Leech: Let's Expose Evidently bad data Collecting Habits – Towards a Serious Game on Understanding Privacy Policies

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Abstract

Most privacy policies are incomprehensive and largely unreadable. As a consequence, most users do not bother to read them. We propose Leech, a serious game developed in a students' project for learning about the contents and structure of privacy policies so that users get a rough understanding what to expect in privacy policies. *Leech* is an adventure game and the player has to solve quests to complete the game. Two of the tasks are implemented as a mini game to allow more complexity. Two pre-tests led to promising results and we intend to quantitatively evaluate the game in the next step by investigating players' online privacy literacy, demographics, values on privacy policies, actions within the game, and their in-game experience.

1 Introduction

With the rise of the Internet of Things, privacy policies are not only used to cover websites but also for any kind of service connected to the internet [13]. However, after the introduction of the EU General Data Protection Regulation (GDPR) most privacy policies are used as legal agreements and users encounter them to be largely unreadable [2]. A recent study has shown that even a transparent and comprehensive privacy policy was misunderstood by half of the participants [12]. Although tools to support the users exist [1, 14], exercising privacy choices still requires a high level of effort from the users [9]. Therefore, we have developed a serious game to educate in particular laymen users about the structure and content of privacy policies. The aim of the game is that players get a better understanding of privacy terms, and learn about the structure of privacy policies, potential consequences of accepting a privacy policy and how to compare two privacy policies.

2 Related Work

In the non academic context, a couple of games exist which intent to raise awareness about privacy issues, e. g. Privacy Chicken Game [1], Google's Interland [2], Datak – a game about personal data [3], Data Dealer [4], an app to explain data flows and improve data literacy called "Stadt Land Datenfluss" [5], and game for FarmVille and CityVille players from Zynga [10]. These games show a wide variety of approaches, however, they were never academically evaluated.

Games that enable the player to learn about privacy have also been developed in an academic context and discussed in literature. Bioglio et al. [4] created and evaluated a web application for school children in order to raise their awareness about privacy mechanisms in social networks. They found their tool to be effective in teaching children potential privacy risks. Berger et al. [3] developed a chatbot game for teenagers that addressed privacy concerns in a smart city. They found out that quizzes and real life examples were most effective in raising privacy awareness amongst players. Friend Inspector allows its users to playfully increase their privacy awareness on Facebook [5]. Fatima et al. developed a serious game to raise privacy awareness and found a positive long-term impact on users online behavior in terms of controlled information sharing [7].

While all of these games teach the user about online privacy in some form, none of the games focus on creating a better understanding of privacy policies and their contents.

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[1] https://www.nytimes.com/interactive/2020/01/21/opinion/privacy-chicken-game.html
[2] https://beinternetawesome.withgoogle.com/
[3] https://www.datak.ch/
[4] https://datadealer.com/
[5] https://stadt-land-datenfluss.de/

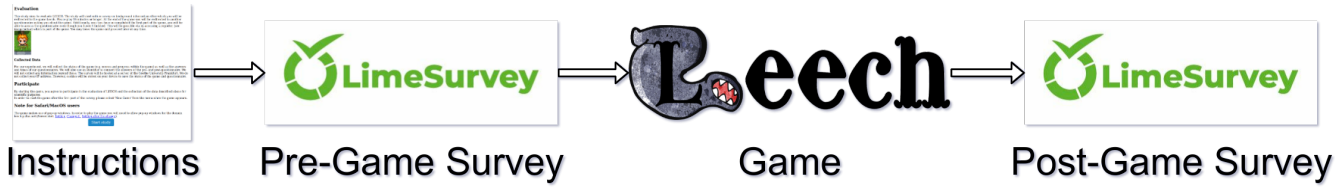

Figure 1: Experiment Overview

3 Methodology

This section describes how the game was designed and how we evaluate it. Since the study will be done online, we can not control who is participating. Thus, we can not ensure that no minors or special groups will participate in the study and do not qualify for an exempt for the ethical board. The study design was examined by the common ethical commission of the economics faculties at Goethe University Frankfurt and Johannes Gutenberg University Mainz and no ethical concerns about the research project were expressed.

3.1 Game Design

To achieve the goal of creating a better understanding of privacy policies within players of our game, we had to find a suitable game genre. Since privacy policies are very text-heavy this genre must be able to transport a lot of text. We identified adventure games as suitable, because they are able to convey a lot of text through dialogues with non-player-characters (NPCs) or soliloquy. Furthermore, the adventure genre allows to create a continuous storyline throughout the game can potentially create suspense and motivates players to keep on going, even though they might perceive the general topic of privacy policies as being rather dry and boring.

Several elements in *Leech* were used to allow players to foster knowledge about privacy policies:

- In the main game, NPCs like friends or colleagues of the character explain throughout the game how privacy policies work and the effect it can have neglecting them.
- Two minigames are embedded in the main story to allow for extra interactivity that would not have been possible to implement in the dialog-centered main adventure game mode:
  - A game where the player has to sort snippets of a privacy policy to learn about relevant parts and the structure of privacy policies.
  - A quiz to more broadly cover different topics from the GDPR.
- Actions and choices the user makes, e. g. the choice of a agreeing to a certain privacy policy, have consequences later in the game and aim to enable the player to recognize privacy-friendly privacy policies and to learn that accepting a privacy policy might not have immediate consequences, but may have consequences later.

Besides covering different aspects, the variety of game designs is also intended to keep the user engaged throughout the game and make it less monotonous and repetitive. After selecting the game genre, the development platforms, and the used elements, the rough plot of the adventure game was elaborated and the game characters and their functions were determined. Based on this a detailed script with dialogues, soliloquies and stage directions was created. This was done in order to separate considerations about the content of the game from technical considerations when implementing the game at a later stage.

3.2 Evaluation

For the evaluation we decided to have a website with instructions informing the participants about the structure of the experiment, the game, data collection, and potential technical issues and workarounds. From there participants are redirected to the pre-game survey implemented with Limesurvey [8] hosted at Goethe University. We ask about the participants' demography, their online privacy literacy [15] and about their values on privacy policies [6]. Within that process there is also a unique identifier generated which is passed to the following instances and used to link the participants' answers. After the pre-game questionnaire, participants play *Leech*. The game has several exit points allowing the players to also end the game without playing it through. Last is the post-game questionnaire which gets the participants' game status via several hidden variables and asks the participants for an evaluation of the game by the In-game Game Experience Questionnaire (GEQ) with 2 items on competence, sensory and imaginative immersion, flow, tension, challenge, negative affect, and positive affect [11]. We also ask for a self-reported feedback on the different learning goals sketched in the introduction. Figure 1 shows an overview of the sequence.

4 Game Contents

The main game (cf. Fig. 2) starts with Dave, our main character, discovering a new Service: Leech Cloud. He starts using

Figure 2: Start of the Main Game

this service without reading the respective privacy policy and because of his enthusiasm he wants to tell everybody about it. Already in his first discussion, he realizes that this service does not only have advantages. During his adventure he interacts with lots of interesting people who demonstrate him the disadvantages of ignoring the terms of the privacy policy. Even at night the guilty conscience does not let go of him. In his dream, Europa (hero figure) appears to him, who draws his attention to the right to erasure (GDPR) and encourages him to travel to the castle of the leech (antagonist and boss) to get the data back.

As in every adventure game, Dave has to finish tasks to proceed in the game. Besides tasks incorporated in the main game, there are two tasks implemented in mini games. When Dave meets the data protection office of his company in exchange for advice, the data protection officer asks Dave to put together a torn data protection declaration (cf. Fig. 3). The snippets of the data protection declaration must be put in the correct order using drag and drop. The snippets each consist of a heading of the data protection declaration and the corresponding explanation. If the snippets are lined up correctly, the player may proceed with the main game; if the order is incorrect, he will be asked to edit them again. Solving all tasks along his way will lead Dave to the castle of the data leech, where he has the possibility to retrieve his personal data. But before Dave can enter the castle of the leech, he has to prove his knowledge by passing a quiz (cf. screenshot in right corner of Fig. 4). The quiz is based on the GDPR and after answering each question, the players get feedback on their answers. The player needs to answers at least half of the questions correctly to be allowed to enter the data leech's castle.

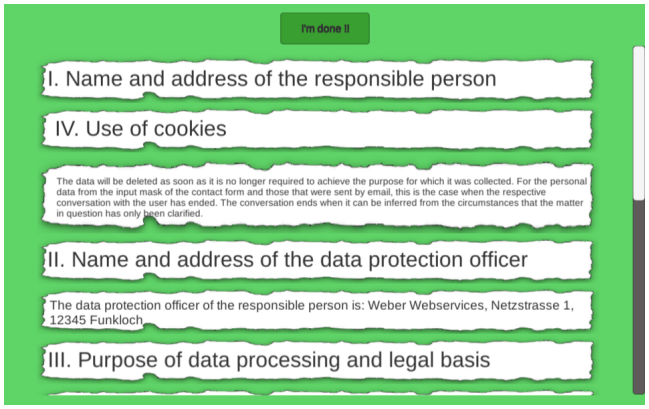

Figure 3: Minigame: Sorting Snippets of a Privacy Policy

5 Architecture and Implementation

For the implementation of the main game RPG Maker[6] was selected as the development platform as it allows the creating of a visually appealing game (cf. screenshot in the top of Fig. 5). Due to several restrictions within RPG Maker, the mini games were implemented with the Unity game engine[7]. Both tools allow across-platform development. To avoid spending too much resources on testing, we chose HTML5 for webbrowsers as solely target platform.

In particular to support non experienced players, the upper left corner shows the player the next task (cf. Fig. 6). This prevents the player from getting lost and allows that they focus on the game's content and learn something about privacy policies.

Especially for our evaluation, we added reporter NPCs at several points in the game as shown in Fig. 7. By talking to a reporter the player is able to end the game at any time and proceed with the post-game survey.

[6] https://www.rpgmakerweb.com/
[7] https://unity.com/

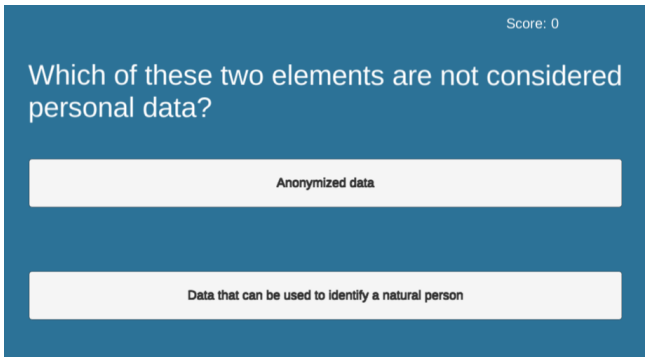

Figure 4: Quiz

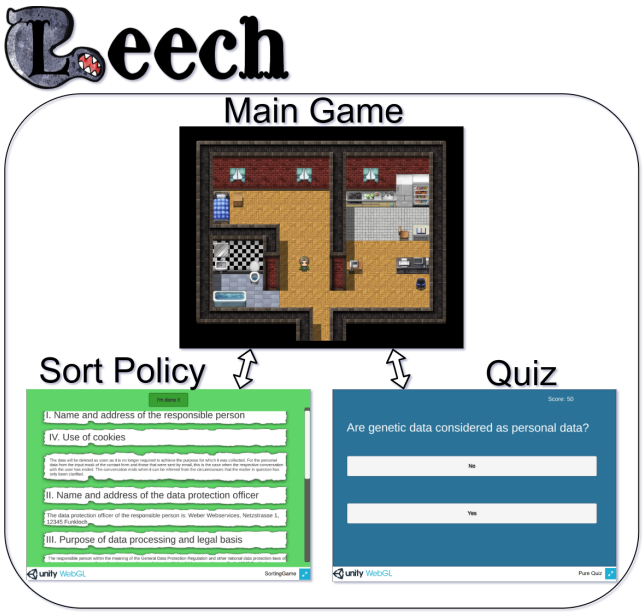

Figure 5: Game Overview

Figure 6: Next Task

The player's decisions and performance during the game will be stored for the evaluation. The main game receives the players' results via browser cookies and uses URL variables to pass the data to Limesurvey. We collect the players' general progress in the game, players' decisions within the game, players' last result for the quiz and the number of retries for the final question. Table 1 gives a brief overview of the collected data.

The game along with the instructions and surveys is available online and can already be investigated via https://leech.pallas.net/.

6 Evaluation

So far we have run two pre-tests. The first one with 12 researchers from Goethe University and the second one with 6 persons with a mixed background. In general the feedback was positive and most players liked the game and those who were not already aware beforehand, confirmed that they learned about privacy policies. As a result of the feedback, we have also improved the instructions, i. e. with some explanations for non-experienced players, we have fixed some

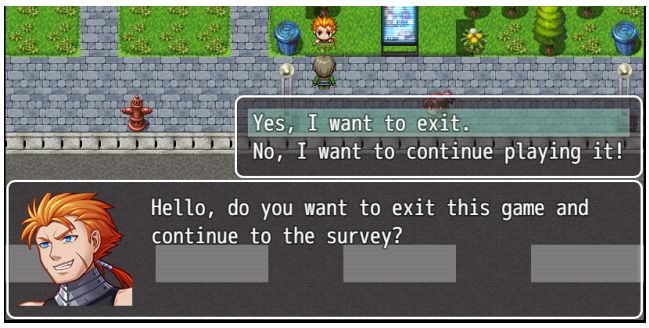

Figure 7: A Reporter Allows the Player to End the Game

flaws, i. e. improved the usability for different browsers, and improved the usability, i. e. added some more explanations and instructions like the description of the task within the main game.

As a next step, we intend to broadly advertise our game/survey and get a sufficient amount of data to do a quantitative analysis.

7 Conclusion and Outlook

We have proposed a serious game to foster a better understanding of privacy policies for laymen. So far we have conducted some pre-tests and the qualitative feedback looks promising. As a next step, we intend to do a quantitative evaluation of the game considering the constructs mentioned in Sect. 3.2 to investigate if the game fulfills its purpose and if there are differences with regards to the players' demography.

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Table 1: Overview of Parameters Passed to Post-Game Survey

Variable	Meaning
Checkpoint	Progress in Game
QuizScore	Score of the Privacy Quiz (0 – 160)
Supermarket	Which supermarket was chosen
Retries	Retries for right to erase data (0 . . .)
SuccessEuropa	Answered him/herself (1), got hint (2)
ID	Unique identifier to link the surveys

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