



Serious Game Approach for Understanding Road Safety and Security for Vulnerable Public Transport Users

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Introduction

We present a series of serious game workshops conducted across 10 cities in the Horizon Europe UPPER project, to identify challenges and barriers that individuals face when using the public transport system. The serious game approach was used as an innovative method to gather information from participants, aiming to improve participation from vulnerable groups or those less likely to participate in more standard public outreach forums. The serious game workshops took place in Leuven, Versailles Grand Parc, Valencia, Oslo, Thessaloniki, Mannheim, Hannover, Lisbon, Valencia, Rome, and Budapest. The games were focused on a different measure in each city; the measures related to improving user information for public transport, demand responsive transport, public transport stops and stations, motivating behavior change, and specifically improving road safety. While a variety of measures were discussed, participants continually referred to the need for safety and security while using the public transport system.

Research methodology

The serious game method for transport has been developed from previous research with a main goal of moving beyond broad assumptions about vulnerable public transport users and identifying possibly overlooked challenges and solutions. To use the game method in these 10 cities, the game needed to be tailored to the local context and specific intervention. Thus, 10 different games were developed. This included creating a game concept, identifying known or potential challenges for passengers/users, and developing game materials. During the game, participants provided solutions to questions posed on 'challenge cards' to move forward on the game board. The game method allows users to express their main concerns through sharing their experience and discussing their experience with others who may have similar or different experiences. The game aims to be inclusive by using a variety of methods to connect with different users: visuals, social interaction, physical interaction, and providing specific rather than abstract challenges. The game also allows participants to take turns which ensures each person's opinions will be heard.

Results

In this series of games, various challenges asked about safety and security of participants, while sometimes these issues came up naturally in the discussion. In many cases, the physical design of bus stops was considered problematic. For many users with limited physical mobility and those with wheelchairs, bus stops could be slippery during rainy weather, and participants recommended using better materials and improving design of shelters. In some cases, ramps for wheelchairs were not designed to code; participants noted that 'any kind of ramp' is not



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necessarily useful for people with limited mobility and could lead to a false sense of having an accessible environment. Additionally, these situations may require users with limited to mobility to have assistance, leading to less independence. In different cities, participants noted that bike lanes ran between bus shelters and the curb where the bus picked up passengers, creating dangerous situations. In some cases, there were concerns that even with infrastructure improvements, automobile drivers did not follow rules, creating a less safe road environment, and more action on the part of local authorities to address this was desired. Finally, participants noted that new stops, either for traditional or new services, should be in suitable locations to ensure to comfort and convenience of passengers.

There were also many challenge cards related to security. In some cases, participants responded to prompts about waiting at an isolated bus stop at night, waiting for trains at a dark platform, or dealing with an aggressive person at the bus stop. Some of the responses were expected, such as suggesting improved lighting or camera monitoring at stops and stations. Many participants suggested having an emergency call button at transport stops. It was also noted that people avoid stops that do not provide feelings of safety or clear visibility, such as underground stations at night. In addition, particularly for users who have visual or cognitive impairments, having the correct information about bus routes is not only a matter of convenience but a matter of safety, since if they get on the wrong bus, it could be more difficult for them to identify that it is indeed the wrong bus and may face challenges finding the best way to get back to the original route. Interestingly, to address many of these issues, physical presence of helpful staff was one of the most highly desired improvements among all the participants in the game. Additionally, creating active and lively environments around stops and stations could contribute to the passengers' sense of security.

Discussion and conclusions

The serious game challenges and responses often focused on specific details, resulting in some solutions that are relatively easy to implement, such as: better placement of QR codes (linking to additional information) at bus stops, using larger fonts for information at bus stops, and providing maps that associate stops with local landmarks, etc. Participants also suggested visual design solutions for user information to support passengers with different disabilities, drawing on existing examples from other sectors. At the same time, the fact that many users highlighted known safety issues shows that best practices for transport safety have not been rolled out evenly across cities. Either these have not been included in local guidelines or guidelines have not been sufficiently implemented. The serious game workshops, as well as sharing results across cities, has been an opportunity to understand how cities have adopted best practice guidelines, as well as to identify cities that could provide best practices in bus stop design for people with various disabilities. Additionally, while few of the challenge cards mentioned drivers or staff, the need for well-trained and informed staff came up in every game session. In terms of game methods, using mixed groups of people having various combinations of mobility challenges and disabilities, improves the identification of mutually beneficial approaches.