He says he feels dizzy and needs to go to the hospital. He thinks he might be hallucinating because just a second ago he was on a beach and all of a sudden in a forest.

Although the evaluations from both event locations, assessed by the questionnaires, do not vary much some observations suggesting that there were differences on how people played on those locations can be made. Differences on the quality of footage, programme and the role of instructors are listed in the following table. One of the biggest differences when the use of Props is concerned is that the role of spoken narrative was significantly bigger during the three occasions the event took place upstairs. This might be because one of the instructing Unique Unicorn members there was acquainted with the game idea from previous occasions. Instructor also frequently used the word storytelling to describe the situation where downstairs instructor used the word “improv” (Transl. from Finnish impro). The more commanding role the instructor downstairs took though resulted in to a higher participation by students to that event, but there were long pauses between scenes where upstairs the students were able to react fast to the projected game scenes, on one occasion cycling through seven scenes in seven minutes. The video material gathered from six events makes four and a half hour of footage.

Table 4. Initial observations from the footage

<table>
<thead>
<tr>
<th></th>
<th>Conference Room</th>
<th>CAVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of the footage</td>
<td>10 min is missing from the beginning of one event and the view is obscured on brief occasions.</td>
<td>Camera view is obscured on brief occasions.</td>
</tr>
<tr>
<td>Music during warm up</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Instructor frequently used the word Storytelling to describe what was done</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Instructor had a commanding role during the event</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Role of spoken narrative was significant</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Long pauses between scenes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Participants seemed preoccupied with other things</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Instructor repeatedly encouraged the participants to take bigger poses</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
People seemed to situate differently against the backdrop of game scenes. They crouched and even lied on the floor more often on the event location where the game content was projected on a screen that was closer to the floor (Figure 14). From that initial assessment from the footage it was hypothesized that there might be a wider scale of involvement against more immersive backdrop. This was an initial assessment of the footage so the resulting coding of the video material was partly hypothesis coding and partly eclectic coding (Saldana 2012). Since the material was so rich, the footage was reviewed minute by minute several times with different viewpoints into the contents.

How students opted for bigger poses and crouched or lied down during the event were taken from the play where they posed still in front of the screen as a group. These kind of situations occurred on all events, both up and downstairs. Material from the two events that had 25-28 participants was discarded from this assessment, because the footage gathered was the most obscure on those events. In addition the situations differed greatly since all participated downstairs because they were prompted to do so and upstairs some people are completely preoccupied because there was no supervision or guidance. Hence the sample here is from four events with 40 participants in total. Observations are adjusted in relation to how many people actually participated and are visible on stage at that moment. Only first reactions to the scenes were taken into account. Big pose here means a pose where one has elbows above shoulder level or feet stretched out or both.

Table 5. Count on how the participants situated themselves against the screens

<table>
<thead>
<tr>
<th></th>
<th>Big pose</th>
<th>Crouching or sitting</th>
<th>Lying down</th>
<th>Participants</th>
<th>Accounted poses/Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAVE</td>
<td>28</td>
<td>18</td>
<td>3</td>
<td>108</td>
<td>0.49</td>
</tr>
<tr>
<td>Conference Room</td>
<td>8</td>
<td>33</td>
<td>3</td>
<td>182</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Participation in creating scenes was more voluntary in CAVE, which explains partly the lower number of participants also the greater involved in the scenes. More time was used on acting and spoken narrative upstairs than downstairs; hence there is more material for this assessment from downstairs. Downstairs the instructor frequently encouraged people to take bigger poses, ten times during the first event alone. This did not seem to help in getting the participants to do so. Even upstairs all participated in playing on stage at some point, because they took turns in doing so. When all adolescent reported their roles in questionnaires, no one stated they had not been acting (Table 3). The difference in accounted poses per participant in notable, suggesting that half reacted with a bigger pose upstairs, where downstairs only one in four reacted thus. Differences might even out if there was more material for observations.

From the footage it is obvious that the role of actual acting and spoken narrative were bigger upstairs. In fact on one event where the students seemed to feel the most comfortable with the setting and each other they narrated their poses and had conversations relevant to their roles during play, where only taking a pose in front of a
scene would have been required. It can also be observed that the storytelling is first
descriptive of what is displayed on the screen, but as the events progressed the stories
became more fluent although remained very short. Just to elaborate with examples “Look
a snowman. There is a fire in space and an elephant.” became: “Once upon a time there
was a quiet city. What was strange about the place was that the moon was shining in the
middle of a day...” This shift did only happen upstairs, but there the instructors
consistently suggested the participants to take on storytelling and not improvisational
acting. So no conclusions on the level of engagement or involvement to the scene can be
made based on stories. What can be concluded though is that the role of instructors and
what they suggest to the participants is relevant in what kind of action takes place on stage
and how the participants viewed the nature of the event. On the other hand based on
assessment of the physical involvement of the participants to the scenes, staging of the
event seems to have more significant impact on how the participants react than how the
participants are instructed to behave. Upstairs involvement was higher despite the
downstairs instructor frequently reminding the participants to take bigger poses. These
things do not though seem to affect how people themselves assessed the situation,
although there are slight reported differences on how they enjoyed it (Figure 20).

![Figure 20](image)

Figure 20. How participants assessed the nature of the events, when asked whether it was a
story hour. The upper limit of the scale is 100%.

During the moments in the event where there was actual stories told the interaction
between the prop masters and storytellers was mostly one way - through Props to the
screen and on stage. There was rarely an obvious feedback cycle between the participants.
This could be one area of improvement for future events.

In addition to whether the participants viewed the situation a story hour there were three
other question where there was slight differences on how the assessments were. Had no
time to follow the event, Enjoyed the event and Enjoyed following the story (Figure 21).
Had No Time to Follow the Event

I Enjoyed the Event

I Enjoyed the Story

**Figure 21.** Graphs of the subjective assessment that varied based on location. The upper limit of the scale is 100%.

The differences in enjoyment of the story and not having time to follow the event can be explained by the differences in guidance at the locations and the resulting content. Majority of the participants on both locations reported enjoying the event. There is just much higher number of answers at the very end of the scale.
7. Discussion

Based on this research it can be said that it is possible to fuse improvised storytelling and pervasive gaming. The level of pervasiveness of the game though could be assessed by closer evaluation of the spatial, social and temporal expansions of the game situation (Gielkens 2011). What was done during this student project and thesis work shows a promising and an encouraging start. There are storytelling systems out there and the idea of “a story box” an item that is there to remind people of stories and mythologies is old (Wirth, et.al., 2011; Rukmini Bhaya, 2012; Orbaugh 2012). Following is discussion based on the results and observations that have been gathered during the year long and on-going development of Props storytelling game. Not just the results from the game events, but also the future potential of Props is discussed in detail. Research questions dealt with development and possibilities of a storytelling pervasive game.

7.1 How Is This Still a Game and What Makes Props Unique?

By a glance it would be easy to deem Props just another digital storytelling support system, but it certainly has ramifications for more than just that. Props also has similarities with augmented reality projects like Egyptian Oracle and GENTORO (Sugimoto et al., 2009; Jacobson & Gillam, n.d.). Props stage could be modified to be viewed from a handheld device superimposed with the RL stage just like an augmented reality content would. Furthermore having the stage and the objects 3D in a virtual environment make it possible to organise the game situation for a more immersive location like a CAVE.

It is possible though to strip Props from all its other game content and view it only as an interactive storytelling system. Even then it differs in a way the content can be so freely situated and combined to have new emergent meanings. As an example a cow, elephant and hearts effect at the stage at the same time obviously suggest that there is something going on between elephant and the cow. With even a small selection of combinable elements one can tell much more than just with readymade images.

When viewed as a game Props is a game of performance like SingStar or Guitar Hero (London Studio, 2004; Harmonix, 2005). The game has no competitive element and the reward for playing is the experience and the co-created story. What could also be said is that Props is just example of gamification, where storytelling and improvisational theatre are infused with game design elements. Much on how people assess the difference of game and play or playful design, depends on the subjective definition of what game play is. Some definition of gameplay has no mention of quantifiable outcome or a winner and some mention this as the defining feature between the two (Alvarez & Djaouti, 2011; Deterding et al., 2011; Walther, 2011). Although Props divides opinions on its nature as a game it is not the point of this thesis to delve deeper into the definitions of play and game. That could be the topic of another research.

Main emphasis on Props is on the timely occurrence of storytelling and that the stories are improvised with heavy reliance on the imagination of the narrators and actors. The storyteller, prop master and audience are present at the time the story is told. It is modernised representation of an age old tradition where people gather around to listen to a story unfold. How the game differs from that is that the setting spans between two realities of RL and VR. This represents the spatial expansion required from a pervasive
game (Montola et al., 2011). The social aspect of storytelling event is expanded by bringing in the audiences to the storytelling event and having the audience participate by acting as prop masters. There is an important improvisational and sometimes theatrical element to Props too which in turn separates it slightly from traditional storytelling and DIS. Maybe the playful nature of improvisational theatre and storytelling (Johnstone 1999) makes it easier for a game like Props or infusion of game content and technology to be infused and accepted into this context.

Improvisational storytelling and improvisational theatre are somewhat different but we had the chance of having performers and adolescents play in front of a scene that was staged in virtual environment... As a side thought the multitude of social games ("Encyclopedia of Improv Games", n.d.) that are meant for improvisational theatre and storytelling would offer options for creating multitudes of new games and events.

### 7.2 What is the Use of Having People Tell Stories for Each Other – Props as a Serious Game?

Whether stories are fiction like Props where the storytelling is timely and fiction or factual like in Rider Spoke (Rowland et al., 2009), Little J, an ongoing project to make the citizens responsible for reporting their local news as it happens ("Little J Beta”, n.d.) or just recording cities present day and history like in Urban Tapestries (Thelwal 2006). Weaving stories and communicating by storytelling with other city dwellers, sometimes strangers, can help to build a sense of community. The stories that are personal or resonate from personal experiences can also have a healing and bounding effect between community members (Couldry, 2008; Lamont Hill, 2009; Speedy, 2011; Benson et al., 2012). In a storytelling setting similar to Props, a game called Time Slips helps develop compassion and understanding between medical students and elderly patients suffering from dementia. Fictional stories are told in a group setting and inspired by digital imagery. The stories are written down and retold at the end of a session where the group also decides how to name the tale (George et al., 2013). A story communally heard has a social significance, but co-creating a story heightens the effect (Gabriel & Connell, 2010; Speedy, 2011). It is not difficult to imagine a situation where children and nursing home residents would for instance tell a collaborative story mediated by Props. This would engage children into listening the stories and surely be a cheering event for the elderly.

Factual narrative has already been established in use for ethnography in sociology and anthropology (Davis & Warren-Findlow, 2011; Polletta et al., 2011), but the use and significance if storytelling in those yet remains to be shown although it has some advocates (Watson 2011; Stankiewicz, 2012). There is not to say that Props could not be used as a platform to experiment on the possibilities for the use of narrated stories in research in especially interaction and social closeness.

On a more practical note storytelling coincides and complements children’s literacy learning and helps to develop imagination. Props could be harnessed to aid in literacy learning for children (Ryokai et al., 2003). Props could be used in a small scale as a mediator when building team spirit in classrooms. Having the role of prop master rotational and allowing everyone have their voice and opinion heard while telling the story might help empower the quieter ones. While working with children and having their
opinions of the game experience and the game recorded mere observation is not enough? It is better to ask their opinion directly (Read & MacFarlane, 2006), if Props is ever to be tried out again on a story hour in events or classrooms of any kind.

Children can be considered natural target group for a story telling game, but Props has the possibility to reach audiences any age at least a glimpse of this was achieved when we did the early trials of the game where neither our prop master nor the narrators were children. Expanding the target audience for the events would fit the pervasive nature of the game.

7.3 Role of Interaction in Props

Significance of interaction in interactive storytelling is only at the level of HCI. Props also mediates interaction between people. In a game setting Props system, the game content, is not just an embellishment or collection of images. It is a mediator for the storytelling, an important mediator in the interaction between the players. It aids people in collaboration when creating the story and is also designed to be played across distances. From reviewing of the short tale written from the children’s story hour with Unique Unicorn it can be said actors, narrator, prop masters and the audience there took part in telling the story. The view of the two children who took part as prop masters was mediated by the game. The audience noted on occasion to the actors and narrator of the change in scene. Children’s inexperience with the game content restricted how specific their direction and power over the contents of the story was, but they got a change to affect directly to the story and it was apparent that both prop masters were joyous when they could hear the story being nudged to a new direction. Prop masters were situated with their back into the stage so they could only hear the story and occasion took a peak at what was going on behind their backs. The author was instructing the children in the use of the game so she was able to observe their reactions as well as the whole stage.

When our game was tried out in lab test setting (Figure 9) and during children’s storytelling hour the role of game content was bigger in the sense that there was a strong emphasis on spoken narrative. On those occasions the feedback gathered was though of little significance. During the Science day event with a bigger sample and bigger setting one can come to conclusion that game content truly can mediate storytelling.

Based on our results with adolescent school kids and the use of Props in a situation where participants are not acquainted with the game idea is that the role of instructors is very significant in how the participants view the event, what the level of their participation is and how the event play unfolds in the end.

The idea of using storytelling as ethnographic method to map interaction between people i.e. fictional narrative ethnography is there (Davis & Warren-Findlow, 2011), but it has not apparently been used too often. Small experiments on creating collaborative stories and how they affect the mood set and empathy of the participants have been conducted though (Couldry, 2008; Lamont Hill, 2009; speedy, 2011; Benson et al., 2012; George et al., 2013). During Props game events the stories themselves are told by different people. The story material is collected from different sources with different methods. First two stories were taped and the third was written from notes. Although observations can be made from how the stories came about and their structure there is not yet enough material to look into the patterns of human or human computer interaction with it.
7.4 How Setting Affects Level of Engagement in Game Mediated Storytelling?

What is the point of making immersive spaces for storytelling, when narrative can be as engaging when one reads a good book? Human imagination is the most powerful vessel to transfer you between time and space. Level of engagement and involvement in VR environments and immersive locations like CAVEs are continuously researched and with better methodology than was done with Props (Lugrin et al., 2010). What was done during this research was though a blind test on only the location & guidance differing. Their effect on physical involvement with adolescent school kids in a “story box” setting where one has the same visual content in 3D presented on two locations, the other a conference room and the other a more encompassing setting in a CAVE was observed. There is little research on the potentials of storytelling systems and virtual story boxes in these kinds of settings where the story content also is fully improvised by the participants themselves.

Immersive setting does not need to be technologically advanced for immersion. But the motivation to be immersed and involvement can be affected with guidance and setting that is technologically advanced. When having adolescent school kids try improvised storytelling and acting in a setting that, one might not expect such motivation, staging the scene and suggestion become more important in conveying an engaging experience for the participants. Stories are told and improvisational theater conducted already in immersive settings but the role and the participation of the audience in those is not as high as it is with Props (Bobick et al., 1999; Lugrin et al., 2010; Deterding et al., 2011; Wirth et al., 2011).

When Props was played with adolescent participants assessed the significance of the game content to the event and stories high. Also from the gathered video footage it can be said that the participants reacted and staged their positioning according to what was projected on the screens. Presenting a higher physical involvement in CAVE than in a conference room setting might have other implications. Knowing that there is a link between action and sense of presence (Riva & Mantovani, 2012) one might speculate that the heightened enjoyment of the event was a result from having a more immersive setting used for Props stage. Encouraging is that many agreed that he game offered them a way of participating. Especially if one considers the number of people who said it is unusual for them to participate in common activities or that they do not like performing.

7.5 Future Development Ideas

Props for now is a humble storytelling game, but it has potential for more. The material collected during this research was quite scarce, but many more game event and more through recording of the events might have a use even if the game or the game was not altered or the game event expanded any further. More footage also video from a game event might give more insight on how people react and interact during the game event. Also mapping the disposition on the participant towards each other (George et al., 2013) before and after the game event might tell us more about the socialising aspect of collaborative storytelling.

Props could also be developed into the direction where it is used to mediate storytelling with just children or children and adults together. In interaction between children and the
game content the game design could be improved much, just by adding icons into the game menu and making the menu more intuitive by offering children the easy choices they seem to favour. Although text based lists might aid children of a certain age in developing their reading skills. And it is not always clear to adults designing games and interactive systems to children, how adaptable, imaginative, easily engaged and skilled with technology our digital natives are. Development and testing these new features might bring new insight in HCI, especially in interaction between children and computer systems.

Props was newer tried out according to its original idea, where the audience would be expanded to include people from RL and VR and the storytelling event would be socially and spatially as expanded experience as it could be. Expanding the audience and its participation would further develop the pervasive nature of the game and give storytelling events new dimension. Having the participants scattered within and between RL and VR environments is a spatial expansion of the game event and doing so could bring new insight on how distanced people can be of each other for the storytelling event to be engaging and have the same intimate feel one would get while telling a story around a campfire. Also it would be interesting to know if similar positive effects on social binding and healing (Coulter, 2008; Lamont Hill, 2009; George et al., 2013) could be achieved in a setting where the players and audience are on different locations. And to what extend these positive effects have more to do with being closely associated and having the fictional storytelling only act as an ice breaker or enabling activity that brings people together and allows them to be acquainted with each other. Does the storytelling speed up the process of getting acquainted and would any other similar activity work in similar fashion with similar effect? Does fictional storytelling offer a fuzzy layer of reference where people with all backgrounds can find something to identify themselves with? Furthermore does adding a games and technology into the setting aid these processes?

Props can also be used as purely recreational addition to 3D Internet to attract users. The stage could serve as a visual bulletin board (Churchill & Nelson, 2007) on interactive screens and within the 3D city. How to create content into 3D Internet to attract audiences is one of the key-concerns in the area (Walczak, 2012). Added elements similar to Props into the architecture of the 3D city to have a surprise lurk around every corner, would certainly make the grey realistic city scape more attracting. Possibility to create this type of surprises into the design is something that sets 3D Internet apart from traditional web pages. Having likely content on a VR stage brings always the option of overexposing the content to the RL stage in augmented reality experience to be viewed say with head-worn display glasses. Props is an example of enhancement to the stage that can be made with less expenses and more imagination in VR. All the possibilities are there if the imagery should ever leak into reality. This would also offer greater immersion into the story world.

Props has similarities with storytelling karaoke, augmented and mixed reality projects that have emphasis on stories or improvisational elements. The game idea is expandable but fairly simple and it would not be a surprise if there were many more similar games done. So far Props seems a novel game idea when all its features are concerned. Completely similar game with timely fictional storytelling, improvisation and RL & VR representations does not seem to exist. Since the game is still under development, the future design improvements based on this research could be improving the role of actual storytelling during game events and also enhancing the game aspect of Props, to help it distinguish better as a game and not just gamified version of storytelling.
7.6 Shortcomings and limitations

Design science research approach to this thesis was opted only after the student project phase. Research into the environment was deducted by the needs of the project and followed no specific framework. The need for background research stemmed from the course requirements that stipulated that background research needs to be done and also from the practical requirement of learning to use the development tools. In that sense the beginning of this research might not be rigorously conducted design science research, but as a follow up extant knowledge on topics related was constantly revisited.

The questionnaires dealt to the Uniiikki Unikorni performers after children’s story hour, was answered by three out of four members who were performing during the game event, two of the answers were received only within five weeks from the event. Originally it was also envisioned that the feedback would be gathered from all the performers, but later it became apparent that the performers who did not take part into the game event actually snuck out at some points during the event. Also the performer, who was narrating and had possibly the most stressful part in the situation, never answered his questionnaire. Based on observation only it can though be said that the narrator was the skilful and well-rehearsed storyteller and his stress during the situation did not show.

Apart from the test events conducted during the early development, the stories told during game events were short and the narrators were all differed on how they chose to take directions from our Prop masters, so any generalizations of human behavior in a situation like Props game play cannot be done based on this research alone. Apart from maybe the notion that in a small quaint setting people unfamiliar to each other are surprisingly willing to tell an incoherent fictional story together.

Material gathered from the Science day event is rich but also varies in quality and two adjacent events had slightly differing programme and different instructing performance group members. These differences and set backs were though taken in consideration when analysing the material. Because the role of spoken narrative differed so much on both event settings the level of engagement could have not been assessed based on stories. Only the initial poses by people took were taken into account, since especially the ones who arrive to the scene slightly later are possibly reacting to each other and not what is projected on the screens. Only two thirds of the video material was usable for these assessments, since two of the occasions were so crowded that much of the time the view to the scene was blocked. Also it was more difficult to tell from the footage, who was on stage and who was just loitering around. On the two crowded events the role of the instructors had heightened significance to how people behaved. In the CAVE there were more preoccupied adolescent than downstairs where the instructor was more ordering. Although this was taken into account when analysing the material, it should also be taken into account when considering the significance of the outcome, especially the assessment on how people situated themselves against the game scenes. The findings here could use further conformation although they seem to follow what is previously known on physical involvement in immersive environments.
8. Conclusions

This thesis describes the yearlong development of a pervasive storytelling game for 3D representation of a city. In game development design science research approach was opted after the early prototype of the game was already developed as a student work. Research questions for this thesis work were: Can storytelling be made into a game that engages people and even inspires them into telling fictional collaborative stories? Does a game developed for this purpose have further possibilities and potential uses for research and as a serious game not just recreational addition for 3D environment?

Opinion on, whether Props is a game or not, are divided. This observation is based not just on our results but also how the game idea has been received on occasions it has been introduced or described. The boundaries between related definitions are somewhat obscure like the boundary between a game event and gamified RL situation or the boundary between playing a game and just playing. The concept of pervasive gaming is vast and can withhold all gamified RL situations, game events, game play and just playing around. This is why Props can be categorized as a pervasive game despite what the opinion on its more defined nature is.

Storytelling karaoke and improvised storytelling using digital visual aids are out there, but they have limitations often set by the small selection and low quality of the visuals. Many serious games are used in narrative aid therapy with children and adults for encouraging factual storytelling. Augmented maps and systems for gathering stories are often focused in collecting factual stories and presenting them to audiences on another occasion. The storytelling events themselves are oftentimes only partly improvised and rarely recreational. Part of the charm in storytelling events is that everyone is present at the time the story is told. The reactions of the audience, actors and prop masters all can have a possible effect on how the story goes and this then allows social binding to take effect. Props is a game to mediate storytelling events as a storytelling support system. A complete game event can span between realities, locations, audiences which enhances Props’ pervasiveness. Further try outs with Props could enlighten the role of digital media in mediating interaction between people not just HCI. Because the game content, the digital storytelling support system part, of Props does not determine too much what the game is used for, it is adaptable to many purposes. Many questions were still left unanswered. What is the level of pervasiveness for Props in all the possible ways the game can be played? Can fictional narrative used to study interaction? How does gameplay change the disposition of people towards each other and what can be the role of a storytelling game in that change? These are few of the interesting possibilities there are there for the next step of development.

To make this research a further success is to validate the game, show the relevance by further testing and grounding into extant knowledge base and also coming up with meta artefacts i.e. alternate ways of using the game and the elements that spin from its design. One could consider one such artefact being the use of the game in not just improvised storytelling where it was originally designed, but also in improvised theatre. Design of the game was improved by using the game on various occasions and grounding conducting extensive literature review to map the game artefact’s grounding to the fields of 3D environments, pervasive games and storytelling revivalism. The game idea brought
addition to the existing knowledge base in combining storytelling and pervasive gaming in a form of a short academic paper on the topic and also in evaluating storytelling systems in the form of this thesis.

For now Props has been used to look into how event scene and instruction can affect the level of engagement adolescent have during game mediated improvisational storytelling and acting. It appears that adolescent have more physical involvement in improvisational acting mediated by a game or a storytelling support system, when the setting is more immersive like a CAVE. This does not necessarily reflect much on how they enjoy the event. The role of instructors is significant on how the event unfolds and how significant the role of actual storytelling is during the situation, but they do not seem to have an effect on the physical involvement. These findings do bring also new insight on how to stage a Props game event in the future if the game is used to mediate participatory improvisational theatre.
9. References


Wright, W., (1989) SimCity [Video game]. Infogrames Entertainment, SA.


Appendix A. Transcripts of the Early Test Events

Cursive written parts are spoken and everything else is observations or other things heard from the tapes. Unless otherwise mentioned the speaker is the Narrator. The transcripts are translated from Finnish. The English transcripts are the material that has been used for further analysis.

I Tests Warm-up (about 6 min)

Narrator reads from paper a story about a little red riding hood. She does not always react in time to what is on screen, since the printout of a story is on the way.

Narrator takes a head start: *It was a dark and stormy night.* She hast to restart.

Once upon a time there was a cabin on the outskirts of a forest. There lived a big girl and her mum. (Prop master reacts to the story, by adding a cabin and a forest scene to the stage muttering to her self: cabin-forest-forest-cabin…. There is a pause in the story.)

Guidance: *You can continue rambling or just tell something* (participants chuckle). A tomb stone appears on the stage. *By the cabin there was a tombstone people called the little red riding hood. The girl lived in the cabin.* (A walrus appears). She had a walrus and two fishes as a pet.

Guidance: *You can just tell your story. There is no need to only react.*

One morning… On one morning the mother made… (A long pause for the prop master to look for morning sky in the game selection. She gets some guidance in the use of the game menu too)... Little red riding hood to attend some business. She went through a dangerous forest and came across a wolf. (Amused reaction by the participants as a walrus appears at the stage. Prop master comments: *Cannot get any closer than this*. She also notices to use the car prop as a vehicle for little red… she moves the prop back and forth the forest scene.) Wolf asked Little Red: *Good morning, where are you going to? She was going shopping to the city since her mum was ill.* (Pause: Prop master is looking for appropriate props.)

Guidance: *You may continue telling the story, even outside the guide story. Anything that comes to mind. There is no need to wait for Prop master to give you something.*

Prop master: I’m just hanging around here.

Grandmother… no mum is ill and I’m taking some food for her. I am always a nice girl and do what mother tells me to. (Pause).

Guidance: *You don’t necessarily have to read the story from the paper and you can decide by yourselves when to start and end the story.*

At this point the Narrator puts down the story aid.

There needs to be an assault of some kind. No, a storm breaks out and the car slides to a ditch.

Guidance: *Should we start all over. Is it ok for the Prop master.*

Prop master: *No, the car is now going to the ditch.* (Participants laugh as the prop master tries to make the car prop tumble)

Little red is a little dizzy and does not know where she is. She is lost.
Prop master: Can I get the car back to... I can!

I Test Continued. Storytelling without Aids

Let's start from the fact that it is a dark and stormy night?

Prop master looks for rain and night props: Yeah.

Little red still lives in a cabin in the middle of a forest. All of a sudden she decides to go joyriding in the middle of the night, since there is no booze in the cabin. (Participants laugh) The bar is far away in the city. On the way there she bumps into a tree. Suddenly a wolf comes across (This time the walrus is on stage swiftly). He wants to know, what the hell is Little Red up to. Little Red follows the wolf and he takes her to his pad (Room scene). There they can find, booze, good music and other spirits. At some point they run out and they begin a trip to the city (City scene, and car). But they have waited for so long that all the bars are closed and they decide to head back home. By the time the wolf and Little Red should part their ways they notice that they have fallen in love (Hearts effect). So wolf takes Little Red to her pad where she wonders why he has such a big teeth.

Guidance: You can decide when the story ends.

The story ends so that the wolf eats Little Red and lives in her cabin for ever after.

II Test

The Prop master is the same person as earlier, but there was a different narrator. Test events were held two weeks apart. Narrator is offered the possibility of a warm up session, but she refuses.

Story (About 21 Min)

The story begins. There was a sunny afternoon. (Pause, prop master is looking for a morning sky.) I was sitting by a palm tree (Narrator sees the game menu from the screen, is fast reader and picks up items from the lists before the Prop master has a chance to notice them).

Prop master: Help! (Chuckel)

By the beach... the waves rippled. Sun was shining. (Narrator picks from the list a sun and beach. Prop master is trying to keep up.) I got hot. I walked across the beach and saw something strange afar. I think it was an elephant. (Elephant prop) It was pink and I wandered what it was doing at the beach. The elephant started running. It was followed by a cow. (Prop master spends some time finding the cow from the selection) The cow followed the elephant backwards. They are obviously friends and on their way to a faraway place. I went for dip. In the water I met a shark. The shark (A walrus prop) looked a bit peculiar, but it was obviously a shark. It had a shark like tail. It tried to bite me, but I swam away fast. The shark shouted: “Don’t go!” I wondered what was up, but decided to swim away, because I was afraid the shark would bite me. I swam to the beach. There was a car waiting for me. My friends and some butterflies were in the car. We drove to the city. The city seemed desolate as it was a Sunday afternoon. People were not up and about yet. We went to a café and parked the car outside. I ordered coffee and cupcake (Room scene and Mushrooms prop) that looked like a mushroom. The café had a Christmas theme and waitresses had dressed up as snowmen. Upside down snowmen... (Prop master
is fiddling around with the snowman prop, a pause). There were live trees growing the café too, butterflies fluttering and bunnies hopping about... Not hopping... Where had the bunnies gone? Last time we were there there were bunnies. (Narrator saw bunnies on the menu, but it took a while for the Prop master to locate them) We left the café and headed to the jungle to see more elephants (Pause). We had heard that there were a lot of pink elephants in the nearby jungle and they had a secret. They had hidden a treasure somewhere in there and they guarded the treasure aggressively. We were not able to get close to the treasure although we caught a glimpse. They moved the treasure around to be able to guard it as well as possible. These elephants too had many cow friends. I cannot tell when the friendship between cows and elephants had started, but it had lasted at least for centuries (Figure). Apparently they benefitted from each other somehow. (Pause, Prop master tries to keep up with the narrator and throws cows and hearts to the stage. Narrator chuckles.) They obviously liked each other, cows and elephants. Their relationship was possibly intimate. It started to rain in the jungle. Water! (Prop master tries snowflakes prop.) It was 25° C. The rain came down as water. (Laughter.) Elephants left the jungle and hid the treasure again. We continued our journey in the jungle. We met pirates. Their ship was on dry land and they were stuck in the jungle. The monsoon was only starting so they would have been able to continue their sailing only later. Meantime they had built themselves a sandcastle to live in. (Pause 1 min. Prop master is looking for the sand castle.) Pirates also loved to play in the sand. They had a lots of sand toys. (Narrator was reading the menu again and not reacting.) There was a lot of toys and although the pirates were playful they also could, only by small incentive, become aggressive and start waging a war. So we did not want to go too close. Now they though had a party season and they celebrated with fireworks (Narrator is picking menu items again, before Prop master). Rain did not affect how nice the fireworks were. Pirates were known for their wonderful fireworks. Then we became witness to a very unusual event. The elephants arrived to the pirate site. Pirates saw the treasure and decided to pillage. Elephants protected the treasure fiercely. They attacked the pirates and trampled them. The pirates were sneaky enough to get to the treasure and steal it away from the elephants in the end. They hid with the treasure in to the sandcastle where the elephants dared not to follow. Elephants were gutted and they cried. (Rain effect from the Prop master.) Sky was crying with them. Elephants continued their journey through the jungle. They ate mushrooms for consolation. (Pause: Prop master is looking for mushrooms.) The monsoon came to its full force and the pirates sailed to the sea. There were plenty of seals (walruses) swimming in the sea. They were towing the pirate ship. The pirates vanished into the horizon. Only the tombstones of the trampled pirates left standing at the beach. One elephant had also died in the encounter. Elephants shot its ashes into the sky on a rocket. They had built the rocket themselves. The elephants were very skilled in this sort of electronics. Their elephant friends ashes flew to the orbit. We head back to the city. (Prop master empties the stage and looks for the city scene). There was a riot there. People thought it was wrong that pirates had stolen the treasure from the elephants. The city was set on fire. Elephants and cows came to wonder what was going on. They did not think it was so serious. They would find new treasure. So they flew away. The city calmed down. The fires were extinguished. The rioters left for their homes and it stopped raining. We also drove back to our homes. Our journey was over. We saw many things and thought we might as well get some sleep now. That was the story. (Applauds)
Combining Storytelling Tradition and Pervasive Gaming

P. J. Alavesa
Department of Computer Science and Engineering
University of Oulu
Oulu, Finland

D. Zanni
Department of Computer Science and Engineering
University of Oulu
Oulu, Finland

Abstract—In recent years storytelling has gone through various attempts of renaissance, thanks to a recreational storytelling revivalist movement, which has not been largely successful. Pervasive gaming is an all-encompassing branch in gaming and has the potential to reach a large amount of people. Moreover, it provides a way to mix modern society with age-old traditions like storytelling. This paper describes the development of a small scale pervasive game embedding at the same time social and improvisational features and the use of this game by amateur storytellers. The game, Props, aims to take storytelling from oblivion to modern urban environments.

Keywords— pervasive gaming, storytelling, game development, digital storytelling, improvisation

I. INTRODUCTION

In recent years there has been a revival in storytelling, especially where narrative is used to aid research in social interactions. Revival of storytelling as a pastime has not been so successful [1]. Storytelling is by definition the art of portraying a tale with words, movement, images or other embellishments. Digital aids are widely used to enhance storytelling events: for instance storytelling karaoke relying on digital enhancement are popular during storytelling festivals. The storytelling revivalist movement could benefit from the possibilities brought by the use of digital technology during storytelling events, overcoming the criticism of inability to integrate storytelling into modern context that it has been receiving. Most pervasive games are set in urban locations where there is the inclusion of modern technological infrastructure, social abundance and availability. Storytelling has long history and many social implications [1]–[4]. Combining the two, tradition of storytelling and pervasive gaming, could benefit both phenomena.

Augmented reality and mixed reality games are sub-genres of pervasive gaming [4] and stages are locations that people inherently expect to be setting for displays. Some augmented reality experiences are based on real life stages, but those are primarily meant to be interactive tourism guides or story enhancers. They often require minimal participation from the audience [5]–[7]. Apart from virtual reality dioramas there are storytelling support systems which include the use of technological aids. They are mostly intended for children and also in high demand for purposes that are both recreational and pragmatic [8], [9]. Children could be considered an obvious target group for stories and fairy tales, so systems like these do not expand the audience of a storytelling event.

Most of the times an element of improvisation is present in pervasive and mixed reality games. However even in pervasive live action role playing games (LARP) and games that have heavy reliance on story elements the main plot and characters are already set and even the outcome of the game might be known in advance. There are many available methods and aids for creating characters and plot-lines for games and interactive drama, these are though not focused on the timely occurrence of a storytelling event [10]–[14].

This paper describes the development of a small scale pervasive game. Props is a game that can take storytelling from camp-fire sites to modern urban environments. Furthermore it has potential to reach both children and adults. The game was developed as content for 3D representation of Oulu, a city located in Northern Finland.

II. DESCRIPTION OF GAME PROTOTYPE

The development of Props (Fig. 1.) spanned through the autumn of 2012 and was a joint effort of four students from Information Processing Science department at Oulu University investing roughly 300 work hours each on the project work.

Figure 1. Action-shot of Props. On the right side is the main menu of game. The purpose of the game is to aid and inspire timely improvisational storytelling. The game prototype produced
was designed to have two active participants, the prop master, who stages the scene, and the narrator, who tells a story. The story itself and the stage can have audience on both locations, in the real life (RL) stage and at a corresponding location in virtual environment. The virtual reality (VR) environment of the game is set at the reality corresponding place in the 3D model of the city (Fig. 2.). In Props, the RL location is at the center of the city of Oulu, on a promenade that is a popular meeting and event spot, a place where people pass by daily. In close vicinity of the stage and along the promenade are also placed large interactive touch screens, ubiquitous screens (UBI screens) that are ideal for displaying varying visuals for the passing public [15]. The available infrastructure makes this location not just a social but also a technological urban hotspot, an ideal location for a game like Props. It was originally envisioned that the narrator would be situated in the RL stage where the game is set. There is no reason why this could not be done although it would require some arranging. The overall game setting is quite simple and much of how the players and audience are situated can be determined by the players themselves. The easiest way to play is to situate everyone in the same room. Props is a game of performance much like Sing Star or Guitar Hero, only in this case the game is about storytelling, there is greater freedom in what the outcome will be and anyone can participate in creating a story without competition.

The game has large selection of props, scenes and backgrounds to provide storytelling support. The design elements of the game were intended to have high visual appeal and despite the abundance in selection, this was mainly achieved. The props and scenes can be selected in the game menu with a click of a mouse, allowing the prop master to place them on the stage. Items can be deleted from the set or moved around and rotated with keyboard commands. The main menu contains different types of props, sub menus and options for clearing the stage or filling it with random selection of items. The prop master, who sets the stage for the story, has plenty of options to choose from and the possibility to come up with surprising combinations.

What makes Props a pervasive game is how it takes storytelling out of its usual context and spans between presentations of real life and virtual. It also has an obvious social expansion, especially if an audience is brought into the game situation or if the players are previously unknown to each other. Much is determined by how the players and organizers of a game event decide to play.

III. Props Game in Improvisational Theater and Storytelling

The realized aspects of the game were tested in lab on two occasions by bringing in outsiders to play the game as a narrator and a prop master (Fig. 3.). The main emphasis during the initial testing was on finding bugs, but we also aimed at seeing if people engage with the game situation. During these testing events, the storytelling went surprisingly well after a slow start. Narrators and prop masters found ways of using limited selection of props to represent their story. The prop master on both occasions chose a supportive role and seldom used the possibility to direct the story onto a new path.

These test situations were still far from a game event where the narrator could be situated at the real life stage and the audience might be distanced from the narrator when following the play through UBI screens or in 3D city by just looking at the VR stage and listening to the story.

The improvisational theater group Uniikki Unikorni (Unique Unicorn) is a small Finnish amateur performance group.
Props got a small time slot during the children's story hour held at the Oulu Improvisational Theater Festival 2013. Some changes were made to the game to make it more suited for the event. The graphical user interface was localized i.e. translated into Finnish and some additional game content was created. Making the changes was quite simple since during the game development code reusability had been taken into account by making the addition of props simple and the main menu updatable.

During the storytelling event nine people, five of whom were children, were in the audience. Seven members of the performance group were present and four of them took actively part in the storytelling and acting. Props was introduced at the end of the story hour (Fig. 4.). Two children got to try the game out as prop masters, while the members of Unikkii Unikorni told a story and acted it. Props and scenes were selected from a laptop by the children themselves with the aid of an adult (Fig. 5.). The scene was projected behind the performers. The story followed the prop selection very closely. Children favored easy options like random button. Narrator swiftly renamed the random button a “space vortex” in his story. It helped to have seasoned performers to narrate. They were used to improvise and the story flowed from the beginning into a smooth and likely end. One could conclude that the main difficulties met during the session were technical and could have been avoided with better preparation.

Figure 4. Narrator (left) was situated at the side of the stage with a view to everything that was going on.

Figure 5. Children played as prop masters and selected items to the scene

The feedback from the performers was gathered via email, after the event. Improvement ideas and other thoughts were also enquired with two open questions at the end of an eleven questions questionnaire (Table I), where the questions were based on a five level Likert scale. Three out of four performers who took part in playing the game answered the questions. Two performers agreed on how the game influenced the story and the event, answering that the influence was positive, to quote one of the performers: “It was great fun to improvise in front of a changing scene, but the best part was the enthusiasm of the children as they got to affect how the story went”. One had differing opinions on how the game affected the story hour. This performer did though show enthusiasm in trying the game out again and evaluated audience's reaction to the game positive.

<table>
<thead>
<tr>
<th>Question</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>The game content brought a positive addition to the story-hour</td>
<td>4 5 3</td>
</tr>
<tr>
<td>I would like to try the game again in similar situation</td>
<td>5 5 4</td>
</tr>
<tr>
<td>I preferred the story-hour without the game</td>
<td>2 1 4</td>
</tr>
<tr>
<td>The game had a positive effect on the content of the story and how the story flowed</td>
<td>5 5 2</td>
</tr>
<tr>
<td>The game idea was easy to grasp</td>
<td>4 4 3</td>
</tr>
<tr>
<td>The game affected the story too much</td>
<td>2 2 5</td>
</tr>
<tr>
<td>What was on the screen had no significance on how the story went</td>
<td>1 1 2</td>
</tr>
<tr>
<td>I do not like that storytelling is mixed with technology or games</td>
<td>2 1 1</td>
</tr>
<tr>
<td>The game suits this situation, but I would not like to use it on every story-hour</td>
<td>3 5 5</td>
</tr>
<tr>
<td>I think the audience had a positive reaction to the game</td>
<td>4 5 4</td>
</tr>
<tr>
<td>Playing was too difficult for the kids, that made the event unpleasant</td>
<td>2 3 4</td>
</tr>
</tbody>
</table>
What was encouraging was that all three performers agreed on not having a problem with mixing technology and games into a storytelling event. On the other hand they either wavered or agreed with not necessarily using the game on every story hour. This might suggest that mixing technology and storytelling tradition is not a problem, but doing so is still considered a peculiarity and has a place and a time only on special occasions. Too few opinions were presented though for this to be in any way conclusive. All in all Props works as a visual support system for storytelling and improvisation. It is still difficult to say how well it works and how well it would be received on other occasions.

IV. LIMITS, USES AND FURTHER DEVELOPMENT

For now Props is just a small game with big potential. The game prototype and the game idea are at such an early stage of development that it is still possible to take it to several directions and make it serve different kind of purposes. When compared to many other urban pervasive games Props does not span the game action throughout the city scape. In the original game design it was envisioned that the narrator i.e. the storyteller is situated at the real life presentation of the stage and the props are placed in the VR representation, where the audience can enjoy the visual display and the story on both location. Adding more audience to the game is an important part of the game design and expands the social participation into the game event. Apart from making obvious improvements in the playability of the game, the possibility to stage the scene or to be a prop master could be made available for anyone through a UBI display or a portable device. This would be a nice addition to big scale storytelling events.

During storytelling events narrators are often seasoned storytellers who have no trouble telling a story in front of a public audience. They might also have routine reactions to outside inspiration. When we had seasoned storytellers as narrators and actors the resulting story was well structured, but otherwise Props tends to produce unstructured stories. These latter incoherent tales are also more personal. In this sense the game could be a good aid in therapy. In addition stories that resonate from personal experiences can have a healing and binding effect between community members [16]–[18]. Both the storytelling revivalist movement and pervasive gaming have the possibility to reach masses, but they seem to have trouble doing so. In this sense both seem to have immense untapped potential [2], [3]. Props was tried out during the children's story hour, with experienced storytellers. One might even consider children and storytellers as the obvious target groups for the game. Props though has the potential to reach anyone and help city dwellers unleash their imagination, tell their story or be inspired to create a new one. We received some indication of this potential from our preliminary tests where none our narrators were experienced storytellers and where the prop master was not a child.

As a conclusion, we believe that it is possible to take an established custom or tradition and embed it into pervasive gaming scene. The realization does not have to be very large in scale in order for the end result to be functioning and with ramifications.

ACKNOWLEDGEMENT

The authors would like to thank L. Annola, T. Taipaleenmäki and X. Hu for taking part in building the game prototype.

REFERENCES

Evaluation-Day-of-Figurines-II.pdf
Appendix C. Questionnaire for Science Day Event

The questionnaire is translated from Finnish. On some questions the legend that is present in the graphs of the Chapter 6. is mentioned in brackets.

Your Age?

Circle your answer

Were you a prop master: yes / no
Were you an actor: yes / no
Were you a narrator: yes / no

On a scale 1-5, where 1= disagree, 2= somewhat disagree, 3= cannot say, 4= agree somewhat, 5= agree.

<table>
<thead>
<tr>
<th></th>
<th>😞</th>
<th>😞</th>
<th>😞</th>
<th>😞</th>
<th>😞</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game and game content affected the story (Game Had Effect)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Game had a significant role in the event (Game Had Significance)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I Affected the story with Game</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I found a fitting way to participate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Felt like an outsider</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I participated as an audience member</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I had no time for other roles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I had no courage for other roles</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I favoured a role</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I collaborated creating a story with all other participants</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(Collaborated with Participants)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I collaborated creating a story with all other class mates.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(Collaborated with Classmates)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I got heard during the event (Got Heard)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I enjoyed the part I played</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I don’t usually participate in anything with class mates</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(Unusual to Participate)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The game offered me a way to participate in storytelling</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I used the game guided by story</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I guided the event with the game (Guided Event with Game)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I guided the story line with the game (Guided Story with Game)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I guided the participants with the Game (Guided Participants with Game)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am not into performing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The event was improvisational theater</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The event was a game hour</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The event was a story hour</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I recognised the stage</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>It was significant for the game that he stage is recognised</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>If could try the game in 3D environment as it is, I would try it (Would Try Again in VR)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I had no Time to Follow the Story</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I enjoyed the Event</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I would like to try the game again in a similar setting (Would Try Again)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I enjoyed the Story</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>