User-Generated Game Design in Pervasive Thwarting Games for Persuading Sustainability

Joel Ross

Games and other interactive experiences are increasingly being studied and used as tools for solving significant societal problems. These "serious games" and "games for change" are not only fun to play, but also provide some other value to society (such as education, health care, or scientific exploration) and demonstrate how games can promote pro-social behavior change. In particular, pervasive games [8] that integrate the virtual world and the physical world have the potential to directly influence player actions and behaviors by framing everyday activities as in-game actions that are subject to game rules and limitations. However, successfully encouraging behavior change—particularly for a complex, situated goal like achieving environmental sustainability—is highly dependent on a person's individual identity and context [6]. For example, a game designed to encourage people to drive less by using public transportation may not be effective when targeted at people who live in cities that lack robust public transit infrastructure, or whose individual lives make such behavior change impractical (such as needing to shepherd children or account for disabilities).

Because a pervasive, direct-action game for sustainability cannot feasibly be designed to effectively encourage behavior change among a wide variety of players, my dissertation research looks at how user-generated game design can allow users to shape the scaffolding of existing serious games to best suit their individual contexts. User-generated game design occurs when players develop their own rules or obstacles in a game, whether as "house rules" [7,16] for a game played face-to-face, or as the custom levels or features that have long been developed by video game "modders" [14]. In these forms of participatory culture, players demonstrate a high level of engagement and meta-cognition regarding the played game, which makes the design process particularly suitable for promoting awareness and adoption of pro-social behaviors such as sustainability [2,4,5]. In a pervasive game that uses user-generated game design, players can make their own rules and obstacles for a game, determining what aspects of the broadly defined game they can most effectively act on in their local context—games can be "scaffolded globally, built locally" for encouraging behavior change.

In particular, my research focuses on using user-generated game design to enable pervasive games for change that encourage behavior reduction [3]. While many serious games encourage players to take action towards a desired social goal, some goals (such as environmental sustainability or personal health) also require people to stop performing undesirable actions in addition to adopting new positive behaviors. For example, people are commonly instructed to drive less, use less electricity, and otherwise reduce the amount of resources they consume and waste they produce in order to live sustainably [10]. In a pervasive game, these undesirable behaviors can be framed as game obstacles—behaviors that players need to avoid performing while achieving a goal. Behavior restrictions are a common and accepted obstacle in games: players try to communicate a word without speaking in Charades, and try to attack enemies without being seen in stealth-based video games like Metal Gear Solid. In a similar manner, a pervasive game can have players attempt to overcome such obstacles and live their lives without performing the proscribed behaviors. For example, a sustainability-focused game could challenge players to not drive a car (and instead walk or take public transit)—in effect, to live a more sustainable life through playing a game.

Performing behavior reduction is significantly situation-dependent—what action a person takes in trying to reach a goal in place of the proscribed behavior will be defined by their individual circumstances. Someone reducing their driving behavior might carpool, take public transit, walk, ride a bike, or simply find alternatives to travel. Pervasive games for behavior reduction can be adapted to these different contexts through user-generated game design, with players creating obstacles and challenges (the behavior to reduce and avoid) for one another. For example, Alice might challenge Bob to cut his energy usage by 20%, or to go an entire week without driving. And because these restrictions are defined by the players rather than a central game authority, they would be more feasible, most effective, and more likely to be adopted for the individual situation: Alice knows that Bob can avoid driving for a week (and that driving is the largest source of his carbon footprint), even if it might require some effort. Indeed, user-generated obstacles may provide more ability-matched challenges (ones that are appropriately
difficult, but not impossible, for the player), which are a key component of engaging and enjoyable video games [15]. Furthermore, this kind of "thwarting" play—where players create obstacles for one another to overcome [12]—is a social dynamic found in many competitive multi-player games, from threatening squares in Chess to creating defenses in Starcraft. Thus by having players design challenges to thwart one another, I believe that a pervasive game could effectively encourage behavior reduction.

To this end, my dissertation research seeks to improve our understanding of how people casually perform the complex process of game design, and how they are able to negotiate the development of rules and obstacles for one another. I will then apply this theory to the creation of pervasive thwarting games in which players develop personally applicable challenges that can better encourage behavior reduction for pro-social goals such as environmental sustainability. My research thus seeks to answer the questions:

1. What are the characteristics of user-generated game design, and how is this process mediated by the design of the game in which it performed?
2. In what ways do players practice and negotiate the use of social thwarting strategies (challenges for one another) in digital and non-digital gaming environments?
3. How can user-generated game design be performed in a pervasive context?
4. What aspects of pervasive thwarting games can be supported by technological systems?
5. What characteristics of user-generated game design and pervasive gaming are best suited to influencing behavior reduction?

Research Plan: This research builds upon my preliminary work [11] developing games that use social influence to promote pro-social behavior change (i.e., environmental sustainability), as well as other research studying social dynamics in games for change (e.g., [1]). My research advances these prior efforts by focusing on user-generated game design to enable social thwarting as a form of social dynamic that may be suitable for the under-supported goal of encouraging behavior reduction. By increasing our understanding of this particular form of play and mode of social influence, researchers and game designers may better be able to develop persuasive technologies as well as games and social systems that can achieve important societal goals.

I am studying how people perform user-generated game design and negotiate the rules of social thwarting challenges as practiced in current games by performing qualitative evaluations and user studies of play practices surrounding existing games. In particular, I am using techniques from game criticism to analyze selections from the 5 million player-created levels in the game LittleBigPlanet 2, exploring how users design challenges and experiences for one another within the framework provided by the game, as well as how the community reacts to these challenges. I am also performing qualitative interviews with video game and board game players, using a grounded theoretical analysis to probe and understand how they generate, implement, and negotiate house rules. This approach will allow me to develop a formal theoretical framework for how players perform game design within the context of an existing game, and how they negotiate the creation of thwarting challenges through this design.

Based on these results, I will design and deploy a prototype pervasive game called Thwarthog that uses this form of user-generated game design to encourage individual behavior reduction in a situated context. In this game, players will be given cards (real or virtual) that they can use as scaffolding to design thwarting challenges for one another that lead to behavior reduction. Because of the pervasive nature of the game, by completing these challenges players will have directly avoided an undesirable action and so engaged in pro-social behavior reduction. In particular, these challenges will target behavior reduction in the domain of environmental sustainability—for example, players will be able to design challenges around reducing driving or home energy usage. By developing this pervasive thwarting game, I can explore the practical application of game dynamics as forms of social influence and gain first hand evidence as to the effects of user-generated game design when applied to pervasive games for change.

Progress to Date and Plan for Completion: I have already reviewed a significant portion of the literature related to this topic, which forms the grounding of my research. I have also already begun performing
game evaluations and user interviews, as well as considering the design of the *Thwarthog* prototype game. In Fall 2011, I intend to complete the bulk of these user interviews, as well as begin deployment of an initial version of *Thwarthog*. *Thwarthog* will be developed iteratively [13] over the course of Winter 2012 as I am finalizing the analysis of the interviews and game levels. By Spring 2012, I will complete the development and evaluation of *Thwarthog*, and begin writing the results of my dissertation. I plan to continue writing my dissertation over the Summer 2012, with the goal of defending my research at the end of the summer.

**Contribution and Implications:** My dissertation research will make a novel and significant contribution to scientific knowledge, benefiting the fields of game studies, games for change, and human-computer interaction. This work offers a novel exploration of player-performed game design, a form of gameplay that is increasingly practiced as part of gamers' participatory culture. Further understanding of this practice can aid in the development of new forms of game interactions, as well as in the use of game design procedures for education and learning (e.g., [9]). This work also explores the social dynamic of thwarting, and how this social practice may be influenced by the technology in digital games and environments. An understanding of these practices can contribute to how scientists view the interaction between human behavior and games as rules-based technological processes. In addition, this research will contribute a practical application of game studies research by providing a technical framework for the development of games for change that support behavior reduction—a distinct form of behavior change that may be more suitable to some social goals, such as environmental sustainability. This framework will enable a novel form of pervasive and social game-play, allowing for the creation of new interactive and social experiences that can persuade individual and collective behavior change towards pro-social goals.