The Implementation of MiRO, a Media-as-Place Computer Game

Hyeok Kim
hci+d lab.
Seoul National University
Seoul, Korea
kimhyuck@snu.ac.kr

Hansol Jang
Information Science and Culture
Seoul National University
Seoul, Korea
qkaehwjr@snu.ac.kr

Haesoo Kim
Information Science and Culture
Seoul National University
Seoul, Korea
haesoo1108@snu.ac.kr

SooMin Lee
Information Science and Culture
Seoul National University
Seoul, Korea
soomin8142@snu.ac.kr

Youngjin Kwon
Department of Communication
Seoul National University
Seoul, Korea
shb02192@snu.ac.kr

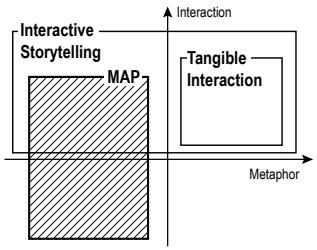
Joonhwan Lee
hci+d lab.
Seoul National University
Seoul, Korea
joonhwan@snu.ac.kr

DIS '19 Companion, June 23–28, 2019, San Diego, CA, USA
ACM 978-1-4503-6270-2/19/06.
https://doi.org/10.1145/3301019.3323881

Abstract
In this study, we implemented MiRO, a web-based Media-as-Place storytelling game that resembles an existing OS. Media-as-Place storytelling refers to a story where its medium is identical to its place. Observing from escape room games, we propose this concept by contrasting it with interactive storytelling and tangible interaction. To realize the computer version of Media-as-Place storytelling, we focused on imitating visual representation and interactions of existing OSs. MiRO involves OS elements (e.g., a taskbar), in-game applications (e.g., e-mail, a web browser), and interaction techniques for existing OSs (e.g., drag-and-drop). We also conducted a preliminary user evaluation with 17 participants. MiRO was perceived as an OS visually, although its interaction was limited due to the characteristics of the web environment. From the interviews, we found that the role of guidance is important because Media-as-Place storytelling allows a high variety of available interaction at a time.

CCS Concepts
•**Software and its engineering** → **Interactive games;**
•**Human-centered computing** → *Scenario-based design;* Empirical studies in interaction design;

Author Keywords
Mystery Games, Game Interaction, Storytelling



	Metaphor	Interaction
Interactive Storytelling	–	O
Tangible Interaction	O	O
MAP	X	–

Figure 1: The idea of MAP storytelling

.

Introduction

Escape rooms have captivated people since its appearance in 2014. According to USA Today [6], escape room facilities, search trends, and related hashtags (#weescaped) have steadily increased in the US and other countries. This global popularity of escape rooms can be attributed to their mysterious plot and the physical manipulation of components. In an escape room, people need to solve puzzles to discover 'underlying truths' and escape. The rooms and objects are real or bear high resemblance to real things. The higher tangibility of escape rooms seems to help people be more immersed in the game, in that tangibility is likely to enhance the presence of a virtual environment [3].

This WYSIWYG-like experience is highly related to, but different from tangible interactive storytelling. A tangible interactive interface provides physical tools to interact, e.g.,[10, 1], but those tools represent objects in the system metaphorically. In escape rooms, however, the objects that people manipulate are not metaphors but exactly what conceptually belongs to the game. For example, a player finds a key in a drawer, which unlocks a door. This type of storytelling, in semantic terms, suggests a concept where the signifiants are the signifiés. We will call this type of storytelling "Media-as-Place (MAP) storytelling", referring to a narrative of which medium and place are identical.

Along with the technological development, a variety of MAP narratives have become possible in the field of computer games. For example, 'Hacknet' [11] is a computer game which offers a terminal-based hacking interface. While playing the game, people are likely to experience using an application. Similarly, 'Sara is Missing' [12] is a mobile game that provides a smartphone-like interface. To further extend this emerging rhetoric, design studies are demanded, and we will introduce our in-progress study on MAP storytelling.

Media-as-Place Storytelling

In this study, we suggest the concept of Media-as-Place storytelling, a type of storytelling where the medium of a narrative is identical to the place of the narrative. A medium is a set of physical objects that delivers a story, and a place is a virtual environment where the story is spatially rooted. This is conceptually distinguished from interactive storytelling and tangible interaction. First, interactive storytelling refers to story systems where users can interfere in and control the progress of the plot [8]. For example, in 'Black Mirror: Bandersnatch,' [9] a recent Netflix film, one can interactively choose the plot of which the place is a town. On the contrary, 'Searching,' [2] a thriller film, is an example of MAP storytelling. The narrative of this movie is delivered through a screen (medium) as a form of a screen (place). For instance, conversations and news reports are mediated through Facetime and YouTube videos, respectively. That is, what is going on on a screen is what we do on a screen.

Second, MAP storytelling also differs from tangible interaction. According to Hornecker and Buur [4], tangible interaction aims to expedite intuitive interaction by combining interactive features to ordinary objects. For example, in Stanton et al.'s educational tangible system [10], objects represent elements in the system. The objects are the physical metaphors of the system elements. However, MAP storytelling requires the absence of metaphorical relationships between the narrative elements and manipulated objects. Instead, the objects are the very elements of a narrative. The discussion in this section is visualized in Figure 1.

Implementation of *MiRO*[1]

Design Objectives

To materialize the idea of "Media-as-Place storytelling", we designed MiRO, a game with a simulated OS and sev-

[1] This game is accessible via https://miro.xyz.

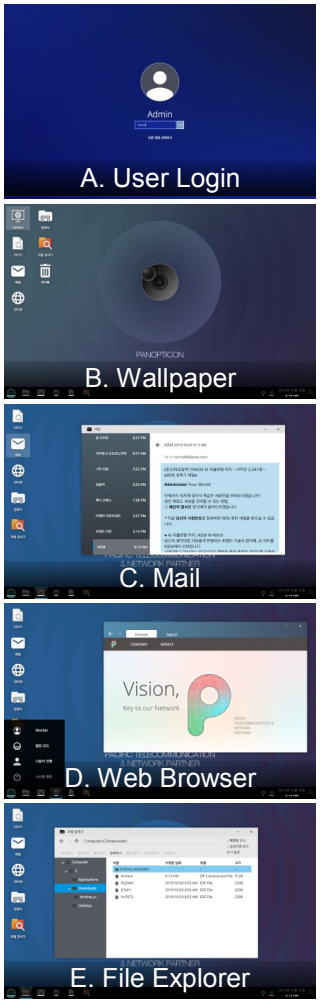


Figure 2: Screenshots of MiRO

.

eral applications. This suggestion looks more or less ironic because the idea of escape rooms originates from digital games. However, MAP interaction emerged as escape rooms are materialized. Therefore, we tried to realize the MAP interaction on computer games. We designed a simulated OS where users can perform everyday interactions in their computer, such as executing applications, manipulating file systems, and sending e-mails.

We focused on two objectives when designing this game. First, we tried to design an interface that can be visually perceived as an OS. We avoided imitating an existing OS to prevent users from confusing it with their own computers. Second, we tried to implement commonly-used interaction techniques in computers. However, we excluded techniques dependent on specific computer models, such as multi-touch for trackpads. To achieve these objectives, we implemented a simulated OS with the following elements:

- OS elements: a login screen, a task bar, a file system with copy-and-paste, a wallpaper, a bin, a notification center, instant notifications, and a firewall.
- In-game applications: an e-mail application, a web browser, a file explorer, a file viewer, a file inspector, and a compressor (plug-in).
- Interactions: drag-and-drop file attachment, double-click execution, multi-selection of files, and moving windows by dragging.

Game Plots

In MiRO, players are an employee of a network company where mysterious events often happen, and they need to uncover the underlying truth. Before starting the game, players select a user account between Admin (locked) and Worker (unlocked). In the initial phase, they log on to the Worker account and follow a to-do list in the wallpaper. If they adhere to the instructions, they will continue doing the same tasks. Instead, they can move on to the second phase after actively seeking hints in e-mails and obtaining the password to the Admin account. In the second phase, they need to decipher locked files, update an application, and send several e-mails to ultimately reveal the truth and 'escape' the virtual environment.

Development Environment and Related Concerns

For accessibility, our game application was developed for a web environment, so we utilized Vue.js, a Javascript-based front-end framework, and Express.js for the back-end framework. With this choice of platform, there followed several concerns. First, HTML DOM elements had to be presented in a single page due to the scope of the Fullscreen API. Second, Javascript's asynchronicity imposed a burden to design the lifecycle of in-game applications carefully.

Preliminary Evaluation

Methods

We recruited volunteers through an online recruiting platform. A total of 17 people (10 male and 7 female) participated, with an age range of 22 to 31 (M = 25.59). The task of this study was to play the game for 20 minutes. They could proceed as far as possible within the time limit, but they also could stop playing the game after the initial 10 minutes. The tasks were performed on an iMac with keyboard-and-mouse setups.

The pre-test questionnaire asked demographic information and game usage patterns. In the post-test questionnaire, we asked the degree of resemblance between our in-game 'system' and a real OS they use in terms of visual representation and interaction with a 7-point scale. The post-test questionnaire also contained a 5-point scale evaluation of the post-game experience based on the Game Experience

Questionnaire (GEQ) [5]. We also received qualitative feedback through brief interviews and analyzed the transcripts by open-coding.

Findings

Resemblance to an OS

In general, the participants perceived the interface of our game as akin to a proper computer OS. The average score of the visual resemblance to an OS was 6.06 (SD=0.83). In the interview, participants said, *It looks highly like a computer* (P4) and *I felt as if I had used a computer because of its overall computer-like interface* (P17). P1, P2, P7, P8, and P15 also provided similar comments. The average score of the resemblance of interaction was lower, 4.71 (SD=1.36). From the interview, we found that people had difficulty in using shortcuts, e.g., Alt+Tab, Ctrl+F, (P2, P4, P8) and right click (P12, P16, P17) which were *unconsciously used* (said by P2). However, the availability of drag-and-drop file movement (P9), double-click execution of applications and files (P16), and the consistency of user settings (P16) made our game's user interaction similar to that of an existing OS.

Gaming Experience

The evaluation was less positive for the gaming experience. In the post-game experience module of the GEQ scale [5]. The average scores were 1.92 (SD=0.51) for positivity, 2.29 (SD=0.62) for negativity, 2.56 (1.09) for tiredness, and 2.61 for returning to reality. In the interview, we found that many participants "felt lost" while playing the game due to the lack of explicit in-game instructions despite the variety of interactive elements (P7, P8, P13, P15). This is related to the paradox of choice [7] that a variety of options might cause cognitive overload. This was contradictory to our expectation that less guidance will facilitate the players' active exploration of hints as in escape rooms.

However, several participants perceived that our game was similar to existing escape room games (P13, P15). In escape rooms, players need to find hints or answers actively by opening drawers or books. On the other hand, computer games tend to give explicit goals or background stories. This implies that the synopsis and clear aim of a game might be important for MAP storytelling games with a lot of interactive options.

Conclusion

In order to test the MAP storytelling on a computer setting, we implemented MiRO, a game that highly resembles an existing OS. MAP storytelling means a style of storytelling where the objects that users manipulate are exactly the same as what comprises the story. In the evaluation, our design was successful in emulating the visual interface and user interaction of an existing OS. However, we were less successful in creating a convincing 'game,' due to the limited number of explicit instructions. To extend the concept of MAP storytelling, a more structured user study is required. However, our study in progress has two major contributions. First, we suggest and shed light on the idea of "Media-as-Place" storytelling. Second, we implemented the MAP storytelling on a computer setting, making a computer a virtual 'place' rather than a medium for a virtual environment. These contributions will help extend the emerging field of MAP storytelling.

Acknowledgements

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2018S1A5B8070398) and the Institute of Communication Research, Seoul National University.

References

[1] Jim Budd, Krystina Madej, Jenna Stephens-Wells, Janice de Jong, Ehren Katzur, and Laura Mulligan. 2007. PageCraft: learning in context a tangible interactive storytelling platform to support early narrative development for young children. In *Proceedings of the 6th international conference on Interaction design and children*. ACM, 97–100.

[2] Aneesh Chaganty. 2018. *Searching*. Sony Pictures. Film.

[3] Daniel Harley, Aneesh P Tarun, Daniel Germinario, and Ali Mazalek. 2017. Tangible VR: diegetic tangible objects for virtual reality narratives. In *Proceedings of the 2017 Conference on Designing Interactive Systems*. ACM, 1253–1263.

[4] Eva Hornecker and Jacob Buur. 2006. Getting a grip on tangible interaction: a framework on physical space and social interaction. In *Proceedings of the SIGCHI conference on Human Factors in computing systems*. ACM, 437–446.

[5] WA IJsselsteijn, YAW De Kort, and Karolien Poels. 2013. The game experience questionnaire. (2013).

[6] Carly Mallenbaum. 2018. Why escape rooms have a lock on the U.S. (2018). Retrieved Febuary 1, 2019 from `https://www.usatoday.com/story/life/people/2018/04/25/escape-rooms-trend-us/468181002/`.

[7] Barry Schwartz. 2004. *The paradox of choice: Why more is less*. HarperCollins.

[8] Nikitas M Sgouros, G Papakonstantinou, and Panayotis Tsanakas. 1996. A framework for plot control in interactive story systems. In *AAAI/IAAI, Vol. 1*. 162–167.

[9] David Slade. 2018. *Black Mirror: Bandersnatch*. Netflix. Film.

[10] Danae Stanton, Victor Bayon, Helen Neale, Ahmed Ghali, Steve Benford, Sue Cobb, Rob Ingram, Claire O'Malley, John Wilson, and Tony Pridmore. 2001. Classroom collaboration in the design of tangible interfaces for storytelling. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 482–489.

[11] Matt Trobbiani. 2015. Hacknet. (2015). Game, Retrieved from `http://www.hacknet-os.com`.

[12] Tim W. and GCM. 2015. Sara is Missing by saraismissing. (2015). Game, Retrieved from `https://saraismissing.itch.io/sim`.