Gamification as a Methodology: A Multi-Part Development Process

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Abstract

Gamification is often thought of as the end result or outcome of a project. In this paper we explore how it can also be adopted during the conceptual design stage using metaphorical games and as a method of testing concepts within a more advanced simulation environment. We explore this from the perspective of the I-GEAR project where it is used as one of many methods in the design of a commuter mobility game.

Author Keywords

Mobility; incentives; requirements capture; driving simulator; mobile application

ACM Classification Keywords

H.5.2. Information interfaces and presentation (e.g., HCI): Evaluation/methodology.

Introduction

In this paper we propose that daily commute can be thought of as a game and that gamification as proposed by Deterding et al [4] can be applied during the concept testing, design and simulation phases of a project. The work is drawn from the I-GEAR project which is on-going in the central European country and city of Luxembourg which has a population of around 90,000 people with 120,000 commuters coming daily from the surrounding countries of France, Germany and Belgium [8]. Traffic problems arise on the key arterial roads between the city and each country with the result that Luxembourg ranked the 10th most congested city in Europe [9]. The problem is further compounded by the high car ownership rate in Luxembourg (the highest in the E.U. with 678 cars / 1000 inhabitants, totaling a 347261 cars in early 2010; as compared to the U.S. with 821 / 1000) [3].

The I-GEAR project encourages commuters to undertake small changes to their overall behaviour, for example taking the bus, going off-peak time or taking an alternative route, etc. It is our view that a combination of small changes through gamification and other incentives can reduce congestion.

This position paper provides an overview how gamification has been employed along with other methodologies in order to assist in requirements capture and design of a location-aware mobility applications.

Background and Challenges

According to Deterding et al [4] gamification exists when gaming elements such as points, levels and leaderboards are used within non-game contexts. Gamification is extensively used already within a range of domains for example in FourSquare where leaderboards and badges are used to encourage people to visit particular locations and increasingly within the domain of reducing traffic congestion (see the SUNSET and I-GEAR projects) [5]. Other examples include Drivescribe and CO2GO. The former focuses on improving driver safety whereas the latter aims to make people more aware of their CO2 emissions. While these projects and applications explore similar or related topics, I-GEAR focuses more heavily on how gamification can be employed to reduce congestion.

The gamification of mobility patterns presents a set of critical challenges during requirements capture, design and evaluation. As we are essentially dealing with altering mobility behaviour, we must understand the precise motivations of the commuters for undertaking particular trips, along with if and how it is possible to change mobility behaviour. Incentives should be as cost-effective as possible, which leads to the exploration of gamification and social networks as a method of providing ("soft") incentives to commuters. However, this does not rule out the possibility of using either direct financial ("hard") incentives such as those used in [2].

From a gamification perspective it is important to see if people will respond to basic gaming elements and change their mobility patterns. As outlined later we explored gamification as a method of testing the underlying concept at an early stage through the use of a metaphorical mobility game within our research laboratory. This allowed us to test the idea of gamification and how people responded to particular aspects of it without expensive prototypes.

From a human factors perspective, introducing a pervasive game into a car while a person is driving could have a major impact on safety and may also jeopardize trust [5]. As a result there is a need to develop user interfaces that require minimal interaction by the driver and hence minimal attention. By extending the gaming context and the commuters' participation within it even with minimal or no interaction with the application the commuter still feels being part of the game. Mobile applications such as FourSquare already do this to some extent in that they maintain the users' status and participation within the game without the need for constant active participation, however points and status expire if the player does not undertake actions regularly. We address human-factors issues as a critical part of our methodology: requirements elicitation and thorough user testing in a lab environment helps reducing any risk to a minimal level. As a final step, a series of controlled road tests will provide final validation or minor changes to be implement before release.

Gamification of Mobility

We employed gamification in order to explore the concept of mobility games and whether people could be persuaded to undertake small changes with the overall goal of reducing congestion. We adopted a metaphorical approach with the daily queue for coffee immediately after lunch being seen as a traffic jam during peak hours. For this we designed two indoor mobility games, one for the SnT and one for a workshop at MobileHCI 2012 in San Francisco. The players could modify their behaviour during peak times in order to reduce the overall "congestion" in busy areas, such as the kitchen or coffee area and earn points for their actions. Real life contexts are ideal for testing reward systems, incentives, and to observe player behaviour. The results from the study [6,7] indicate that such an approach is useful to identify player strategies and issues relating to game logic and the structure of the rules.

Approaches Used in Project
Driver Diaries

The driver diaries will collect a comprehensive picture of the mobility behaviour of road traffic participants in Luxembourg and identify motivations, behaviours and constraints of drivers. A range of data collection techniques will be used: ***a website*** with the project description and an online questionnaire about demographic information and basic mobility behaviours and routines;

a mobile app that collects GPS and behavioural data about the participants' mobility for the duration of two weeks, mainly around their commute to work and back home.

The data will be analysed in order to find specific points of interest. The participants will be able to view their data so that they can comment on it in order to verify accuracy and increase reliability.

Simulator

As our game will be designed to be context-/location-aware, so the mobile application may invite the driver to interact with it while driving. Therefore, the application is designed to place a low cognitive load on the driver (e.g. send notification only during immobility). Both user experience and safety issues of game prototypes will be assessed; this is why we are building a simulation environment [1]. Using this approach it also becomes possible to test different kinds of incentives while the user is performing a simulated driving task (e.g., going to the workplace) and to measure how likely users accept these incentives and actually change their behaviour. The simulator will also be used to assess safety issues.

Conclusions

We indicated how gamification is critical to our project during various stages including concept testing and simulator studies. The use of a metaphorical traffic game provided us with a quick and easy way to test the basic underlying concept of a mobility game. This coupled with our extensive driver diaries study allows us to explore which motivations can be channeled within a game-like environment with the ultimate objective of reducing traffic congestion. Finally, the simulator allows us to test basic game logic and human-factors issues. Both the driver diaries and simulator studies are planned for the first half of 2013.

Acknowledgments

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