CHI 2011 Workshop Gamification: Using Game Design Elements in Non-Game Contexts

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Gamification: Using Game Design Elements in Non-Gaming Contexts

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Abstract
"Gamification" is an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience (UX) and user engagement. The recent introduction of 'gamified' applications to large audiences promises new additions to the existing rich and diverse research on the heuristics, design patterns and dynamics of games and the positive UX they provide. However, what is lacking for a next step forward is the integration of this precise diversity of research endeavors. Therefore, this workshop brings together practitioners and researchers to develop a shared understanding of existing approaches and findings around the gamification of information systems, and identify key synergies, opportunities, and questions for future research.

Keywords
Gamification, game design, design patterns, motivational affordances, funology, persuasive technology, games with a purpose

ACM Classification Keywords
H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; K.8.0 [Personal Computing]: Games; J.4 [Social and Behavioral Sciences]: Psychology, Sociology

General Terms

Design, Theory

Introduction

Games and game technologies increasingly transcend the traditional boundaries of their medium, as evidenced by the growth of serious and pervasive games as an industry and research field. The most recent phenomenon in this trajectory is 'gamification', an umbrella term for the use of video game *elements* (rather than full-fledged games) to improve user experience and user engagement in non-game services and applications.

Following the success of location-based service Foursquare, this design approach has rapidly gained traction in interaction design and digital marketing [22], spawning an intense debate within the professional community[1] as well as numerous 'gamified' applications, ranging from productivity to finance, health, sustainability, news, user-generated content and tutorials. Several vendors now offer gamification as a service layer of reward and reputation systems with points, badges, levels and leader boards.[2] At the same time, gamification has caught the interest of researchers as a potential means to create engaging workplaces [16] or facilitate mass-collaboration [11].

Background

To wit, the use of game design and game elements in other contexts is an old topic in human-computer interaction (HCI): Attempts to derive heuristics for enjoyable interfaces from games reach back to the early 1980s [9, 10]. More recently, researchers have tried to identify design patterns that might afford joy of use under the moniker "funology", explicitly drawing inspiration from game design [3].

A growing body of research looks into "games with a purpose" piggybacking game play to solve human information tasks such as tagging images. This included work detailing specific design features that afford player enjoyment [20]. Furthermore, researchers in HCI and management sciences have identified design principles that enhance the motivational affordances of computer-supported collaborative work [5, 21] – principles which are congruent with research on the motivational psychology of video games [17].

In persuasive technology [4], video games and game aspects have been studied as potential means to shape user behavior in directions intended by the system designer [8, 14], or to instill embedded values [1]. Social psychological studies on contributions in online communities or the motivational uses of recommender systems arrived at conclusions that chime with core design properties of video games [7, 15]. Likewise, it suggests itself to model the reward and reputation systems of gamified applications with economically inspired approaches such as incentive centered design.

The user experience of video games has itself become a substantial topic of HCI, with researchers developing models and methods as well as heuristics for the usability or playability of games [2, 18, 19]. An obvious matter of interest is to which degree these can be transferred to the design of gamified information systems. Finally, a growing body of research points to

[1] See e.g. the 2011 Gamification Summit and the gamification day at the 2011 GDC Serious Games Summit.

[2] See e.g. Badgeville, Bunchball, Bigdoor Media, GetGlue.

the significant role of social contexts in the constitution of video game play experience [6], which immediately raises the question whether and how the transfer of (game) design patterns into 'alien' social contexts might significantly alter their experiential affordances.

Workshop Goals

Faced with the broad adoption of 'gamified' applications beyond HCI laboratories on the one hand and a rich if disconnected body of existing research on the other, the goal of this workshop is to bring together HCI researchers from academia and industry to (a) take stock and synthesize a shared picture of pertinent existing and current research surrounding gamification, and (b) identify potential new aspects and research opportunities opened by new gamified applications. To this end, we invite researchers to submit position papers on (ongoing) empirical work or accounts of existing approaches and findings that might elucidate the user experience, psychology, social dynamics and design of information systems employing game elements. The primary intended outcome of the workshop is to build a shared overview of the state-of-the-art (published as a report) by clarifying the questions below, and to seed a researcher community that shall be built out via the workshop site and follow-up events that connect other pertinent research communities (e.g. game studies) towards substantial research and publication efforts.

Workshop Questions

- What is the current state of research surrounding gamification? How might we integrate it?
- Which existing approaches are well-suited to study and model gamified information systems?
- Do gamified applications feature specific or novel characteristics not covered by previous research?
- What happens when game design elements are transferred into non-game social contexts?
- Which promising (new) research topics and data sources do gamified applications provide?

Participants and Expected Interest

We consider the collaborative study of the recent surge of 'gamified' information systems to be of immediate relevance to HCI researchers in all fields mentioned above (funology, persuasive technology, communities, motivational affordances, game UX, etc.): On the one hand, the implementation of game design elements on a mass market scale potentially surfaces phenomena that wouldn't appear in laboratory prototypes. Gamified systems 'in the wild' provide new objects of inquiry in an unprecedented variety, data quality and scale. On the other hand, the focused integration of the many close but by-and-large decoupled research endeavors would greatly benefit each in turn. Although workshops in past conferences have already addressed single issues [12, 13], none of them has taken such an integrative approach. Therefore, at this point in time, such a synthesizing workshop on gamification would be of high interest to HCI researchers as well as researchers working on the increased blurring of (digital) life, work, and play in general.

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Gamification: Toward a Definition

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Abstract
This paper proposes a working definition of the term *gamification* as the *use of game design elements in non-game contexts*. This definition is related to similar concepts such as serious games, serious gaming, playful interaction, and game-based technologies.

Origins
Gamification as a term originated in the digital media industry. The first documented uses dates back to 2008, but gamification only entered widespread adoption in the second half of 2010, when several industry players and conferences popularized it. It is also—still—a heavily contested term; even its entry into Wikipedia has been contested. Within the video game and digital media industry, discontent with some interpretations have already led designers to coin different terms for their own practice (e.g., gameful design) to distance themselves from recent negative connotations [13].

Until now, there has been hardly any academic attempt at a definition of gamification. Current uses of the word seem to fluctuate between two major ideas. The first is the increasing societal adoption and institutionalization of video games and the influence games and game elements have in shaping our everyday life and interactions. Game designer Jesse Schell summarized this as the trend towards a *Gamepocalypse*, ”when

Gamification is the use of elements of game design in non-game contexts. This differentiates it from serious games and design for playful interactions.

every second of your life you're actually playing a game in some way" [18]. The second, more specific idea is that—since video games are explicitly designed for entertainment rather than utility—they can demonstrably produce states of desirable experience, and motivate users to remain engaged in an activity with unparalleled intensity and duration. Thus, game design is a valuable approach for making non-game products, services, or applications, more enjoyable, motivating, and/or engaging to use.

Defining *Gamification*

Despite the recent emergence of the word *gamification*, the underlying ideas have been previously explored within the HCI literature, for example as playful interaction design [5,14,19]. Thus, if gamification is to be understood and developed as an *academic* concept, the task is to determine whether the term and current *gamified* applications are significantly different from previous areas of research, and how to situate this in relation to existing fields. We believe that gamification does represent new research possibilities. For the group of phenomena it represents, we propose the following definition: *Gamification is the use of game design elements in non-game contexts.* Let's unpack this definition in detail.

Game

Firstly, we are talking about elements of *games*, not of *play*. While games are usually played, play represents a different and broader category than games. We agree with classic definitions in game studies that games are characterized by rules, and competition or strife towards specified, discrete outcomes or goals by human participants [12,15]. This distinction is mirrored in McGonigal's [13] recent coinage of the term *gameful* as a complement to *playful*. In terms of HCI research, this means we distinguish gamification from playful interactions, playful design, or design for playfulness [1,9]. In practice though, we assume that the design of gamified applications will often give rise to playful behaviors and mindsets.

Secondly, although the majority of current gamification examples are digital, limiting it to digital technology would be an unnecessary constraint. Not only are media convergence and ubiquitous computing increasingly voiding a meaningful distinction between digital and non-digital artifacts, but games and game design are transmedial categories themselves [12].

Element

Whereas *serious games* describes the use of complete games for non-entertainment purposes, gamified applications use *elements of* games that do not give rise to entire games. Of course, the boundary between *game* and *artifact with game elements* can often be blurry: Is foursquare a game or a gamified application? Is the purpose of foursquare primarily for entertainment and fun, or for something else? To complicate matters, this boundary is personal, subjective and social: Whether you and your friends *play* or *use* foursquare depends on your (negotiated) perceptions and enactments. The addition of one informal rule by a group of users may turn a gamified application into a complete game. Within game studies, we find increasing acknowledgement that a definition of *game* must go beyond properties of the game artifact to include such situated and socially constructed meanings. For the present purpose, this entails that we should (a) look for *technical* as well as *social* elements of games and (b) interpret the technical elements more

as *affording gameful* interpretations and enactments rather than *being gameful*.

Games are also a composite category. No typical element (e.g., goals, rules) on its own constitutes a game and most can be found outside games as well; only assembled together do they constitute *a game* [12]. Thus, how to determine which design elements belong to the set of *game elements*? A liberal set—any element found in any game—would be boundless. A constrained set —elements that are unique to games—would be too restrictive if not empty. We suggest limiting gamification to the description of elements that are *characteristic to* games. There is still much room for debate over what is characteristic to games.

Non-Game Context

Together with serious games, gamification uses games for *other* purposes than their *normal* expected use for entertainment (asserting that entertainment constitutes the prevalent expected use of games).

We recommend not limiting the term gamification to specific usage contexts, purposes, or scenarios, while noting that joy of use, engagement, or more generally improving the user experience currently serve as popular usage contexts. Firstly, there are no clear advantages supporting such a restricted position. Secondly, the murkiness of interpretations surrounding serious games can be directly linked to how authors who initially used the term tied it to specific contexts or purposes (e.g., learning), whereas the class of games satisfying the qualities of serious games has proliferated into all kinds of contexts [17]. Thus—in parallel to Sawyer's taxonomy of serious games—we consider different usage contexts or purposes as potential subcategories. Just as there are training games, newsgames, or health games, there can be training gamification, news gamification, health gamification, and other application areas.

Design

HCI has a long history of repurposing game controllers as input devices. Game engines and authoring tools are also commonly used for non-entertainment purposes, such as scientific visualizations. Within the serious games literature, the term serious gaming is used to describe the (educational) utilization of the broader ecology of technologies and practices of games, including machinima, reviewing games, and others [11]. We consider it most helpful to reserve the term *gamification* for references to *design* elements, not game-based *technologies* or *practices* of the wider game ecology.

When surveying the existing literature on games and gamification, we found that game design elements were often described on varying levels of abstraction. We suggest including all these levels in the definition of gamification. Ordered from concrete to abstract, one may distinguish five levels:

1. *Interface design patterns* such as badges, levels, or leaderboards [7].
2. *Game design patterns* [3] or game mechanics [16].
3. *Design principles or heuristics*: guidelines for approaching a design problem or evaluating a design solution.
4. *Conceptual models of game design units*, such as the MDA framework [10], Malone's challenge, fantasy, and curiosity [14], or the game design atoms described in Braithwaite and Schreiber [4].

5. *Game design methods*, including game design-specific practices such as playtesting and design processes like playcentric design [8] or value conscious game design [2].

Conclusion

This working definition is necessarily broad in order to cover the variety of gamification examples. Still, we believe it articulates a useful differentiation between gamification, serious games, and playful interaction clarifying discourse and allowing research to move into a detailed study of the defined phenomena.

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Badges in Social Media: A Social Psychological Perspective

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Abstract
Representing achievements as badges or trophies is a standard practice in online gaming. Awarding badges has also become a key ingredient in "gamifying" online social media experiences. Social systems such as Foursquare, StackOverflow, and Wikipedia have popularized badges as a way of engaging and motivating users. In this paper we deconstruct badges and present five social psychological functions for badges in social media contexts: goal setting, instruction, reputation, status/affirmation, and group identification. We argue that future research should further explore these five functions and their application in specific contexts.

Keywords
Badges, achievements, rewards, motivation, social psychology, social media, gamification

ACM Classification Keywords
H.5.m Information interfaces and presentation (e.g. HCI):Miscellaneous

General Terms
Human Factors

Introduction
In the context of online social media, badges are "virtual goods" – digital artifacts that have some visual representation – which are awarded to users who

1.

CHI Stars
You cited a big-wig from the CHI community!

2.

Very Verbal
That's quite a vocabulary you've got there!

complete specific activities. Badges have been closely associated with online gaming but also have a long history outside of gaming. In ancient Rome, military heroes were honored with medals adored with the face of Caesar. Closer to home, the Boy Scouts of America's iconic merit badges promote the acquisition of specific skill-sets as diverse as nuclear science and basketry.

One of the first large-scale implementations of badges in online games began in 2002 with Microsoft's Xbox Live service. Since that time, badges have become a fixture in many games. Notable implementations of badges in social media include Wikipedia's "Barnstars" which allow users to award each other for doing valued work [8], Q & A site StackOverflow's system of badges to encourage productive participation, and FourSquare's implementation of badges to promote location-sharing via "check-ins."

The Social Psychology of Badges

Although badges are in widespread use in social media, relatively little research has been devoted to understanding how or why they are valuable and useful. While badges can be fun and interesting, these qualities do not inherently produce social engagement or enhance motivation. We argue that badges can serve several individual and social functions depending on the nature of the activities that a badge rewards and the application of badges in particular contexts. In the tradition of combining HCI and psychology [11], we present five primary functions for achievements and give examples of each. [1]

Goal Setting

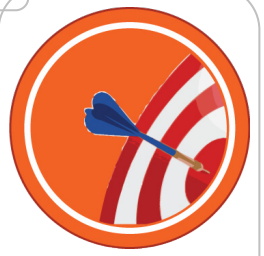
Perhaps the most obvious function of badges is as a goal-setting device. Badges challenge users to meet the mark that is set for them. Goal setting is known to be an effective motivator, and experimental studies have illustrated that the most motivating goals are those that are just out of comfortable reach [9]. Research also suggests that individuals sometimes "consume" goals and the experience of striving for them, even at the expense of consuming physical goods. This phenomenon, which Ariely and Norton call "conceptual consumption" [1], means that the fun and interest of goal seeking is often the primary reward itself. The notion of conceptual consumption is essential to understanding badges because, of course, ultimately the user is left with no physical goods, only the experience and memory which is embodied by a badge.

Two additional aspects of goal setting are also essential to mention. First, the goals presented in a badge are not always explicit, either because system designers choose only to adumbrate[2] how to earn a badge or because the necessary activities are subjective or imprecisely defined. Secondly, goal setting is most effective when users can see their progress towards the goal. Without signposts to mark the way, there is little or no feedback to keep users moving in the right direction. Furthermore, people often escalate their efforts when they know they are near their goal [5].

Instruction

Badges can provide instruction about what types of activity are possible within a given system [10]. This function is useful for indoctrinating new users, but also for helping silo'd users diversify their participation. Badges often embody the social norms of a system by exemplifying the types of activities and interactions that are highly valued [8], and in so doing provide a kind of social shaping of user activities. Through their

3.



Bullseye
No beating around the bush here – you got right to the point!

4.

Speed Reader
The 1st sentence of each paragraph is good enough for you!

instructive function, badges can benefit the system even if users never actually earn the badges. By viewing a list of possible badges, users come to understand individual valued activities and can also gain a Gestalt understanding of the community of users.

Reputation
Badges provide information on the basis of which reputation assessments can be made. Badges are a valuable encapsulation of a user's interests, expertise and past interactions, and can thus substitute for direct experience [7]. Badges assist reputation assessments at several levels. At a general level, examining another user's badges can provide a summary of interests and engagement levels, for example by indicating whether a user is a casual or fanatical community member. Like Boy Scout merit badges, in social media contexts badges can also provide information about a user's skill-set and expertise. By providing an encapsulated assessment of engagement, experience, and expertise, badges can be an invaluable tool for determining the trustworthiness of other people or the reliability of content.

Status / Affirmation
Badges can be motivating as status symbols. Badges advertise one's achievements and communicate one's past accomplishments without explicit bragging. Notably, the power of status rewards derives from the *expectation* that others will look more favorably upon someone who has undertaken the activity represented by a badge [2]. More difficult achievements may be assumed to lead to greater status.

Badges also provide personal affirmation in that they serve as reminders of past achievements much like trophies on a mantelpiece. They mark significant milestones and provide evidence of past successes.[3] The interplay between status and affirmation is important because it highlights how badges can be engaging from both an individual and a group point of view. Some users are likely to attend more to the individual benefits of badges while others are more likely to attend to the social ones. For example, our in-progress research on FourSquare suggests that self-interested individuals are more interested in the status rewards of badges than pro-social individuals.

Group Identification
Badges communicate a set of shared activities that bind a group of users together around shared experience.[4] Achieving badges can provide a sense of solidarity and increase positive group identification through the perception of similarity between an individual and the group. This type of group identification is valuable in social media because increased group identification promotes increased cooperation in collaborative situations [3].

Future Work and Conclusion

We do not suggest the functions we have discussed represent an exhaustive list. However, there is ample evidence in the social psychological literature to support our typology, and we believe it is a useful lens. Much work remains in order to empirically vet the five functions, and to investigate the individual and social dynamics of badges in social media contexts.

We must begin by examining the premise that badging systems are engaging and motivational for all. Evidence

5.

The Finish Line
Congratulations, you made it to the end of the paper!

suggests that badges are not universally appreciated, understood, or attended to. For example, Montola and colleagues implemented badges in a photo sharing service and found that many users did not appreciate them and were worried that badges would create counterproductive usage patterns [10]. Our own in-progress research on FourSquare indicates that most users find only some types of badges interesting or motivational. Furthermore, just as some have questioned whether badges are actually counter-productive as game mechanics [6], the "corruption effects of extrinsic incentives" [4] could make some badges harmful to intrinsic motivation.

Together, these findings demand a program of systematic research into the dynamics of badges in social media systems. In addition to exploring the above typology, our future research will focus on understanding their positive and negative influences, as well as the social aspects of giving and receiving badges awarded by system designers (e.g. FourSquare) versus other users (e.g. Wikipedia).[5]

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Lights Off. Game On. The Kukui Cup: A Dorm Energy Competition

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Abstract
Our research seeks to investigate the relationships among energy literacy, sustained energy conservation, and information technology support of behavior change through an advanced dorm energy competition to take place in fall 2011. Game design techniques are used to attract competition participants, keep them engaged, and have a lasting impact in their energy use behavior through retained knowledge of energy obtained via the game environment.

Keywords
Sustainability, Energy, Behavior Change, Games, Gamification

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ACM Classification Keywords
K.4.m [Computers and Society]: Miscellaneous, K.8.0 [Personal Computing]: General — Games

General Terms
Human Factors, Experimentation, Measurement

Introduction
The world is in the grip of an energy crisis. Fossil fuel consumption severely impacts our environment. One way fossil fuel use can be decreased is by decreasing the total amount of energy consumed. Changing people's behavior with respect to energy offers significant promise in reducing energy use. Darby's survey of energy consumption research finds that identical homes could differ in energy use by a factor of two or more [2]. Our research investigates how best to foster sustained positive energy use behaviors through information technology.

Changing people's behavior is difficult, and to achieve meaningful energy conservation, behavior changes must be sustained. Two strategies that have proven effective are providing direct feedback on energy usage through real-time displays [2], and a toolbox of techniques such as making public commitments and setting goals [6]. Another strategy we hypothesize will

help change behavior (when combined with the previous two strategies) is increased *energy literacy* (knowledge, attitudes, and behaviors with respect to energy). We have devised a research program to investigate the effectiveness of these strategies, which we call the Kukui Cup.

The Kukui Cup

The Kukui Cup is a three-year series of dorm energy competitions to be held on the University of Hawai`i at Mānoa campus (and later in more general residential settings). The competitions are named after the kukui nut, or candlenut, which was burned as an early source of energy by Native Hawaiians. A more complete description of the design and motivation of the competition can be found in [1]. The competition will take place over a three-week period, structured as two individual rounds and one final overall round. Prizes will be awarded to the winners of each round of the competition, and to overall competition winners. Two parallel competitions will take place: an energy reduction competition and a Kukui Nut points competition.

Energy reduction competition

In this competition, each dorm floor competes to use the least amount of electricity (measured in kWh). For reasons of infrastructure, privacy, and cost, energy can only be monitored at the floor level.

Kukui Nut points competition

In this competition, each participant performs activities described on the competition website. The activities include watching a short educational video on energy, attending an energy-themed event, performing an energy-related action such as switching an incandescent light bulb with a CFL bulb, or making a public commitment to some energy-positive behavior. Each activity is worth a certain number of points based on complexity and the effort required to complete. To receive points, participants must verify their completion of the activity on the website with such actions as answering a question or submitting a digital photo. Points are earned by individuals, but can also be aggregated at the floor or dorm level.

The competition brings together activities in the actual world, such as turning off lights when leaving a room, and virtual activities mediated by the competition website. Conserving energy requires participants to take action in the actual world, but energy use is largely invisible so the competition website must be consulted for near-realtime energy usage data and floor standings. The actual world activities of the point competition are described and verified using the virtual world of the website.

We will collect a wide variety of data during the competition including: fine-grained energy usage (before, during, and after the competition), assessments of energy literacy (before and after the competition), and detailed logs of the competition website.

The inaugural Kukui Cup is scheduled to take place in October 2011, in 3 residence halls with approximately 780 first-year students in total.

Challenges

Both actual and virtual aspects of the competition face unusual challenges. Most energy conservation campaigns operate in contexts where the participants

have some feedback on their energy usage, and they have a financial incentive to reduce their energy usage in the form of a utility bill. University dormitory residents typically have no information about how much energy they consume, and usually pay a fixed rate regardless of how much energy they use. Our use of a point competition to increase energy literacy also provides motivation for participants in the absence of standard educational motivations, such as grades and class credit.

Since participation in the Kukui Cup is optional, the biggest risk to the success of the research is failure of the residents to participate. For this reason, much of our current work is focused on making the competition and website as exciting and engaging as possible.

Gamification

One of the main ways we hope to ensure engagement is by making the competition as game-like as possible. Obviously, as a two-sided competition with points and prizes, the overall structure of the Kukui Cup is a type of game, combining both actual and virtual world participation. However, based on discussion with other researchers who have run dorm energy competitions, this may not be enough to keep participants engaged and make them frequent visitors of the website.

The Kukui Cup follows in the footsteps of McGonigal's pioneering efforts to develop games such as "World without Oil" and "EVOKE" that address social and environmental problems [5]. In the Kukui Cup, we are attempting to avoid the mere creation of a "virtual social world" which generally lacks structured, mission-oriented tasks, defined character roles, and explicit goals [9]. Furthermore, as our game does not involve a single narrative, we are applying concepts such as Lazarro's "four keys to fun" to see if we can heighten the emotional content of the activities [4]. Finally, our design must combine and rationalize game elements traditionally considered "male" (mastery, competition, destruction, spatial puzzles, trial and error) with game elements traditionally considered "female" (emotion, real world, nurturing, dialogue, learning by example) [10, 3]. We have incorporated the following game design elements.

Round structure

Some dorm energy competitions are structured over a single time period, with the winner declared at the end of the competition [8]. We will structure the Kukui Cup over three weeks, with a round one, round two, and final round, as is done in some sporting events. The energy consumption score and points are reset at the beginning of round two, while the score for the final round is the sum of the scores of all three rounds. We chose this structure because early participants may gain an insurmountable lead, which could discourage new participants from joining as the competition becomes more widely known. This structure allows a participant who joins in round two the chance to win round two, while still rewarding early joiners since the final round includes scores from rounds one and two.

Levels

The activities available through the website are organized into different levels to make them challenging but feasible. Early levels include simpler tasks and build foundational knowledge to enable participants to understand more complicated activities in later levels. To guide participants, the higher levels

of activities are locked until the participants complete a certain percentage of the lower level activities.

Raffle

We provide prizes for the most energy efficient floor and for the highest scoring individuals in each round. However, with 780 potential participants, most participants would have very little chance of winning a prize. Inspired by Balaji Prabhakar's work with innovative incentive schemes [7], we added a raffle to the competition. Participants earn one raffle ticket for every 25 points they earn. They can allocate their raffle tickets among a variety of prizes, depending on their interests. The system dynamically calculates their odds of winning each of the prizes to which they have allocated tickets, and participants can change how their tickets are allocated up until the end of the round. We hope that the chance of winning such prizes will motivate participants who have realized that they are not going to be one of the winners of the main competitions.

Future Opportunities

The Kukui Cup research project is funded for three years, which will allow us to continue to explore ways to bring more game design elements into the competition. We expect to refine both actual and virtual world components of the competition and website based on the results of the first run, making it a rich test bed for additional gamification techniques.

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Finding Moments of Play at Work

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Abstract
In this position paper, we propose that an important consideration for applying gamification within the enterprise is identifying the appropriate time for manifesting game elements into the work context – the "moment of play." We reflect on our experiences with gamification projects within an enterprise. We call for further research into understanding moments of play in community, team, and individual enterprise experiences, notably synchronous team experiences.

Keywords
Gamification, game design

Introduction
Gamification – the use of game elements in non-game systems to improve user experience – has the opportunity to transform how employees work inside the enterprise. For example, Microsoft has explored how game elements can transform the experience of popular corporate tools like Office [1] and software development [7]. Seriosity's Attent applies game elements to address information overload in corporate e-mail [9].

Well-designed games can provide playful experiences. But the use of game elements in non-game systems may not lead to a playful experience that could provide opportunities to think and act creatively [2]. The same concern can be raised for gamification in the enterprise. Employees are evaluated on how they perform their

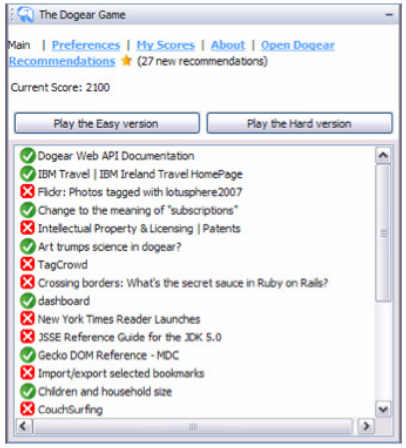

Figure 1: The Dogear Game

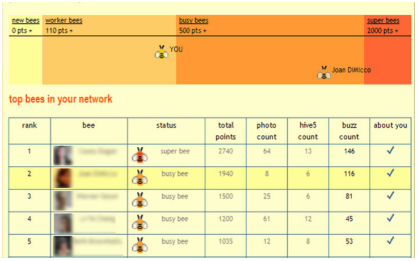

Figure 2: Beehive Points' leaderboard

job, and "playful" activities might be frowned upon by employers. Gamification in the enterprise could be justified as a better user experience for data collection to solve work-related problems, i.e. "Games for a Purpose" [11]. So, *when* can we gamify work in the first place?

Employees are not always engaged in pure work all the time. There are times when they might momentarily distract themselves, such as by socializing or web surfing. We propose that an important consideration for applying gamification within the enterprise is finding such times, and focusing on those that are acceptable to an organization. These are opportunities for a "moment of play" - the appropriate time for game elements to manifest in the work context. In the following sections, we examine moments of play in several past gamification projects in IBM, and call for further research into understanding moments of play in community, team, and individual enterprise experiences. Our examination includes asynchronous as well as synchronous experiences. We highlight synchronous experiences as particularly challenging for finding the moment of play. Implementing synchronous gamification elements is challenging because they require more than one individual to be interacting *at the same time.* Gamification features that can be performed asynchronously can be performed at any time convenient for employees.

Improving awareness of others through Social Bookmarking

The first example, the Dogear Game (Figure 1) incorporated a single player guessing game with an internal enterprise social bookmarking system [3]. Players matched social bookmarks with colleagues who created them. This provided opportunities for players to become more aware of colleagues' interests, to discover interesting bookmarks, and to increase their interest in contributing new social bookmarks.

The game manifested as a plugin to the corporate instant messaging client, a tool nearly always active, making it quick and easy to initiate a round of play, capitalizing on individuals' spare time – this game's "moment of play". This could in turn lead to moment of learning, where the player could discover a bookmark of personal interest or an unknown interest of a colleague. As incorrectly guessed bookmarks could also be recommended to colleagues, this moment could have broader impact on the player's social network. Given that this was presented as an optional, short, casual game – the Dogear Game depends on the individual employee's availability for a brief distraction from actual work. Nonetheless, the initial one month trial of the game had 87 players from more than ten countries.

Contributing and Promoting Social Networking Content

Our second example is awarding points in a game-like setting in Beehive, an enterprise social networking tool [5]. Unlike the Dogear Game, which embedded a game as an IM plugin, Beehive Points incorporated a point-based incentive system to encourage contribution of content (e.g. photos, comments, lists) with an internal enterprise social networking site [5]. Points were computed based on the type and amount of content made by users, and displayed on individual profile pages and a leaderboard page (Figure 2).

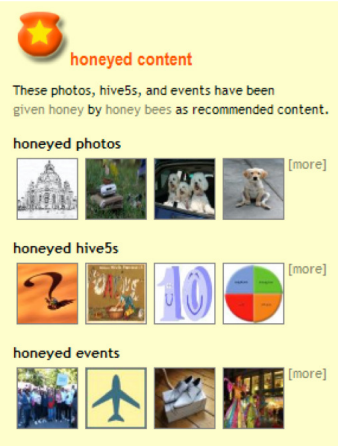

Figure 3: Beehive Honey's promoted content

Figure 4: Bluegrass embedded in a development environment

Following Beehive Points, the Beehive Honey system (our third example) incorporated a rating scheme to encourage promotion of a diverse set of content with the same internal enterprise social networking site [4]. Each week, a new group of users were temporarily awarded the ability to promote one photo, one list, and one event that had not been promoted before. Promoted content got highlighted on the site's home page (Figure 3), email digests, and flagged with a special icon. Promoters were thanked via email, highlighted on a special page, and got a star icon on their profile page.

Like the Dogear Game, both points and ratings relied upon the spare time of hundreds of voluntary participants in the corporation. However, this moment of play impacted an entire community of members, both positively and negatively. In the case of the points system, a noticeable number of employees were actively competing on the leaderboard which led to a number of people complaining about its influence [6]. In the case of the rating system, promoters and promotees engaged in social exchanges as a result, such as thank yous and appreciative comments.

Socializing in Team Environments

The next two examples examined the use of game elements in team contexts. In our fourth example, the Bluegrass project explored socialization and collaboration among software engineers [8]. This was built as a 3D virtual world in a tab-based plugin to an enterprise software development environment (Figure 4). Tasks could be created and moved between the virtual and development environment. Photos from an internal corporate social networking service could be imported and transformed into puzzle games for people to play and learn about each other.

Our fifth example, the Olympus project explored how employees can present themselves in online meetings [10]. This was implemented by adding 2D cartoon-like avatar creation, gesturing, and movement features to a web-based e-meeting system commonly used in the company (Figure 5).

Unlike the Dogear Game and Beehive cases, we found that the moment of play for both to be significantly more limited. The Dogear Game and Beehive cases rely on the spare time chosen by individuals' discretion during or after work hours. For Bluegrass, switching to a full-blown 3D experience proved to be too cumbersome – simply setting up the plugin and waiting for the team to meet was more work than worthwhile. Olympus was easy to deploy as a web application, but was found to only be useful before or after the actual official meeting. In other words, the moment of play was before or after everyone had to engage in the business at hand in the online meeting.

Discussion and Future Directions

In this position paper, we propose that identifying moments of play is important when considering using game design elements in enterprise contexts. We examined moments of play from our past projects.

"Single-player" gamification can be applied to change individual social bookmarking and community social networking experiences, such as in the case of the Dogear and the two Beehive examples. The moment of play depends on the employee's individual time, and can potentially impact other employees who benefit

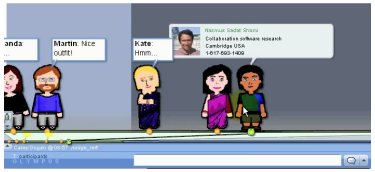

Figure 5: Olympus embedding avatars at the bottom of an emeeting

from another's gaming moment or choose to engage in the same activity. This time might be construed as work-related (e.g. searching for key information, identifying useful contacts) or spare time (e.g. a brief distraction comparable to web surfing).

Work within the enterprise often requires team participation, such as software development (e.g. Bluegrass) and business meetings (e.g. Olympus). Here, the moment of play is a limited resource shared by the team. Factors like corporate culture, the team's social norms, and leadership style can dictate when it is appropriate for a team to participate in a gamification-based experience. The considerations for a moment of play by oneself may be different from a moment of play with a colleague, or with a client – such as our own experiences with "multiplayer" versus "single-player" gamification. Finding the right moment of play may also be essential for certain learning experiences – extending the learning strategy of "enrichment".

We believe there are research opportunities for gamification within the enterprise. Gaining a better understanding of moments of play in individual and community contexts can help further this. Can a moment of play be beneficial and attractive to the individual, colleagues, as well as the corporation? The work context of the team, particularly synchronous teamwork deserves special attention by researchers and practitioners seeking to change the future of work in the corporation.

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Consciousness in Gameplay

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Abstract
Presented here are a set of design dimensions for game media. Principles are drawn from sociological theory about human action and phenomenological perspectives of technology. These dimensions are applied to understanding game elements in non-games.

Keywords
Game design, Design

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design, Human Factors, Theory

Introduction
Gameplay principles applied to systems design require clarity about the scope and foundation of those principles. The word "Game" itself encompasses a variety of meanings – "to game a system" implies a different meaning than "it's just a game". The need for conceptual clarity becomes especially pronounced when designers endeavor to bring "game elements" into new domains such as serious games and 'gamification' of other systems. For example, are games that convey a rhetorical point still considered games if they sacrifice enjoyment? Is an electronic personal trainer considered

a game because whimsical graphics are employed? Answers depend on an explicit understanding of what comprises a game. In the case of 'gamification', when aspects of gameplay imported to non-games, clarity allows precise discussion about intended consequences.

Dimensions of Game Media

As a contribution to the aforementioned, presented here is my developing work on design principles for game media. It is derived from a model of human action by Anthony Giddens and other writings in line with a phenomenological perspective. My goal is articulate a language of dimensions of game media. Designers ought to be able to discuss game-relevant dimensions of the medium (e.g. the interface, software, or equipment). Inspiration for "dimensions" is taken from Green's work with notations [6] where dimensions are developed as a neutral property of an object.

Foundations: A Model of Action

In this framework, a game is an activity with players and rules – most typical is a rule about a final goal, a winning condition. To play a game is for a player to act in accordance with the rules to meet the stated goal of the game. This definition is intentionally bare. Other definitions of games that include playfulness or fun can be adopted by designers, but they are explicitly omitted here. Given this definition, a starting point towards understanding game media is to understand interaction – a familiar concern of game designers [2].

Mario jumps. Master Chief strafes. The Queen checks. Gamblers fold. The Foursquare[1] *user checks-in.* Should player actions be distinguished from one another? Are there particular characteristics that can be applied to in-game actions? I contend that some nuance is required for distinguishing among different actions. My solution is to rely on an articulation of human action as proposed by the sociologist Anthony Giddens [5].

The philosophy of human action is a much-discussed domain. In agreeance with other theorists of action (Dewey, Herbert Mead, and Harold Garfinkel [1]), sociologist Anthony Giddens [5] proposes a simple model: action is directed by knowledge[2]. In the knowledge-based model, action is understood as an ongoing 'coordination' of behavior that informs a body of knowledge. Giddens emphasizes that actors "maintain a continuing 'theoretical understanding' of the grounds of their activity". For the most part, people depend on habitual actions to accomplish everyday existence: walking, eating, etc… Conscious motivations provide overall plans or programs and, granted, there are times when conscious attention and rationale are focused on precise, rationalized actions (e.g. a chess move can be very much in the forefront of a player's mind). Giddens explains that human consciousness does not have total access to one's memory. Regarding this, Giddens lists three mechanisms of recall which divide actions into three types: unconscious ones, habitual ones, and intentional ones. These recalls are:

(1) **Discursive consciousness**– "those forms of recall which the actor is able to express verbally"

[1] Foursquare is a location-based game where players check-in to shops, venues, and locations for virtual points and rewards.

[2] This contrasts with Crawford's model of perception-to-cognition-to-action [2], one long-since criticized for its simplistic definition of perception. Dewey argues that perception itself is an action [4].

(2) **Practical consciousness**— "recall to which the agent has access in the *durée* of action without being able to express what he or she thereby 'knows'."
(3) **The unconscious**— "modes of recall to which the agent does not have direct access because there is a negative 'bar' of some kind inhibiting its unmediated incorporation within the reflexive monitoring of conduct and more particularly, within discursive consciousness."

This division provides three different types of action. The first, **discursive consciousness**, the actors are capable of granting their own actions. In this case, the actor is conscious of his or her rational action. Actions derived from discursive consciousness are explainable; the actor is able to express the motivating knowledge verbally. With this transparency, there is a great sense of conscious control exhibited over these actions. The second, **practical consciousness**, is where the actor is not able to verbally express what he or she knows and how it informs his or her action, but engages in the activity in a familiar, habitual manner. These are actions that actors make that happen in the *durée* of everyday life as a part of routine or habit. Attention can be drawn to these actions, surfacing them from practical to discursive. It is not an action blocked from self-awareness like those **unconsciously** motivated.[3]

Habitual action proves to be an apt description for much of the activity in games. As Huizinga [8] states, game rules carry absolute authority. Rules are followed because they exist – and those rules often prescribe an expected cycle of behavior for its players. Board games, for example, have "Turn Order" sections that are quickly internalized by players into a habitual rhythm. Csikszentmihalyi's flow [3], often applied to games, describes an ideal combination of awareness and habit. The negative scenario – a zoned out gambler who loses his chips in a haze – also shows the fit of practical consciousness to in-game actions.

[3] I will be de-emphasizing the importance of unconscious motivation for game design. For designers, relevant game activity is practical or habitual; the unconscious, less relevant.

Three Move-making Dimensions

This model allows for the introduction of 3 dimensions.

Dimension 1: Presence and Dimension 2: Readiness

The division between discursive and practical consciousness can be mirrored in the interface of the medium by the distinction between presence-at-hand and readiness-to-hand. These terms are taken from Heidegger [7], one of the major influences on Giddens' conceptualization of consciousness. The two terms are used by interaction designers [9]) to describe human consciousness with regards to the tools that they use. A tool such as a hammer, when being used, moves away from the fore-front of one's consciousness into a practical, unproblematic space. If the hammerer takes the time to inspect a broken hammer, then the hammer has move from readiness-to-hand to present-at-hand. It has moved from a position of practical to discursive consciousness. Dimensionally speaking, we can examine how the design of a hammer can allow for scrutiny or fit into a desired rhythm of behavior. High presence means that the medium lends well to conscious attention. High readiness means that a medium fits unproblematically into habitual use. Game rules provide an expected rhythm to measure against.

Dimension 3: Adversity

The adversity of a game environment is the degree to which its material aspects make the game more or less difficult to the players to win. A cross-country racetrack

in the Sahara is considerably more adverse than one along the Côte d'Azure due to climatic differences. Depending on the interest of the designer, adversity can be sub-categorized by different types of resource costs such as time, energy, reflexes, odds, and more.

In games, the removal of difficulty is not necessarily desirable. Instead the appropriate location of difficulty is a design goal – the desired level of presence and readiness of a device is shaped by the expectations of the designers. Conversely, the actual presence and readiness of a device will shape the way the game is played. The cognitive cost (low readiness) of manually checking into Foursquare via text messaging transforms the game contrasts with play using location-aware smartphones. As players interact with the adversity of any medium, this can shift the line between discursive and practical consciousness. Players may grow more aware of the gas in their tank when they realize that a desired Foursquare location is very far away.

Analyzing 'Gamification'

This model allows for high level questions regarding 'gamification'. Any activity that rewards smaller milestones can be seen as a goal-oriented game. Suppose an exercise program awards points to users for entering an affiliated gym. The acquisition of digital points is the goal of the game-within-the-activity. A duality of purpose arises, one for exercise, another for points. The software representing the points is present, ready, and adverse for playing the game. These three dimensions together shift the line between discursive and practical consciousness for the player. Point acquisition might be so easy that it is habitual – or so invisible that players cannot predict how they will score. In a 'gamification' context, this 'playing-line' can be contrasted against the conscious expectations of the main activity. If the player values the points more than the activity, a dimension analysis can help answer how that plays out and can give pointers to how to create a desired balance between conscious attention to the exercise and to the game. This example is brief, but it illustrates the value of a clear player model and its fit to gaming, systems design, and application to non-gaming contexts. Compatibility with other frameworks and discussion for this developing work is welcome.

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Roleplaying gamification to encourage social interactions at parties

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Abstract
We discuss our ongoing work in using game techniques to encourage positive social interactions at parties. We relate our observations of party interaction behavior among guests and discuss game design considerations.

Keywords
Social interaction, social behavior, gamification, parties

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
With the popularity of smartphones and other mobile devices, social computing and gaming are now no longer situated in cyberspace alone, but also in real physical space. As we are beginning to see with Foursquare[1] and other location-based applications, relationships among *people*, *places* and *events* in real physical space can now be abstracted and augmented in-situ with computing interaction designs.

In this paper, we examine *events* in particular and discuss our ongoing work in developing our approach

[1] http://foursquare.com/

towards monitoring and encouraging positive social interactions in a small party setting. Inspired by online role-playing games (RPGs) and their character classes, we take a gamification approach to encourage party guests to take on different social behavioral roles.

Party Observations

The primary author holds a small monthly business and social networking wine party in Daejeon, South Korea called After Work Elite (AWE)[2]. The first two events were held in December 2010 and in January 2011, respectively. About 30 guests attended both parties with a fairly even balance among genders. Each party was held for about 5 hours. From direct observation and informal discussions with guests, we noted the following on guest interactions and behavior.

Guests mostly came in small groups of 1 to 3 persons. At the December party, there was a large group of 5 women who came together. Initially, this large group chatted mostly among themselves at one end of the space while the other guests actively mingled with each other near the wine and hors d'oeuvres, some getting involved in deep conversations with new acquaintances. Eventually, a couple of brave men introduced themselves to the group of women, effectively bridging the social islands. At the January party, there was also a couple who spent most of their time together, using the party as a kind of date.

Conversations were mostly held in small groups of 2 or 3 (this is consistent with psycho-acoustical findings which suggest there is an upper limit of about 4 in conversational groups [3]). At the December party, there was one guest who was good at beginning interactions, but not at sustaining them. Another guest who came alone, although she was usually in a conversation, did not appear to initiate any interactions. She later reported she felt like she did not fit in with the other guests.

figure 1. Guests interacting at the January 2011 party

We observed that there are indeed different kinds of behavior types and offer some tentative example categories. There is the *hit-and-runner* like the guest who was good only at starting conversations, the *in-crowders* like the groups who stayed together, and the *passive listener* like the guest who did not initiate conversations. Some of the more positive behaviors include the *deep talker,* who gets involved in interesting lengthy discussions, the *matchmaker* who introduces guests to each other (as the primary author did as party host) and the *explorers* like the men who opened up the group of women to interaction with the rest of the party. We also note that pre-existing relationships among guests and group size may have

[2] http://afterworkelite.com/

an influence on subsequent party behavior (e.g. the large group of friends and the couple).

We are currently collecting video and sensor data from our ongoing monthly parties in order to better define and refine these tentative behavior categorizations

Game Design

We have observed that some guests are outgoing and talk to many different people or have involved conversations and some are less so and chat mostly with their own group. From a party organizer's perspective, the former behaviors are more beneficial; the more positive social ties that are made among the guests, the more likely guests are to return and the party to thrive as a recurring event. From a guest's perspective, these positive behaviors can also help create a friendly, fun mood that can lead to greater enjoyment of the party. Thus, a party organizer would like to reward such positive social behavior in those who already behave in that manner and encourage such behavior for other guests. However, any persuasive game elements that are introduced should not disturb or take attention away from the original social interactions themselves. In our approach, we plan to simply track interaction histories during a party and use the data as game stats.

We can then provide a reward system of points as incentive to take on different specialized behavior roles much like where players take on different roles such as a fighter or healer in an online fantasy RPG like World of Warcraft [5]. These roles may include the *matchmaker*, the *deep talker* and the *explorer* roles mentioned above. AWE guests can form RPG-like parties or cliques of up to 5 people including at least one of each of these roles. The clique who has collectively accumulated the most points over the course of the party would then be declared the winning clique of that AWE party. They could receive prizes such as merchandise provided by party sponsors, providing incentives to enact the roles during the party.

A clique's *matchmaker* role might be taken by someone who already knows many party members and can act as a bridge between cliques, introducing guests in other cliques to the deep talker. An *explorer* in the clique could be a kind of advanced *matchmaker*, engaging stranger cliques in conversation and introducing them to his own clique. A *deep talker*'s goal would be to discover common interests in deep conversation to connect with another guest. Experience points could be gained by clique members by successfully performing their roles as determined respectively by introducing guests to each other or engaging in lengthy conversations. Gaining experience points would allow guests to earn badges and level up. Limiting the roles taken to such positive social interactional behaviors could lead to more successful parties by encouraging behaviors beneficial for the party and discouraging behaviors that are not. Offering discounts or VIP status to high-level guests could also encourage guests to attend the party regularly, contributing to its long-term livelihood.

Interaction Detection

In order to support our game designs, we need to be able to effectively detect social interactions among party guests. An interaction detection approach that could be implemented on off-the-shelf smartphones without additional sensors would be attractive for our party scenario. It would be convenient for our party

guests who are already used to carrying cellphones if not smartphones.

In exploratory research in our research group, we adapted conversation detection techniques similar to those described in [4] as an interaction detection approach implemented on Android smartphones. In a 2-week preliminary experiment with 7 participants, we were able to group members of our research lab by the projects they collaborated on together by noting the frequency and length of conversational interactions. However, two lab members who had their desks close to each other in the same room were incorrectly identified as belonging to the same project group. In our party scenario, where many people in several different conversation groups may be conversing in very close proximity to each other, we would likely have many such false positives among interacting dyads. For similar reasons, proximity-based approaches [1], most of which have resolutions of greater than 1 meter, would also result in many false positives in a dense party crowd.

Choudhry and Pentland [2] have shown that face-to-face interactions can be determined using an infrared sensor (IR) based-technique. We are currently performing experiments with custom sensors badges using a similar approach based on signal strength rather than IR. Many events use badges or wrist bands to identify guests, and our early results suggest that it is not inconvenient or unfamiliar for our guests. Such a non-sound based approach additionally has the advantage that it could be used for parties even in very loud environments like a dance club.

Conclusion

We have discussed some of our ongoing work in developing our approach for using game techniques to encourage positive social interactions at small networking parties such as AWE. We envision that converging gaming, social and mobile technologies are enabling such applications that are able to augment real world situations with layers of greater cultural abstraction (i.e. game interactions layered over party interactions) and greater awareness of and intentionality in real world actions (i.e. being aware of one's game role at the party rather than defaulting to largely unconscious ingrained social behavior roles and patterns).

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Gamification and location-sharing: some emerging social conflicts

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Abstract
Location-sharing services such as foursquare are a prominent example of commercial apps that use gamification to increase user engagement. These gamification elements however have to coexist with a plethora of usage motivations. We here present selected observations on emerging conflicts between gamification elements and other usage motivations for location-sharing. We argue gamification needs to take into account the social context in which services operate and that conflicts within this context can be detrimental, but can also add to playfulness.

Keywords
Gamification, foursquare, location-sharing

ACM Classification Keywords
H5.m. Information interfaces and presentation: Misc.

Introduction
Current location-sharing services like foursquare are a prominent example of near-mainstream gamification. Foursquare employs gamification elements like points, badges and mayorships to motivate people to engage more with the service and 'check in' more frequently. While the service isn't a game as such, it arguably features pervasive game [9] elements using real places. Most popular location-sharing services differ from earlier research efforts in important ways: not

only do they employ game-based incentives, they use manual 'check-ins' to pair user location with semantically-named, user-generated venues visible to all users and location is shared with a potentially very large audience. We here describe some recent observations on gamification in location-sharing services from two wider research programs at Mobile Life: one focusing on location-based services and the other on pervasive games. We here describe a selection of our findings that show that gamification can have both positive and negative effects on engagement with the service and we show emergent - sometimes conflicting- norms (not) to check-in resulting from for example clashes between 'play'-based motivations and more coordination-oriented uses. Our goal is to identify how gamification motivations can be successfully employed, and co-exist with other uses within wider, complex social contexts, such as in location-sharing.

Location-Sharing

Sharing one's location and knowing the whereabouts of others is not only a practical tool for coordination and communication [1,7]; rather than practicality and accurately sharing location or activities, location sharing is a social, emotional and moral affair [2]. It is used not only to express whereabouts, but also moods, lifestyle and events [1]. People share information that is interesting, enhances self-presentation and/or leads to serendipitous interactions [7]. Sharing is a social negotiation and can support connectedness, social repartee and enjoyment within social groups [1] and reassurance [2]. Which locations are shared can depend on with whom the information is shared, for what it is used [3], and 'right' and 'wrong' places to be [2]. Gamification elements have now been added to this complex landscape of motivations and concerns presented by location-sharing.

Some observations on gamification conflicts

Our group currently uses interviews, surveys and ongoing analysis of real-time 'check-in data' to analyze usage of location-sharing service foursquare. One of our studies, involving in-depth semi-structured interviews with 20 active foursquare users from Sweden, The Netherlands and the US focused on the motivations different people have for using the service (paper submission under preparation). Beyond the wide variety of motivations for checking-in, including a broader use of coordination and social-affective uses previously identified, we also identified motivations not previously described, particularly 'check-ins for me' with location-sharing as a side effect, rather than main motivation. These include check-ins for rewards (incl. discounts), life-logging, diversion and voyeuristic uses. In our studies a selection of participants reported checking-in and sharing their location primarily for the game with mayorships and badges being most compelling. One interviewee specifically set out to try and figure out how to get badges and even manipulated venue information and his check-ins to this end. However, a number of conflicts appeared to arise as well, a selection of which we discuss below:

Playing for points vs. 'nonsense' venues

A way to gain additional points and mayorships is creating new venues to check-into. However, venues that just have been created for 'the game', can also be a non-informational annoyance, making finding 'real venues' users may be looking to check into harder:

"Like... you go to a sandwich shop and there's an order line and a pickup line, and someone checks in at the order line, they check in at pickup line, I think that's kind of stupid [...]"

Mayors & badges vs. privacy & identity management
Users automatically become the mayor of a venue by checking-in the most at that specific venue during the last two months. Mayorships are publically visible on users' profile, and are also shown to any user checking-in to that venue. This means that mayorships can threaten privacy – especially when considering the example of being the mayor of one's home. A selection of participants did use check-ins to 'show off' they 'went places' and 'mayorship battles' for cool places were reported. The badges and mayorships involved in Foursquare however would both facilitate and complicate such motivations. Some participants worried about getting mayorships or badges that would threaten their identity. Would one want to become the mayor of the cheapest eatery in town? Would it be professionally appropriate to have a 'crunked' badge featuring a drunk cartoon on a public profile? At the same time, 'naughty' badges and offbeat mayorships were considered fun and spurred conversations.

Mayorships vs. ownership
A mayorship appeared to communicate not only identity, but also public 'ownership' over a place, which was not always desired. Some participants for example reported annoyance with others for claiming places in an undeserved manner. Interestingly, some check-ins, while technically not 'fake' (aka not physically being there), would be perceived as cheating or as not respecting 'ownership' and social boundaries:

"[...] I've been to his [my best friend's] office like 50 million more times than this other guy has, but he escalated that, he made that part of the game, and it wasn't part of the game before. I thought that was kind of unfair. [...] it felt like it was more my place and like, in a social sense, than it was his place. But then he claimed it"

Potential consequences were feared in some cases. One participant for example wondered whether it was ok 'from a business perspective' to become the mayor of the office of one of his clients.

Anti-cheating aka 'you're using it wrong'
When introducing game-elements, a need for rules may emerge. Foursquare for example implemented 'anti-cheating' rules, where users are warned they will not receive points for a 4th check-in within 15 mins. An interviewed bus driver however for example did not use the service to share or 'play', instead he used the app on his mobile phone to check in when driving his bus and waiting at stops. He found this a welcome diversion, and could now also revisit his routes in his check-in history. While these check-ins had no audience of other users, the service itself could sometimes serve as a disapproving audience. The bus driver for instance recalled that when checking in on the stops of one of his routes, the app would start telling him he was checking in too much to get points. He decided then that he apparently 'must be using it wrong' – services employing gamification need to consider which messages their 'game-rules' send to users who might have very well appropriated the service in other ways.

Inappropriate can be more fun
The conflicts above however should not be seen as a disqualification of gamification elements. This especially becomes apparent when considering the 'physical act' checking-in requires. Multiple participants described 'getting caught' and 'doing it under the table'. Exactly this social unacceptable aspect of using the service also

invoked playful behaviors - making usage of the service a bonding experience within the social group users were using (or in this case, playing) the service with. This was especially apparent for users that saw check-ins not as a tool for coordination only, but also as a playful goal in itself:

"...it's maybe not professionally appropriate to do it, right.[…] but if we're in a situation where it's probably not the best to exhibit such adolescent, teenage behaviour, we won't. What happens then it becomes a way of.. like I was saying, the social part… who can do it most subtle. and like, revel in the victory of doing that, without being in your face about it [...]we'll do like a head nod or some sort of visual cue and the other one will be like, you...you got it...this time"

We now see both non-users and fellow users becoming part of the experience as partial spectators as in [5]. The act of checking-in is either hidden to for example avoid their disdain, or first hidden and then expressively revealed to spectators who are fellow 'players' to amplify the shared experience. We cannot limit our analysis of effects of gamification elements to the virtual game and in this case the audience of the check-in via the service; the physical act of checking-in in itself also becomes a playful activity or performance.

Up for Discussion

The examples above show that gamification can both engage 'players' and restrict 'use'. Conflicts between gamification elements and 'utilitarian' uses might not always be avoidable, and conflicts are not always a negative feature. The challenge might rather be to take advantage of these conflicts to make services more engaging. Separating 'play' and 'utilitarian use' is not always possible, as multiple motivations may be at play and users switch roles (as exemplified by interviewees' using both the terms 'play' and 'use'). Gamification discussions need to go beyond whether gamification elements motivate individual users to use a service. We need to consider the complex social contexts in which services that employ game elements operate. For example, in the case of location sharing we need to consider motivations of the user him-/herself, the social group(s) they are 'playing' or 'communicating' with, the wider context of other users of the system, non-users who might stumble upon public profiles of 'players', and audiences of the physical act of checking-in and many more factors. For understanding the role of gamification elements in such a context, we argue that using multiple lenses and considering both the perspectives of, in this case, location-sharing and game & gamification research is crucial.

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Situated motivational affordances of game elements: A conceptual model

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Abstract
An increasing number of applications use game design elements to motivate user behavior in non-game contexts. Yet current models of video game motivation do not connect to the granular level of single design elements. Similarly, they do not address the social situation of game play. To address this lack, the concept of situated motivational affordances is introduced to conceptualize the motivational pull of single game design elements in varying contexts.

Keywords
Gamification, self-determination theory, motivation, motivational affordance, situation, play, autonomy

Introduction
In the past decades, research as well as industry practice have increasingly expanded their focus from pragmatic issues of human-computer interaction – like utility or usability – to include aspects like emotion, joy of use, user experience, or motivation. One recent strand in this broader shift has been called "gamification": the use of game design elements in non-game contexts [3]. Overwhelmingly, this is done to drive 'user engagement', i.e. to motivate users to engage with an application or service, usually by making it more 'fun' to use.

Yet despite the parallel increase in research on fun, entertainment, and motivation in video game play, we are still in want of theoretical models of the motivational pull of game *elements*. For the existing models by and large focus on *general* motivations for video game play, or how a game (play episode) *as a whole* creates intrinsically motivating experiences of 'fun' or 'entertainment' (e.g. [7,13]). They are not linked to the more granular level of single interface or game design patterns.

Motivational affordances

A promising approach to systematically conceptualize and study this granular level is that of "motivational affordances" [14]. It transfers the well-established concept of affordances from perceived opportunities for action to questions of motivation, linking up with need satisfaction theories of motivation, specifically Self-Determination Theory (SDT) [11]. Need satisfaction theories argue that human beings seek out (and continue to engage in) activities if these promise (and succeed) to satisfy motivational needs, such as competence, autonomy, or relatedness.

Translated into motivational affordances, this means that motivation is afforded when the relation between the features of an object and the abilities of a subject allow the subject to experience the satisfaction of such needs when interacting with the object. E.g., relative to my skills and knowledge, this Sudoku puzzle in front of me affords an opportunity to experience myself as competent when interacting with it.

Not only has the concept of motivational affordances already been operationalized satisfyingly in experimental studies [6]. The underlying theory of motivation – SDT – also finds increasing acceptance as a fruitful approach to the motivational psychology of video games. Playing games is the prototypical example for an autotelic, intrinsically motivating activity, and SDT is arguably the empirically most well-researched psychological theory of intrinsic motivation. Indeed, SDT has been demonstrated to integrate many different findings and concepts regarding the motivational pull of video games into a small set of constructs embedded in one macro theory of human motivation. And several empirical studies show strong correlations between video game features, need satisfaction, and other relevant constructs like enjoyment or intrinsic motivation [10,12].

Context as factor: The autonomy of play

Yet promising as they may be, both SDT research on video games and the concept of motivational affordances share a significant blind spot: Their focus is by-and-large limited to the properties of the game artifact, ignoring the impact of the social situation or context in which the artifact is engaged with.

This becomes particularly striking with regard to autonomy. SDT understands autonomy as a basic motivational need, and dozens of empirical studies and several meta-analyses robustly demonstrate that attaching extrinsic motivators to an activity (punishments, cash rewards) or giving controlling verbal feedback can reduce intrinsic motivation by thwarting a subject's experience of autonomy [2].

Now autonomy is arguably also one core component of (leisurely) game play. The overwhelming majority of theoretical discussions enlist voluntary engagement and lack of serious consequence as attributes defining play

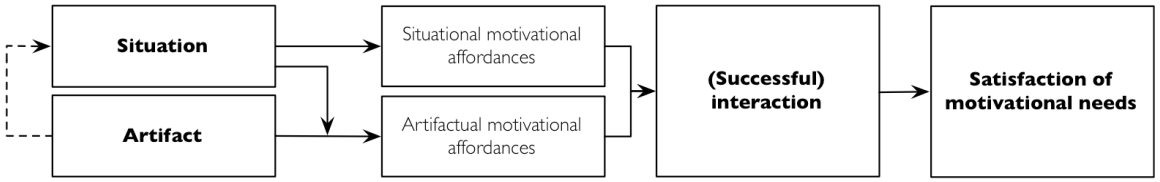

Fig. 1 Situated motivational affordances

against other kinds of activity, especially work [1,5]. At least two empirical studies demonstrate a close link between autonomy satisfaction, intrinsic motivation, and the experience of 'play' in video game usage [9,10]. Thus, it stands to reason that situational aspects of video game usage also play a direct role in its motivational pull: The voluntariness of play provides a strong experience of autonomy, which is intrinsically motivating; this is further supported by the lack of outer consequence – or extrinsic motivators – of video game play.

Furthermore, SDT argues that the autonomy-supporting or autonomy-thwarting quality of environmental inputs is not objectively given, but a subjectively construed social meaning [11]. Put differently, not only does the usage situation ('play') itself entail motivationally salient aspects (voluntariness, lack of consequence). Even the motivational affordances that pertain to the artifact (in our case, the video game) are situated in the sense that their motivational salience is at least partially determined by their situational usage and meaning.

To give an example: One typical design element of current 'gamified' applications are high score lists (or leaderboards). For instance, the application "Scoreboard" allows to add a leaderboard for sales activities to the customer relationship platform Salesforce.com (http://www.hoopla.net/). The underlying reasoning is that the social comparison enabled by such a leaderboard leads to a competitive dynamic among involved users, fueled by the social need for achievement. This overlooks that playing a competitive video game is voluntarily chosen and free of consequence. Yet a public performance comparison at work, introduced by management and tied to cash incentives (as recommended by the software provider), is neither voluntary, nor free of consequence. Thus, it could easily be experienced as controlling, thwarting experienced autonomy and hence, intrinsic motivation.

Situated motivational affordances

If we return to our initial object of interest, the use of game elements in non-game contexts, we can thus conclude that the 'transfer' of a design element from a 'play' context into another usage context likely does not necessarily lead to the same motivational affordances. Thus, to understand when and how game elements engender motivational affordances in non-game applications and services, I argue that we have to conceptualize them as necessarily *situated* [4].

Situated motivational affordances describe the opportunities to satisfy motivational needs provided by the relation between the features of an artifact and the abilities of a subject in a given situation, comprising of the situation itself (situational affordances) and the artifact in its situation-specific meaning and use (artifactual affordances). Thus, the situation at hand both (a) provides motivationally salient features of its own and (b) shapes the usage, meaning, and consequential salient motivational affordances of the artifact in question. Motivational affordances must be perceived to motivate initiation of an activity. (Successfully) acted upon, they satisfy motivational needs and thus motivate continued activity until the need is sated.

As indicated by the dashed line in figure 1, the artifact is also assumed to play a role in establishing the usage situation at hand – such as 'play' or 'work': It enables/constrains possible uses, serves as an interactional focus, primes associated cognitive schemata, etc. Evidence suggests that merely labeling a task as "play" or "game" changes its perception and subsequent performance (e.g. [8]). However, this complex warrants deeper theoretical and empirical exploration that goes beyond the scope of this paper.

Conclusion

This paper argued that the concept of motivational affordances and the connected macro-theory of human motivation – self-determination theory – provide good theoretical starting points to the study of the motivational dynamics of 'gamified' applications and services, if we extend them towards *situated* motivational affordances.

As it stands, the concept is a theoretical sketch that leaves much to be asked for. Next steps will have to unpack the construct of 'situation' in a way that is on par with existing theories on situated HCI [4], to prove that the model and its constructs can be operationalized and are useful in empirical research, and to validate its broader assumptions.

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Design Challenges in Playable Data

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Position Statement

Work published this year at CHI has introduced the notion of game-y information graphics which take raw datasets from sources such as data.gov and create playable visualizations by adding elements of goals, rules, rewards, and mechanics of play [2]. One example is Salubrious Nation, which uses geographically tagged public health data such as smoking and obesity rates, to create a guessing game. The goal of the game is to accurately guess the magnitude of the given health parameter for a randomly selected target county. A player's guess can be informed by looking at the map (See Figure 1) for visual clues as a slider is changed, or by using hover-over information on correlated variables (e.g. poverty rate or elderly population rate).

In addition to allowing players to use the map-based graphic to arrive at insights about the data and to redistributing players attention to different aspects of the data, such an approach also offers the promise of reducing the amount of effort needed to repurpose that data into new playable experiences. Interested readers can see [2] for all of the details.

In the remainder of this position paper, however, I would like to expound on and explore the design difficulty associated with creating a *challenging and balanced* game experience when drawing on raw

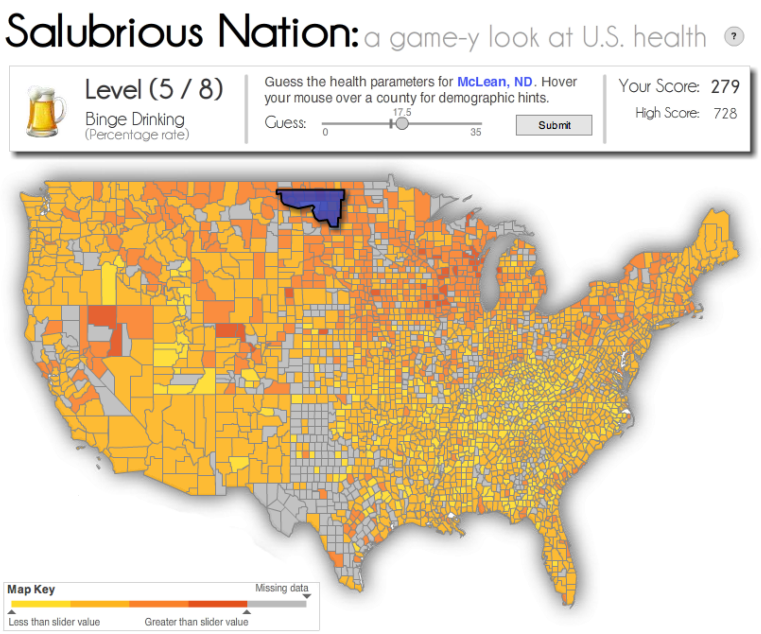

Figure 1. Salubrious Nation. http://www.salubriousnation.com

datasets as input for the construction of a game. Ordinarily when designing games, substantial effort is directed to level design. In fact, many games employ dedicated level designers who work with the game designer in order to provide the right amount of challenge, reward, and balance to the game experience [3].

In contrast to such heavily authored experiences, gamified data experiences (whether they be based on infographics as in Salubrious Nation, or not), may draw on data that is incomplete, inconsistent, or dynamic. For instance, if a dataset is missing values, such missing values must be taken into account so that this does not completely break the game, or at least does not substantially reduce the engagement of the experience. Salubrious Nation relies on correlations between health variables to demographic variable such as poverty rate, to help users predict the public health variable (e.g. smoking rate). If the data were updated in such a way that relationships (i.e. such as a correlation) was diminished or removed, this would affect the playability of the game.

Dealing with data that is updated, refreshed, or otherwise dynamic represents a design challenge. Another example, the California Stimulus Map Game [1] was a game-y infographic created for the Sacramento Bee newspaper website. In this trivia game players had to answer a series of trivia questions about stimulus funds by interacting with a visual map of the state of California. Two weeks after the initial publication the data for the map in the game had already been updated by the government. Not only did this affect the visual representation of the map, but it also impacted the answers to some of the trivia questions, thus forcing the designers to update the game in order to accommodate the new data. One approach to dealing with this issue would be to devise better automatic authoring routines so that trivia answers could be extracted directly from the data without human intervention (e.g. “What is the county with the largest (or smallest) amount of stimulus money”). More research needs to be done to determine the best way for dealing with changes to data which can impact a play experience. Methods developed should be robust to incomplete, inconsistent, or dynamic data and should provide for a playable experience regardless of reasonable changes to such data.

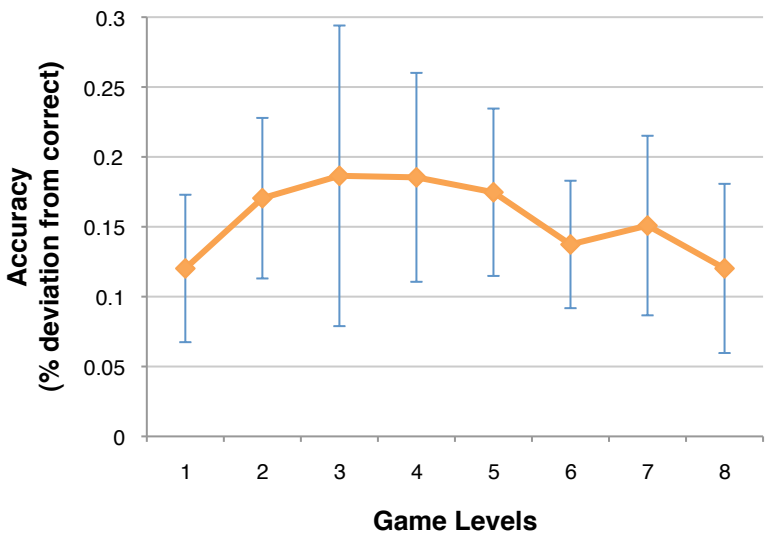

Figure 2. The average accuracy of players' guesses for each level. Error bars show the standard deviation

A more general issue with raw data is that the challenge or difficulty of the experience produced in the game is hard to control. With one set of data as an input a game may be too easy but with another it could become too hard. For instance, in Salubrious Nation there were 8 levels, each using a different public health parameter. For each of the levels we measured the average accuracy of the guesses that were produced by the 41 players in our experiment. This is shown in Figure 2. As can be seen in the graph, some levels were more difficult than others, even considering some potential learning and improvement by players in the latter levels. This is in contrast to the typical game design pattern of increasing difficulty of levels. Indeed, based on the collected data it may be advisable to re-order the levels in Salubrious Nation so that easier levels are first and more difficult ones later.

In the absence of carefully authored levels of a game, we can still collect log data from players in order to infer difficulty and challenge. While this is relatively straightforward for a puzzle where there is a correct answer and a relatively simple metric can be used to infer difficult, there remain open questions for research. How can log data be used to infer other measures of difficulty (frustration even)? How can playable data games be rapidly and perhaps automatically re-adjusted to assess difficulty so that in a short period when a game is first being played it is able to evolve and adjust itself to provide an appropriately balanced and challenging experience?

These questions apply generally to the gamification of any data-based resource. When gamifying a dynamic, perhaps arbitrarily defined data source, how can we arrive at estimates for the challenge, balance, and playability of those experiences? Properly instrumented such games could perhaps automatically adapt their levels and difficulty to compensate for differences in the input data. I believe that answering these questions will be essential to being able to more rapidly create compelling gamified data experiences in the future.

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Player Types and Gamification

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Abstract
This paper presents a brief history of the concept of player types starting with Bartles's work on MUDs and continuing to more recent, empirical research. Player types are not a defined concept and any categorization of players or users needs to occur within the context of a particular application or domain. Play-personas are suggested as a useful tool that can be used to put player type research into practice as part of the design process of gamified systems.

Keywords
Gamification, Player Type, Personas, Play Persona

Introduction
In *Hearts, Clubs, Diamonds, Spades: Players who suit MUDs* Richard Bartle [1] made his now famous observations about player types in the early MUDs (Multi-User Dungeons/Domains). He pointed out that not all players play for the same reasons, or play in the same way. He outlined the four types of players - socialisers, achievers, explorers and killers - each with different motivations, in-game behaviours and play styles.

For at least a decade this was the only research of its nature. Recently significantly more research has become available in this area.

What are Player Types based on?

The idea of Player Types assumes that there are distinct player-related phenomena that can be categorized, for example: motivations, play styles, behaviours, genre preferences and pleasures. These are then formalized or grouped as: categories, typologies or taxonomies. The means by which these categories are reached is mixed, from formal statistical methods to more interpretative approaches. For example the Bartle four types model is based on player behaviour and pleasures and was obtained through long-term, game-based focus groups.

Bartle's work, and many others' is based on particular games or genres. It is difficult to generalise outside the context that the research was carried out in.

There is also a methodological problem in interpreting in-game behaviours as specific motivations or play preferences without actually engaging in qualitative research with players.

Players each have different strategies for play and that as well as large-scale groupings of behaviour around preferred playings, there are also many hidden, appropriative or resistive types of gameplay that are worth considering [11].

A Critique of Bartle's Model

Bartle's model was an early foray into player studies, but has some issues. The first issue surrounding Bartle's four types was that it was never intended to be a general typology of all digital game players, however it is often referenced out of MUD context and applied to game design generally [8,12], and also recently in gamification [6].

Although it is both an insightful model for MUDs, Bartle's model suffers from a number of weaknesses. First that the components of each player type may not be correlated. Secondly that the types may be overlapping or mixed, yet Bartle asserts that they are mutually exclusive. Lastly, it is not an empirically based model that can be validated [15]. However there is recent work that has built on these early ideas.

Empirical work in player types

Nick Yee has carried out a long term, quantitative study of Massively Multiplayer Online Roleplaying Games (MMORPGs), gathering data through a series of questionnaires [16]. One small part of this involved a validation, or exploration, of Bartle's original model [15]. As the question generation is based on Bartle's work it can be seen as an empirical grounding and refinement of those original four types. Yee's updated model of player motivation has three main components and 10 subcomponents.

- Achievement: Advancement, Mechanics, Competition
- Social: Socialising, Relationship, Teamwork
- Immersion: Discovery, Role-playing, Customization, Escapism

This work shows that the Killer type is not separate, but instead correlates strongly with the competition subcomponent. It also shows that the activities characteristic of Bartle's explorer type are split between the mechanics and discovery subcomponents.

This new model develops, and empirically grounds the model Bartle proposed. It is also contextually valid as there is a historical link between MUDs and MMORPGs. Yee is careful not to describe his work as player types. They are overlapping sets of psychological and social

'motivations' based on player behaviour and preferences. The research also shows strong correlations between particular motivations and gender.

Another example of this approach is an ethnographic and interview based study of the BBC's online game *Adventure Rock* [7]. A taxonomy of children's 'orientations' to the game was created that includes: Explorers, Self-stampers, Social climbers, Fighters, Collector-consumers, Power-users, Life-system builders and Nurturers. This research also highlights specific gender and age preferences in these categories.

Kallio, Mayra and Kaipainen [9] take a much broader view and through a detailed study created a model of player mentalities for all digital game play. Because it is much more generally about games it loses the specificity in gameplay behaviours that both the Yee and Jackson focus on. It is a study in the general social and cultural motivations that cause people to play digital games.

Using a set of nine heuristics, they determine nine different player behaviour types. These are based on the length, regularity and social context of the game play. These are grouped into three sets.

- Social Mentalities: Gaming with Kids, Gaming with Mates, Gaming for Company
- Casual Mentalities: Killing Time, Filling Gaps, Relaxing
- Committed Mentalities: Having Fun, Entertainment, Immersion

Another approach is one typified by the work of Canossa and Drachen [5]. They carried out a clustering analysis of gameplay metrics collected via XBox Live [14], from players of the game *Tomb Raider: Underworld* [13]. Using metrics such as completion time and number of deaths they create a simple taxonomy of players' behaviours explicitly to help in game design.

All of this recent work shows the range of detailed, empirical and formalized research that is going on in the area. There are also less formal and more industry focused pieces of research. Klug and Schell, present a collected list of nine player types used in the industry [10]: Competitor, Explorer, Collector, Achiever, Joker, Director, Storyteller, Performer and Craftsman.

Play-Personas

Rather than thinking of player types as being some form of absolute play preference a more useful way is to use them is as personas within the design process [2]. These can be applied in the same way as personas are normally used in User Centred Design [3] and are something that interactive designers are familiar with. In this situation we don't have to be too concerned with differentiating between motivation, behaviour or preferences as personas are intended to be a rich story to be used in design. For game design these tools are becoming increasingly important as the types of players being designed for are becoming less and less like the game designers themselves [4]. However the creation or personas is very contextually situated and needs to be based on rigorous, application specific, qualitative and quantitative research.

Conclusions and Future Research

It is tempting to create a generalised schema or taxonomy of player types. However the insights generated and the types of behaviours are constrained by the particular games and the game cultures around

each. Kallio et al [9] carried out a large-scale study and the focus necessarily shifted to the social situations that surround games rather than play style or behaviour.

Achievement and socialisation are two common components of the models described above and these are also the common patterns and mechanics that gamified systems are relying on [17].

Gamified services present an exciting and ready-made opportunity for data-intensive, quantitative research due to their client-server nature.

One of the clear things that many of these studies highlight is that both gender and age play important roles in game playing motivations and behavior.

Lastly, all the research described here is on digital games, not gamified services. Although some aspects can be extrapolated from one domain to another, not all research about digital games can be applied directly to the gamification of other applications. There is also real danger that the design of gamified systems will continue to be based on non-empirical research from the wrong context, ultimately leading to commercial failure and user disappointment.

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Exploring the Potential of Gamification Among Frail Elderly Persons

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Abstract
The application of game elements a in non-gaming context offers a great potential regarding the engagement of senior citizens with information systems. In this paper, we suggest the application of gamification to routine tasks and leisure activities, namely physical and cognitive therapy, the gamification of real-life activities which are no longer accessible due to age-related changes and the application of game design elements to foster social interaction. Furthermore, we point out important chances and challenges such as the lack of gaming experience among the target audience and highlight possible areas for future work which offer valuable design opportunities for frail elderly audiences.

Keywords
Gamification, accessibility, user experience, elderly, digital game design, serious games

ACM Classification Keywords
H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; K.4.2 [Computers and Society]: Social Issues – *Assistive technologies for people with disabilities, Handicapped persons/special needs*; K.8.0 [Personal Computing]: General - *Games*.

Introduction

Western societies are faced with the challenge of the demographic transition which leads to a drastic increase of the group of senior citizens during the next decades [8]. Also, the rising number of persons living in full-care nursing homes challenges common practices of elderly care which needs to encourage frail elderly to remain cognitively, physically and thus socially active.

In this context, preliminary research results suggest that the application of digital games and regular applications incorporating game elements may positively influence the physical, cognitive and emotional well-being of this demographic: A study examining the psychological effects of engaging in digital games suggests that playing commercially available Wii games positively affects the overall well-being of seniors living in retirement homes [6]. Apart from that, gamified applications have been implemented in physical therapy, e.g. stroke rehabilitation [1]. Tools such as SilverBalance which incorporate game elements may be used to further analyze the use of digital games among seniors, e.g. exertion games [4]. Also, the implementation of game elements allows for the development of motivational information systems for cognitive training [7].

Hence, the further exploration of gamification of routine tasks as well as leisure activities among frail elderly represents a valuable design opportunity. Yet, a set of challenges has to be addressed when designing for seniors, for instance a lack of gaming experience as well as cognitive decrements caused by age-related processes. In the following section, we suggest applications of gamified information systems and highlight design issues which need to be addressed.

Gamification and Frail Elderly Persons

Game elements can be integrated into information systems for elderly audiences in different ways, for instance to augment routine tasks, to offer new user experiences and to foster social interaction.

figure 1. Re-creating real-world experiences through gamification: SilverPromenade.

Augmentation of Regular Tasks

One of the most basic design opportunities is the gamification of regular tasks which have to be performed routinely. On the one hand, this includes the idea of motivating users to participate in physical or cognitive therapy by providing game-like experiences which resemble leisure activities and foster the user's engagement and long-term motivation [2]. In this context, offering achievements and highscore lists may encourage elderly persons to compete with peers. On the other hand, data provided by these applications may be used by medical or nursing staff in order to monitor and analyze the user's performance. Thereby, decrements or advances in the user's abilities could be detected at an early stage and quickly be acted upon.

Re-Creating Inaccessible Real-World Experiences
With the wide availability of full-body interfaces and haptic input devices, another design opportunity is the re-creation of real-world experiences which have become inaccessible due to age-related changes and decrements. In this context, the term gamification needs to be applied on a broader level. An example is SilverPromenade (cf. figure 1) which enables the user to set out on virtual walks in well-known areas, for instance through the city forest, while corresponding video material is played based on his or her movements on the Nintendo Wii Balance Board.

figure 2. Elderly users interacting during a playtesting session.

Gamification for Social Interaction
Finally, the presentation of playful activities and the integration of game elements such as game metrics offer the possibility of fostering social interaction between senior citizens living in nursing homes. First focus group results suggest that offering common ground for discussion, e.g. by providing highscores for mini-game challenges, is a great way of playfully getting into touch and transferring positive experiences from the virtual to the real world [4].

Chances and Challenges

Generally speaking and regardless of the integration of game elements, it is important to account for the most important age-related changes when designing for senior citizens, such as decrements in sensory processes [5] and cognition [3], as well as physical limitations [3, 4] which may occur during late life.

In this context, two main challenges have to be addressed when creating gamified information systems for elderly users. First, the lack of digital gaming experience among today's senior citizens has to be accounted for [5]. While younger users are familiar with gaming systems and game elements can be integrated into regular applications based on common domain knowledge, this is not possible when designing for elderly users. Hence, one of the main advantages of gamification - motivating users based on offering game-like, enjoyable experiences - cannot draw from similarities between digital games and gamified applications. Instead, designers have to rely on board and card game experience of elderly users, thus the advantage of gamification lies within the general opportunity of engaging users in playful activities regardless of previous engagement with digital games. Furthermore, a lack of gaming experience may have a negative impact on the general understanding of metaphors derived from digital games, which is expected to further hinder the engagement of elderly persons with gamified applications. Therefore, it is especially important to create systems featuring carefully selected, easily accessible game elements

which do not rely on the user's prior gaming experience, which partially contradicts the basic principles of gamification. Second, another challenge is created by necessity of appropriately augmenting routine tasks, which need to be meaningful and entertaining in order to engage elderly players in the long run: The inclusion of game elements in everyday life has to provide an additional benefit to the user instead of being a mere add-on. Thereby, it is possible to avoid the extension of a tiresome task without engaging the user. Also, it is important to consider the workload and computer literacy of nursing staff in the context of design for institutionalized elderly which may not be increased by attempts at gamification.

The chances of gamified systems for frail elderly users are manifold. First, applying data mining algorithms to metrics logged by gamified applications offer interesting information for medical and nursing staff and an easier way of monitoring one's cognitive and physical health. Second, gamified information systems provide a range of new leisure activities for frail elderly which may add to their quality of life. Also, existing work including focus groups has shown that learning and understanding game elements is possible and may be enjoyed by users of all ages. Finally, to design senior-friendly applications featuring game elements, further collaboration between game designers, researchers and gerontologists is necessary. By bringing these groups together, it is eventually possible to create challenging yet enjoyable experiences for senior citizens.

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Brainstorm triggers: game characteristics as input in ideation

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Abstract
In this paper some of our explorations regarding game applications as a model for engaging consumer product interactions will be presented. We systematically looked at what makes games appealing, based on analysis of the literature and on studies we conducted with games ourselves. What we report here is how we used the outcome of these efforts as a starting point for a set of ideation (brainstorm) guidelines regarding 'affectability' when working on novel product concepts.

Keywords
Brainstorming, ideation, user experience, affectability

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Product design and development tools

Introduction
Although "User Experience" and "emotional product design" as a topic is increasingly receiving attention [2, 4, 6, 7, 9, 10], systematic tooling that can help in the early development phases of products that are "affectable", i.e. that will be enjoyable and engaging to

their users, is still scarce. Several publications provide guidelines regarding what characterizes affective products, for example [4, 6, 7], but these descriptions tend to be quite general, and by themselves not sufficiently supportive to guide the development process towards a concrete idea for an affectable product – more specific input will be needed to properly support the development team during the early phases of product concept creation. It is important to address these qualities early on, because it is very likely that affectability is going to require some fundamental design decisions about what it is that the user is going to be offered, and in what way. And such fundamental design decisions are usually difficult if not impossible to readdress at a later stage in the development process, when most features of the product under development have been fixed.

If we want to understand which factors could contribute to an affectable, enjoyable device, a potentially interesting domain to look for inspiration is that of games. Most games have the inherent quality to lure people to touch, and try, and to motivate people to engage in interactions. In an ongoing research activity, we are exploring if characteristics of games can teach us something about designing enjoyable consumer applications such as coffeemakers and vacuum cleaners. Preliminary findings suggest that factors found to be important in games, such as control, but also curiosity, surprise, attractiveness of visual and tactile elements, and sociability, might be interesting candidates for consumer applications as well.

In this paper, some of our explorations of game applications as a model for thinking about engaging products will be presented. No final conclusions can be presented at this point in time, but we would like to discuss some of our findings so far. We systematically investigated what makes games appealing, based on analysis of the literature and on studies we conducted with games ourselves [3]. What we report here is how we used the outcome of these efforts as a starting point for a set of ideation (brainstorm) guidelines regarding 'affectability' in novel product concepts.

Affectability guidelines derived from games

Reviewing the many publications on games and fun resulted in a large list of factors and aspects. We clustered these into three dimensions: *accomplishment, discovery, bonding*. Only brief definitions will be provided here, given available space, more elaborate discussions with examples are provided in [3].

The first dimension, getting a sense of *accomplishment*, has to do with clear goals that can be met, progress towards those goals and clear influence over that progress. It is determined by the *balance between challenge and control*, by feelings of mastery. The second dimension, getting a sense of *discovery*, has to do with curiosity, the human drive to explore and discover new things. Creativity is thought to be related to this source. The third, getting a sense of *bonding*, has to do with recognition and affirmation, being part of a group, connecting to others. Cooperation or doing something together is about the need to be needed. It creates a sense of belonging, a connection. Related to this aspect is competition, comparing own accomplishments with others.

Next to the just presented dimensions, three *enhancement* factors are distinguished. These influence the effectiveness of the three dimensions, but on its own do not provide fun. We identify three main

enhancement factors: fantasy, aesthetics and physicality. The first, fantasy, has to do with a theme the game may have. The second, aesthetics, has to do with appearance, e.g. whether the interface is pleasing to look at or made of nice materials, producing appealing sounds, etc. Physicality has to do with having an interface that is physically engaging.

In the next section we will describe a case in which we used these dimensions and factors in the ideation and concept generation phase of a product development project. Different approaches to support ideation sessions have been developed over the years [e.g. 1]. However, few tools appear to be available that can specifically support the "ideation for affect" at this stage [2].

Using the affectability guidelines as triggers in ideation

We explored the use the affectability guidelines in the ideation phase of an innovation project on robotic vacuum cleaners. The goal of the project is to design expressive behavior for robotic vacuum cleaners to make them more affectable and fun to users. Also, careful design of the robot's behavior is expected to be helpful in increasing users' understanding and appreciation of what the robot is doing and why it performs certain behavior [8]. A brainstorm session was organized, in which the affectability guidelines were used as triggers to help participants in the brainstorm to come up with ideas how to make a vacuum cleaner, which is normally a very functional appliance, more fun and exciting. Five researchers with a technical background (i.e. computer science, software engineering, and HCI) participated in this brainstorm, which was moderated by the first author. The moderator first introduced the background of the guidelines and explained the different dimensions and factors (see Table 1).

Table 1. Affectability guidelines and some examples of ideas for the robotic vacuum cleaner

Affectability dimensions/factors	**(# of ideas) and one example idea**
Accomplishment • Clear goals • Perceived progress • Feedback • Influence over progress	(47) Users throws 'coins' around in the room that the robot has to collect
Discovery • Curiosity and exploration • Creativity • Unpredictability is good, arbitrary is bad • Balance between ambiguity and consistency	(17) Once in a while, the robot gives a cleaning tip of the day
Bonding • Recognition • Affirmation • Belonging • Balance between cooperation and competition	(10) Make the robot react on petting by the user
Enhancement factors • Fantasy • Aesthetics • Physicality	(6) Give the robot a clear character / personality

Initially, participants found it difficult to come up with ideas. However, after some examples of how these guidelines could be applied to robot vacuum cleaners were provided by the moderator, many ideas were generated. Table 1 presents an overview of the number of ideas that were generated by the participants and some examples to illustrate the type of ideas that resulted from the guidelines.

All participants had experience with brainstorm sessions. They indicated after the session that this new approach resulted in a different type of ideas (more playful), compared to brainstorms that start from functional or technical triggers (more functional). Based on the number of ideas, it seemed that the participants were better able to work with the accomplishment dimension than with the other dimensions. Participants had in particular difficulties with applying the trigger 'affirmation'. Overall, bonding is perhaps less easy to apply to a vacuum cleaner, even a robotic one, since it is usually seen as such a mundane, non-personal appliance. Same argument might be applicable to 'enhancement' – although such factors are often applied in product design, it was perhaps more difficult to come up with new ideas for what is typically seen as a usually stored-away appliance.

After the brainstorm, the ideas were reviewed and clustered by the project team into 30 distinctive concepts and ranked on a number of criteria set by the product manager. The ranking led to a selection of 12 concepts that were translated into usage scenarios. These scenarios were evaluated with 15 potential end-users. It is outside the scope of this paper to present the details of this evaluation, but some scenarios were clearly more appealing than others. The scenario that described a robot with a dedicated game mode in which it played a mimicking game and copied the cleaning patterns made by the user was least appealing. The scenario in which the robot shows in a fun way that it is putting extra effort in cleaning a very dirty spot was considered one of the most appealing concepts. A general observation is that the scenarios in which the fun element was combined with a functional benefit scored higher than scenarios without a clear link between the fun aspect and the function of the appliance.

Discussion

Many ideas for the robotic vacuum cleaner were directly referring to gaming elements, which is not very surprising, since the affectability guidelines were derived from gaming studies. However, for a 'serious' and functional consumer product, explicit gaming functionality and features are not always desirable, as pointed out by the mixed feedback on gaming related concepts for the robotic vacuum cleaners by the participants in the follow up study. For example, our idea to have a playful way of cleaning the floor by allowing children to remotely control it like a radio-controlled race care was not appreciated, since people were concerned about making a toy of an expensive household appliance. On the other hand, ideas to create a personality for the robot that reacts in a lifelike way to people or to a very dirty floor were much more appreciated.

The evaluation data collected in the next stage of the project provided a useful check of the desirability of the product concepts by users. It also provided useful first feedback on the triggers that we used in the brainstorm, and on other issues requiring further investigation to obtain a more coherent picture of what elements of games could be adopted for application in consumer products. The most important issues are:

- Which fun aspects of games can be used as triggers in consumer product development and which aspects are more difficult to use? In the robot vacuum cleaner case, accomplishment factors seemed more easy to use as a trigger than bonding

factors such as affirmation. Is this the same for other products or would each type of product require a different subset of affectability guidelines as triggers?

- At present, it is not clear what the relative importance or contribution of each of the dimensions is to an overall feeling of enjoyment. The challenge offered is generally seen as the most important factor in making a game enjoyable (e.g. [5]). However, if this will apply to consumer products as well is not so obvious. For example, it is unlikely that consumers will appreciate a coffee machine that challenges them at 6:00 in the morning when all they want then is a quick cup of coffee. Similarly, a vacuum cleaner that wants to 'socialize and bond' when one is in a hurry to have the living room cleaned before guests arrive, will not be seen as funny. This could mean that one should design for adjustable affectability (*aka* an on/off switch).
- How do fun aspects relate to usability and functional aspects? What if a fun criterion can only be met at the cost of a usability criterion? For example, adding a challenge to a product can potentially create more fun interactions, but what if that reduces e.g. efficiency, a usability factor.

Conclusion

We made first steps in developing an approach to use fun factors - derived from game research – in the ideation phase of consumer products. Clearly, we are still in the midst of exploring the factors that might contribute to an enjoyable interaction with consumer devices. But in our robot vacuum cleaner case, we observed that using affectability guidelines based on games in the ideation phase resulted in a different type of ideas (more playful), compared to brainstorms that start from functional or technical triggers (more functional). Furthermore, it seemed that some dimensions were more easy to use than others. Another important observation was that a relatively large amount of ideas were directly and explicitly related to gaming. However, for a 'serious' and functional consumer product, explicit gaming functionality and features will not always be desirable. So, the triggers may need to be reformulated in a way that they more easily will inspire to come up with ideas that lead to an engaging, fun product concept without turning it into a game. We also identified a number of issues that still require further investigation. More study is needed of brainstorm sessions with other applications, with probably modifications to the current set of guidelines, and by systematically comparing our guidelines to other instructions to brainstorm participants [e.g. 1]. But despite the limitations of this pilot, the results and feedback of the vacuum cleaner research team has given us confidence that this approach can be helpful.

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“Gamification” from the perspective of service marketing

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Abstract
The developments in game industry and service design have led to an increased use of so-called game mechanics to drive customer retention and engagement outside the realm of, what can traditionally be seen as, games. This act of enhancing services with game-like features has largely been coined as ‘gamification’. The phenomenon has been thus far discussed atomically, without ties to existing literature on service marketing, to which the goals of gamification are strongly related to. This paper presents a definition for gamification from the perspective of service marketing and lays ground for future studies on gamification and marketing.

Keywords
Gamification, games, game design, service marketing, service design, persuasive technologies

ACM Classification Keywords
H1.m. Information systems - Miscellaneous

General Terms
Theory, design, management

Introduction

The use of game design in non-gaming environments have raised a lot of interest both in industry [10] and in academia [12][2] during the last years. This discussion has remained, however, mainly in the realm of game studies and social sciences. Although an increasing number of games are offered as services to consumers, only very few academic articles that bridge game design patterns to service or marketing literature have been published (see e.g.[15]; [8]; [9]). Anchoring game mechanics in the existing service marketing literature could however provide not only a framework on how gameplay could be viewed as a part of the overall service and on how they could support the core service offering but also bring proven models from the service marketing domain to the development of "gamified" services.

In the first section of this article, we will present an overview of service marketing, its origins and its key concepts. In the second section, we will show how games can be seen as services or service systems. In the third section, we present our definition for gamification using concepts from service marketing and present examples of our conceptualization. In the final chapter, we summarize and discuss potential directions for future research.

Emergence of service marketing

In the late 1970's and early 1980's, a handful of marketing scholars started forming a new school of thought for marketing concentrating on services because the classical marketing axioms were based on the exchange of physical goods which could not provide a sufficient understanding on services .[7]. This line of research developed quite independently of the mainstream marketing science until the 1990's [6] when it started to gain popularity also outside the sphere of service marketing scholars. Marketing theory build to fit services started to seem applicable also for goods marketing. In their 2004 article, Vargo & Lusch [16] launched the term service-dominant (S-D) logic for marketing and proclaimed that the service approach should replace the classical marketing theory. Since then, the S-D logic for marketing has gained growing interest both in academia as well as in industry.

One of the key concepts of the service approach, *value-in-use*, help explain the ubiquitous applicability of the service logic and the profound difference between the traditional, goods-dominant logic and the new service-dominant logic.

In traditional marketing theory, value is considered to be created during the production process by the company and to be embedded in the product. The product then "carries" the value in it and the value is transferred from company to the customer with the transaction. In service context however, this value-in-exchange approach becomes meaningless, as there is no physical product to which the value could be attached.

Service marketing literature sees the customer always participating in the production process as the value is generated only once the customer uses the service or the good. In this value-in-use model company's role in the value creation is to support the customers' processes by offering resources into them. Resources can refer e.g. to personnel, machinery, service setting, or to available information sources.

Service, service system and service package

For the purpose of our paper, three key concepts of service marketing need to be defined: service, service system and service package.

Vargo and Lusch [16] define *service* as "the application of specialized competences (knowledge and skills), through deeds, processes, and performances for the benefit of another entity or the entity itself". Thus, any intentional act - no matter how small - that helps an entity can be considered a service.

A systematic bundle of services constitutes a *service system* that according to Spohrer et al. [14], "is an arrangements of resources (including people, technology, information, etc.) connected to other systems by value propositions". A service system's aim is to use its resources and the resources of others to improve its circumstance and that of others [17].

The *service package* model [7] in turn helps firms manage bundled services or service systems. The basic service package consists of the core service, enabling services and enhancing services. Enabling services are required for the offering of the core service while enhancing services support the offering of the core service and thus increase its value or differentiates it from the services of the competitors.

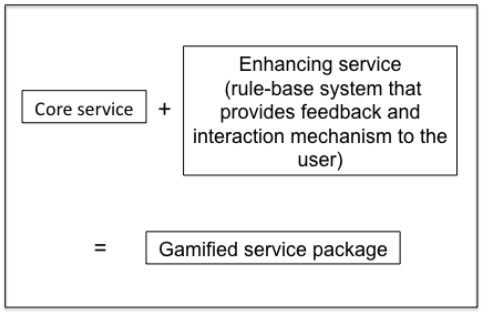

Figure 1. Definition of "gamification" from perspective of service marketing

Games as service systems

Large part of the current game design literature sees games as systems. For example, Salen & Zimmerman [13] have defined game in the following way: "A system in which players engage in an artificial conflict, defined by rules, that result in a quantifiable outcome". According to Cook [3], "Game mechanics are rule based systems / simulations that facilitate and encourage a user to explore and learn the properties of their possibility space through the use of feedback mechanisms."

Other definitions highlight the systems' role in creating experiences. Fullerton et al [5] describes the process of designing games as envisioning what kind of an interactive experience a game should create, and proceeds to create the necessary designs, in the form of rules and procedures.

Looked through the service marketing literature described above, game mechanics can be seen as services and games as service systems. They are co-produced by the game developer and the player(s). Co-production part of the company takes place when the game's storyline is created, rules invented and the visuals are designed and the co-production part of the player(s) as well as the value-creation take place each time the game is played. The core service is to provide entertainment and fun for the player [10] and the quality of such "game service" is strongly determined by the functional quality of the service or game experience which is often referred to with such concepts as flow [3].

A Proposed definition for gamification

Based on the literature presented above, we define gamification in the following way:

Gamification is a form of service packaging where a core service is enhanced by a rules-based service system that provides feedback and interaction mechanisms to the user with an aim to facilitate and support the users' overall value creation. Figure 1

Table 1. Examples of gamification

Core service	Enhancing service	Gamified service
Profile in LinkedIn	Progress bar for measuring progress in filling personal details	The enhancing service increases the perceived value of filling all details by invoking progress-related psychological biases.
Café	Mayorship competition in Foursquare	The enhancing service creates a competition between customers where they have to visit the café frequently enough -> retention
Dry cleaner	Loyalty stamp card. You get 1 stamp for every visit	The enhancing service invokes the psychological biases related to progress and thus increases the perceived value of using the same dry cleaner service.
Gym	Heya Heya	Gym experience that sets goals and helps to monitor the progress of the training.

illustrates the definition and Table 1 gives some examples of gamification.

According to the definition, for example Foursquare is not a gamified service in itself, but it can potentially gamify, ie. enhance through rules, feedback and rewards other services, such as restaurants or bars. Moreover, the definition remains agnostic to the nature of the core service; meaning that the core service can also be a game that can be further gamified creating so-called meta games. From this perspective, it is not only non-games that can be gamified.

Conclusion & Future directions

In this paper, we have defined gamification from the perspective of service marketing. This anchoring of gamification in an existing body of knowledge will help subsequent research to examine how gamification can contribute to marketing sciences. It also provides the gamification research with proven theoretical models to build upon.

An interesting line for future research could be e.g. the investigation of customer loyalty cards and other widely used marketing techniques as gamified services. Gamification could also be used to expand the servicescape model from only physical settings to more abstract constructions as Arnould and al. have evoked previously [1].

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Driving the Scoreboard: Motivating Eco-Driving Through In-Car Gaming

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Abstract
Eco-driving is one way in which car emissions can be reduced. Gamification, as a type of persuasive technology, has the potential to encourage eco-driving by making it competitive and rewarding. We suggest a research plan to construct a preliminary theoretical foundation to map the connection between information communicated to the driver and eco-driving on two dimensions: the type of reward awarded to the driver and the social and community aspects of eco-driving.

Keywords
In-car interfaces, eco-driving, gamification, persuasion

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; H.5.2 User Interfaces: User-centered design

General Terms
Design, Human Factors, Theory

Introduction
Automobile emissions account for 27% of all U.S. greenhouse gasses [11], thus the reduction of CO_2 emissions and fuel consumption from road transportation has become an increasingly important

Figure 1 – Chevrolet Volt's display

Figure 2 – Ford's EcoGuide

goal for most countries, in the attempt to fight global warming, health hazards and implement the Kyoto Protocol [5]. Reducing emissions can take many forms such the introduction of electrical vehicles (EV), technological advancements for existing solutions (e.g. improving engines' efficiency) and reducing the vehicle miles travelled [1], to name just a few.

An important (but typically overlooked) contribution to emission reduction is the modification of driving style, frequently referred to as "eco-driving". Eco-driving is a win-win proposition both for individuals, who can benefit from reduced fuel consumption of ~10%, and for society, through reduced emissions and the associated benefits thereof [1].

Communicating Eco-driving Information

While basic eco-based displays (such as a "shift up" indicator) date back many years, more recent commercial interfaces allow the drivers to see how efficient their driving style is. For example, Kia's Eco-Driving System [9] – placed in the middle of the dashboard - alternates its color between green, white and red, to indicate driving style and environmental friendliness. The Chevrolet Volt provides its driver with considerably richer information, showing the available battery charge, and also an efficiency driving style feedback meter too (right side of Figure 1). eco:Drive is a somewhat different approach co-developed by Fiat and Microsoft. It allows drivers to obtain fuel consumption and emissions data using a USB stick and then to display it on a computer's screen equipped with the eco:Drive software.

Existing studies show favorable reactions of drivers toward feedback devices in their cars ([1], [10]) and positive effects on eco-driving. An example is a heads-up-display feedback system to encourage eco-driving among school-bus drivers [11].

Games and eco-driving

Persuasive technology – "*interactive computing system designed to change people's attitudes or behaviours*" [4] – is an important means in order to achieve eco-driving. It requires fast and personalized feedback [12] in order to enhance immediate performance [2] as well as to maintain behavior over time.

Gamification - the use of game play mechanics for non-game applications in order to encourage a certain behavior (Wikipedia) – is an obvious type of persuasive technology. Building on human's psychological predisposition to engage in gaming and natural curiosity and their drive to play and master their environments, gamification can motivate people into productive behavior [12].

The desire to play is based on different needs that are fulfilled by specific games. Nine types of players are documented [7]: The Competitor, The Explorer, The Collector, The Achiever, The Joker, The Director, The Storyteller, The Performer, and The Craftsman. Most players are a combination of two or more types, often changing roles depending on the actual game being played. The rewards obtained from playing games vary, in accordance with the above categories: from bettering other players (The Competitor) to experiencing the boundaries of the play world (The Explorer).

Key to gameplay are rules, rewards and punishments resulting from changes in the game, and the presence of an environment, as well as ranking.

Games and cars
Currently, games have a relatively minor role in car interfaces. In some cases, games are entirely spontaneous and are initiated by the driver, e.g. when drivers change their driving style in order to maximize fuel efficiency and therefore are in fact engaged in some sort of an energy conservation game [8].

Other interfaces, though, are intentionally conceived in order to provide a game-like experience. Ford's EcoGuide dashboard (Figure 2) rewards eco-driving through the use of growing leaves and vines. A similar idea, suggested by [10], adds an EcoScore which can be used to compare between different trips or to compete against other drivers. Common to both interfaces is the concept of ranking, which motivates drivers to reach high scores and to compare their performance with other drivers. Steve Bishop of IDEO, responsible for the design of Ford's EcoGuide interface, explicitly suggests that: "Video games engage their users in a similar fashion with levels. In fact, when we observed hybrid drivers, we found they were going for high scores, a gaming behavior that has never existed in cars before. We designed to accommodate it." [3]

Academic research on video games suggests that competition is a key element of the entertainment provided by these games, as they allow for a continuous stream of challenging and competitive situations [14].

Future Research

The research surveyed above leads us to believe that gamification of eco-information has the potential to improve eco-driving. As we see it, future research should address two main issues: first, the type of reward that is given to the driver for excelling in eco-driving and second, the social and community aspects of eco-driving.

The relationships between these two dimensions are presented in Figure 3. Each quadrant on the Reward-Relationship grid represents a unique situation that will result in a specific driver-car-other driver interaction: when the interaction is personal and confined to the car, the driver competes with him/herself and the reward is presented as a score or message inside the car. Extending the reward to the 'real' world could, for example, award the driver the privilege of using the carpool lane for a period of time, or grant him a gift at the gas station. Interactions that are more social could see the driver compete against others with varying degrees of acquaintance - friends, people who drive the same route etc. The reward could again be confined to the car or, for example, could be broadcasted online or even on variable message signs along the road.

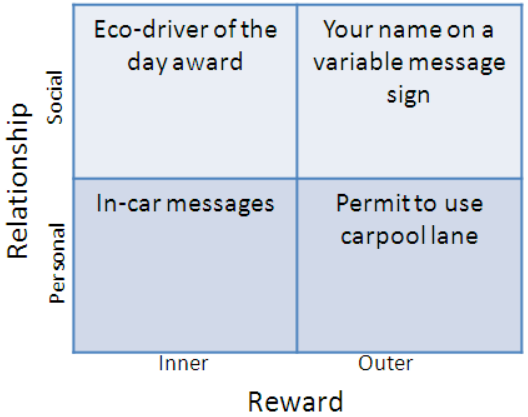

Figure 3: The Reward-Relationship grid and possible implementations.

Our research plan intends to create a preliminary theoretical foundation to map the connection between the presentation of information to the drive and eco-driving and to support it by: 1. Employing ethnographic methods to study the actual interaction of drivers with existing eco-driving interfaces. 2. Studying the effects of 'tangible' (monetary-like) rewards on drivers' attitudes. 3. Exploring the effects of social interaction and social networks on the relationship dimension explained above.

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It's Not Just Whether You Win or Lose: Thoughts on Gamification and Culture

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Abstract
As it is popularly understood, gamification risks becoming synonymous with achievement. Yet achievement is only one potential aspect of games that gamification could focus on, and one that is not necessarily well suited as a motivation for many cultures around the world. In this paper, we argue for a need to draw on cultural motivations in the design of gamification systems and examine some of the issues involved in adopting such an approach.

Introduction
In Danish and other Scandinavian cultures, there is an important concept known as Janteloven [8]. In Janteloven, one should never try to stick out from the crowd. Those who do try to stick out do so because they think that they are better than other people. But no one is any better than anyone else, which is why one should not try. Janteloven is essentially a set of rules for encouraging social equality, social stability, and uniformity. Some locals question whether Janteloven still serves as an apt description of Scandinavian society. But as many a foreigner who moves to Scandinavia soon discovers, Janteloven is still an important cultural creed and one of the first aspects of Scandinavian culture communicated to newcomers.

Gamification can be characterized as the use of game design elements in non-game contexts [3]. In a culture in which it is undesirable to stand out and to strive to

achieve more than one's neighbour, does it make sense for us to design gamification systems that focus on competitive differentiation, achievement points and leaderboards? How do we make sense of gamification in cultural contexts that seem inherently at odds with gamification's current trademark design elements? If we choose to introduce more culturally sensitive game elements, how might we go about this process?

Achievement, games, and gamification

Popular perceptions of gamification are intrinsically linked to the systems currently labeled with the gamification "brand". That many of these systems rely on markers of achievement as guiding feedback suggests that gamification has become almost synonymous with achievement. Yet achievement is only one aspect of games that could be harnessed by gamification and there are many others that have not yet been explored and exploited by designers.

The achievement-oriented approach to gamification relates to deeper issues surrounding general perceptions of games and the values they codify and promote [1]. While it is possible to find examples of games that promote diverse values, achievement remains fundamental to most understandings of games. For example, in Caillois's classification of games, the core game category of agon describes competitive games, which are hard to separate from the concept of achievement [2]. The very concept of "winning", whether stemming from explicit competition or not, is also at base a recognition of achievement.

From the game system to the world

The assumptions of characteristic game values, and accordingly, gamification values can be challenged when we consider them in terms of the broader cultural and social contexts in which they exist. For example, for any given game, it is worth considering whether the values it embodies and promotes are deemed acceptable in its surrounding cultural context. But does it matter whether games map to our cultural values, or does the somewhat separate nature of the game context exempt games from complying with cultural rules, expectations, and patterns?

The same question can be asked about gamification. But whereas for games, there are compelling arguments for both sides, for gamification there are strong pragmatic reasons for considering mappings to cultural and social contexts. Gamification takes place in non-game contexts, i.e. it concerns moving game elements outside of game systems and into the world. The context of operation for the game elements in gamification *is the world*. Any separation between game and culture becomes even blurrier. If we had reasons before to bring socio-cultural factors into the frame, those reasons are further intensified by gamification's context.

Culture and games

In the words of Hofstede, "culture is the software of the mind" [4]. It impacts on our perceptions, attitudes, and behaviour, and it shapes how we relate to others and our environment. Importantly, it is shared and learned. Following on from early connections drawn between culture and games by Huizinga [6] and Caillois [2], more contemporary game studies thinkers have also explored the relationship between games and culture. This exploration has tended to revolve around three areas: representations of culture and different cultural groups in video game worlds, appropriations of video

games amongst cultural groups, and the development of subcultures within or around particular games and genres. For example, game studies scholars have explored representations of minorities in terms of race (e.g. [4,9]) and the place of games within non-Western cultures (e.g. [7,12]).

The structural similarities between games and cultures have yet to be explored deeply. Both have rules, implicit and explicit, which serve to guide us in terms of how to act with regards to others and our environment. Both suggest goals that are worthy of pursuit, and noble and ignoble ways to achieve them. By agreeing to abide by the rules we become insiders. Those who do not abide by the rules are frowned on – either by other people, or by system mechanisms.

In fact, a game system is not just contained within hardware or software, but also contains players as people. Game systems rely on players interpreting and acting not just in response to hardware or software signals, but also by drawing on their prior knowledge, beliefs, and systems of ethics.

Culture and gamification

As we pointed out earlier, the context of operation for gamification is in the world. Within the world, people rely on cultural rules and patterns to guide beliefs and interactions. Our previous research on persuasive games suggests that even while playing closed-system games, people do not leave their cultural backgrounds and assumptions behind [8]. We found that people were more welcoming of persuasive games that were consistent with their cultural beliefs, and demonstrated greater shifts in attitude change in culturally matched conditions. If anything, it seems more important for gamification designers as opposed to persuasive game designers to draw on cultural patterns for inspiring design directions, as the cultural and gamification systems operate within the same space.

Cultural motivations as design inspiration

In our previous work on culture and persuasion, we looked to insights from the cross-cultural psychology literature to inspire design concepts. One etic framework of culture that seems promising from a gamification design perspective is Schwartz's theory of cultural orientations [11]. In this model, universally understood cultural value types are spatially co-located in a circle in terms of similarities and differences. Adjacent value types such as *egalitarianism* and *harmony* have more in common with one another, whereas distant value types, such as *egalitarianism* and *hierarchy* are considered opposing values. Part of Schwartz's research objective was to position different cultures within this model to facilitate our understanding of which values are most important to different cultures. America is positioned closest to *mastery* (which encompass the notion of achievement), *hierarchy*, and *affective autonomy* values, indicating that amongst Americans, cultural importance is given to these concepts. America is positioned far away from *intellectual autonomy*, *harmony*, and *egalitarianism* values, indicating a cultural de-emphasis of these concepts. In contrast, Denmark is positioned close to *intellectual autonomy*, *egalitarianism*, and somewhat close to *harmony*, and is far away from *hierarchy*, *embeddedness*, and, to a lesser extent, *mastery*.

Frameworks like this do not propose design solutions. They do, however, help designers to understand the cultural context of their users. More than this, they are

highly suggestive of design possibilities. For example, Schwartz's framework would suggest that gamification systems for Danish users that were premised on achievement and differentiation by rank would make little sense culturally, whereas systems promoting notions of equality, creativity, and freedom would make more sense.

We point out, however, that gamification as a concept is curiously subordinated to games. The game elements that designers make use of in gamification systems are generally those that are somewhat familiar to users. In fact, the most prolifically used gamification mechanics are those that we have seen used time and time again in games. These elements serve as a kind of shorthand for previously experienced and well-established game dynamics and mechanics. If we design gamification systems by using elements of games that few people have experienced before, however, or if we sidestep games altogether and focusing just on cultural values, these systems will embody something other than gamification, and move more towards becoming novel design mechanics.

Satisfying two literacies

Drawing on people's familiarity with games while satisfying their cultural expectations suggests that we need to intertwine people's cultural and game literacies. For the particular interactions and attitudes our gamification systems are designed to encourage and support, we need to (a) understand how those interactions and attitudes are contextualized culturally and socially, i.e. in relation to relevant motivations, special cases, taboos, etc., and (b) explore how we can map familiar and compelling game mechanics to support culturally contextualized interactions and attitudes. This is a knowledge that we must build through design experimentation and reflection, and one that will ultimately help gamification to mature.

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Play Society Research Project

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Abstract
This paper introduces how a approach on creating experiment setups for identifying tipping points of playfulness – when something stops being playful, or when something turns in to playful. The approach is implemented in a project that has just started, and in the paper we will explain in detail a part of the project hypothesis titled as conceptual analysis of playfulness. The overall goal of the project is to provide guidelines for the media and ICT industry on how to create playful applications and services. The conceptual analysis work package can deliver a wider understanding of playful experiences and the nature of playfulness.

Keywords
Playfulness, gamification, design research, prototypes, media industry

Introduction
Gaming is a megatrend. Not only kids and boys, but also aged people and both genders play and buy games. Playfulness is not related only to video gaming, but it appears in many different products, applications, services and activities. Playfulness is somewhat analogous to fun, enjoyable, engaging, non-seriousness, exploration, challenge, immersion, but then again, it can be related also to "harder" qualities such as well-defined feedback or control, just to name some of the key perspectives playfulness can take.

One of key benefits of playfulness is the fact that people like to spend time with things that are playful. For example, the iPhone is often described as playful device – without ever explaining what this actually means.

Currently, there is no dominant framework for defining what playfulness means, how something becomes playful, and why it is important. Previous studies conducted in NRC Tampere [1] have explored the different models that describe playfulness or game experience. This study also formulated a new playfulness model called PLEX. The PLEX Framework has been utilized in a number of studies and design cases [2][3]. Further, a set of design cards has been created on basis of the framework. [4]

Understanding and mastering playfulness can have a dramatic effect on how people can be persuaded to buy media products and services, and even more importantly, how to make customers spend a lot of time with products and services. Time spent with products has a paramount importance in networked media, especially when we are talking about functionalities that are dependent on social content.

The play society project is about understanding how and why something becomes playful. This is achieved with a series of prototypes and experiments that focus on the critical tipping points between playful and non-playful. Also, the project focuses on understanding what the social dimensions of playful experience are, and how playfulness facilitates co-experience. Experiments include user tests with prototypes and questionnaire-based data collection and analysis, as well as psychophysiology-based measures. Ultimately, the project delivers general recommendations related to playful design. When we understand better how and why playfulness emerges, then we can create better and more enjoyable designs and interfaces for games, media in general, and software and design overall.

Research methods

The play society project is based on the following experiment structure:

- Hypothesis development workshops
- Prototype and experiment design
- Prototype development
- User studies

The hypothesis development and prototype design is focused on delivering experimental setups with conditions that could show structured and statistically valid differences between playfulness and non-playfulness. The goal is to generate these two conditions with a minimum amount of manipulation and clearly structured design principles. Hence, the idea of the experimental setup is to create a tipping point for playfulness. This tipping point can be based on manipulation in the interface or interaction design, social context of use, or in the content composition. With this initial study we are not aiming for a comprehensive model or observation on playfulness, but merely a single thread of empirical validation on how a shift can take place. Then again, gaining a comprehensive view on playfulness is the ultimate goal of the project. For this, we have developed a conceptual analysis research track, which will be implemented in parallel with experiments.

Conceptual analysis

The first deliverable of the hypothesis development part of the project has been a new playful events categorization. This categorization will be used to build the conceptual model from the bottom up. Basically, this model is complementing the PLEX approach. Categorization is based on identification of different reported playful user experiences. We collected the events in a workshop by utilizing 6-3-5 brainwriting method originally developed by Bernd Rohrbach. [5]

In the workshop, we had 13 participants and achieved to collect more than 300 different playful events. We have analyzed the reported events and generated a draft categorization based on them.

In the next phase, we will repeat the workshop procedure several times with different user groups. This way, we can expand the amount of reported events, and make our model more robust. We have also plans to add new features to the workshop, which would allow users to identify to which category the reported experience belongs in their opinion, or to generate new categories. Ultimately, these workshops will refine and validate the categorization.

After we have a categorization, we will proceed with the conceptual analysis by breaking down each category into smaller temporal components. This will allow us to understand the underlying structures behind each category and hopefully will reveal new insights regarding the nature of the playfulness.

Playfulness and Gamification

Our primary goal in understanding playfulness is to be able to design for playfulness, or how playful experience and events can be delivered and designed. Gamification is about how game elements can be used in the design of non-games. In this way, our goal with playfulness is similar to the gamification; actually, we could call our approach in the Play society project as "playfulication".

Playing and gaming are related topics. The seminal publications on game research by Huizinga and Caillois are basically talking more about playing than gaming. Another way around, the background theories behind the PLEX model are taken from game theories as well as from play theories. A narrow perspective could claim that gaming is a subset of playing. Then again, there are some forms of games and gaming quite far away from something that could be described as playful event. Differences of playing and gaming can be found from how the goal is defined in the activity, or how the activity is surrounded by a kind of game world.

In practice, the concepts of playing and gaming are more complex, and relating them is not a straightforward task. Also, playing and playful activity are somewhat distinct concepts. Overall, we have found that defining playfulness via other theoretical concepts (such as experiences, activity mechanisms, rules or sub-elements) is an ultimately complex path. For these reasons, we have chosen the bottom-up approach in the conceptual analysis of playfulness in the Play Society project. Also, for this reason, we do consider gamification and our "playfulication" aligned topics, and we believe that theories and practices under both topics can be potentially applied to each other.

In the Play Society project, we target to identify tipping points between playfulness and non-playfulness.

Currently, based on our preliminary conceptual analysis, it is probable that the tipping point manipulations that we choose will be related to the situation of the activity instead of the activity assignment or the product or interface used in the experiment. This is because the subject's self-reports highlight the importance of the situation surrounding the specified playful event. Situation is a generic concept, by which we mean for example context variables, social dynamics, relationships between people and the place, or the state-of-mind of the user.

It is highly probable that when we achieve to identify the tipping points of playfulness, we can also deliver results that explain something about game experience. Understanding the dynamics between situation and game experience will have strong implications on how gamification can be delivered. Furthermore, understanding how to manipulate the situation is a significant topic for both gamification and for designing for playfulness.

Project Organization

The Play Society project is a combination of academic and industrial research. It is also part of a bigger research project framework called Next Media, which is linking together 6 Universities and over 20 media companies in Finland. Play Society project-leading organization is Nokia Research Center Tampere. The other industrial partner is Sanoma Corporation – the biggest media company in Finland. Academic leader is Helsinki Institute for Information Technology, and other research partners are Center for Knowledge and Innovation Research (CKIR) Helsinki and Game research lab in the University of Tampere.

Overall, the project has ambitious goals of achieving empirical validation for how playfulness could be designed in a media product. The research consortium has extensive experience on various experimentation and analysis methods, theoretical formulations of playfulness and game experience, and game design and prototyping, which gives us good capabilities to pursue this challenging task.

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Mayor or patron? The difference between a badge and a meaningful story

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Abstract
"Life is a game". This is the claim of a number of novel services to help people to overcome common motivational problems. This notion of turning life into a game was recently called *gamification.* This paper discusses the typically employed strategies to motivate people to change their behaviour and attitudes. Based on this, we advocate an experiential, more intrinsic approach to *gamification*, which focuses on the provision of meaning rather than rewards.

Keywords
gamification, behaviour change, user experience, persuasive technologies, user experience design

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design

Introduction
We all have much to do. Some activities are meaningful and pleasurable; others are monotonous and mind-numbing. The latter need an extra-portion of motivation. Luckily, there are a growing number of novel digi-

tal services, which offer help with getting "things done," that is, overcoming motivational problems. For example, *EpicWin* claims that "one hero emerges, who can vanquish any task." "Make being organised as much fun as gaming with EpicWin the to-do list app with an RPG setting" [6]. And *Foursquare* announces: "earn points and unlock badges for discovering new things" (see figure 1) [7]. These services present "life as a game" [10]. They reward the fulfilment of tasks or the discovery of new places with virtual points, badges or levelled-up characters. This was recently called *gamification*. Note, however, that the idea of using elements borrowed from video games for the design of "serious" software to improve user experience (UX) and user engagement is not new [e.g., 8]. An early example is Dennis Chao's *PSDoom*, [4], which used the first-person shooter *Doom* as way to "gamify" the administrator's task of managing and "killing" processes. Already at the end of the 90ties of the last century, Jack Carroll and John Thomas [3] suggested to use game-like interfaces for real-world process-control to overcome vigilance breakdowns. The novelty of *gamification* is thus certainly not *gamification* itself, but the *gamification* of the personal, everyday-life.

The most basic contribution of *gamifcation* systems is logging and monitoring, which results in an automatically kept diary of activities (e.g. where did I eat, where did I buy my coffee etc.). Diaries are good for re-experiencing and reflecting past events (see [14] for an example in the domain of interactive products). However, even a detailed record of what we did does not necessarily change how we act. A diary provides a *basis* for insight and change, but does not actively induce it. *Gamification* wants to overcome this. However, according systems largely rely on primitive reward mechanisms, like points, badges, or level-ups. We find that approach rather limited – a relic from the era of behaviourism, a reissue of Token Economies and Learning Machines. In contrast, we argue for an experience-oriented approach, which focuses on creating new stories of the things we need to do, to transform the tedious into a meaningful experience.

Figure 1: www.foursquare.com

Being a mayor or a patron? Rewarded by experiences

An example of a task allotted by *Foursquare* to its users is to revisit a restaurant or pub and become a loyal customer and finally the "mayor" of this place. The mayor is the customer with the most days checked into a venue over the last 60 days. Actually, being a regular or a "patron" of a pub is certainly not a novel notion. But there seems to be a difference in being a *Foursquare* "mayor" of a place or a "patron" of a favourite pub. A patron is a loyal customer. S/he knows the employees or is on first-name with the host. The patron's

motivation to go to her/his favourite pub is the good experiences s/he could have. It is intrinsic [5]. The reward for going there lies in the activity itself. In contrast, becoming a "mayor" of a place can be solely driven by the wish to get the according badge, which then can be converted into products (e.g. a free coffee at *Foursquare*). Note, that while in both cases people will finally show up in a particular place and will eventually spend money, there might be a big difference between being there because of an intrinsic interest in the people, the place, the atmosphere or being there because of a badge. Of course we acknowledge that a "mayor" of a pub meets other people, likes the place or is a well-known person there, but *Foursquare* does not enable, optimize or even enhance a good pub experience. It simply lures its user to a place to get a badge, and that's it – it is purely extrinsic [5]. In other words, *gamification* systems like *Foursquare* might increase the likelihood of a particular behaviour, but do not improve its experience. There are other examples of *gamification*, which are more intrinsic, like *Akoha* cards [1], *Boom Boom* Cards [2] or *Tiny Task* [13]. *Tiny Task* is a set of key fobs labelled with tasks: a combination of activities for others (e.g. “work for charity”) and for oneself (e.g. “flowers for you”). *Akoha* and *Boom Boom* stimulate users to commit acts of kindness. They focus on social interaction and altruistic behaviour (e.g., buying a stranger a cup of coffee). Although *Akoha* provides points for a task done, the offered tasks foster and shape new experiences, provide new stories to be told.

Of course *EpicWin's* or *Foursquare*'s offer (badges, level-up for characters) are not always linked to rewards in the real world. In that sense they are symbolic and one may argue that they simply fulfil the intrinsic psychological need of collecting and saving. This need is about ownership, which is a strong motive and motivation to act [11]. However, compared to the multifaceted possibilities for need fulfilment in a pub one *really* likes, enjoyment form ownership appears rather limited. It doesn't tell stories of good conversations and stimulating relationships.

But even if the objective would be changing behaviour only, *gamification* seems to be predominantly suited to increase the likelihood of vacuum cleaning or putting out the rubbish. But think of tasks, which typically involve self-improvement, such as resource-saving, social relationships, or self-control. These tasks are composed of many single successes as well as the occasional relapse. What is needed is a way to integrate single successes into a meaningful whole – a requirement, which is much better met by meaningful experiences than single rewards. In sum, we argue that "the objective is not only to demonstrate and maximize change in overt behavior, but [...] to make change a worthwhile experience." [9].

Conclusion

Gamification helps people to visualize and remember tasks and goals, they might otherwise lose track of [12]. While this is always a good start for self-reflection and change, it is only half the story. The other half is about actually implementing new behaviour, overcoming routines and seemingly bad habits. So far, systems mainly offer rewards given that a particular behaviour is shown, reminiscing of last century's operant conditioning through Token Economies. Nowadays, psychology suggests a more complex picture. Novel behaviour needs to be meaningful. It must be tied to psychological needs, such as relatedness or stimulation, and be

shaped into a meaningful story. This argues against simple extrinsic rewards, but calls for systems, which suggest activities and set goals derived from an overarching goal, such as being happier or being more social. This is what *gamification* should aim at.

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What could media art learn from recent experimental games?

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Abstract
This paper discusses the lessons that can be learned from recent experimental games for media art practice in order to think of more sophisticated interactive art experiences. Firstly, methodically examined interactivity in games helps to think how to approach sophisticated interactivity. Secondly, the critical and aesthetic attitudes involved in recent game design and practice are useful to think of reflective mode in the interactive experience in media art. Lastly, the wide and rich use of interface technologies helps to consider the inter-relationship between media and technology.

Keywords
Interactivity, critical distance, aesthetic & reflective experience, media art, experimental games, persuasive games, newsgames, pervasive games, casual games.

ACM Classification Keywords
J.5 Arts and humanities, H5.m. Information interfaces and presentation, Miscellaneous.

Introduction
In *Art as Experience*, Dewey says that a work of art is an individualized participating experience[4]. A work of art is recreated every time that it is esthetically experienced by the viewer. The viewer creates an imaginative relationship with the self through his/her experience with an artwork, and this kind of process

can be called "interactive engagement." In this participation and interaction with the work of art, the most important thing is the interacting with the self. In this sense, according to Dewey, all artwork is interactive. However, questioning why and how interactive experiences can be perceived differently in interactive media art work from fine art work, my former research has examined how the early video art works create different aesthetic experiences from the interactive media art work, particularly focusing on the screen experience[7]. Looking at how physical and perceptual interactivity becomes a central component of the relationship between viewers and many artworks, the research examines that unlike the screen experience in non-interactive artworks (i.e. video art), interactive media screen experiences can provide viewers with a more immersive, immediate, and therefore, more intense experience through its instant feedback system. For example, many digital media artworks provide an interactive experience for viewers by capturing their face or body though real-time computer vision techniques. What I focused on in this situation was that as the camera and the monitor in the artwork encapsulate the interactor's body in an instant feedback loop, the interactor becomes a part of the interface mechanism and responds to the artwork as the system leads or even provokes them. This kind of direct mirroring experience in interactive screen-based media artworks hardly allows the viewer the critical distance or time needed for self-reflection. Therefore, in media art experience, the critical distance or time needed for self-reflection in the course of interaction needs to be greatly considered. And the interactive mechanism based on computational closed feedback system needs to be approached more philosophically and aesthetically.

Continuing with this question, these days what I have found useful for this as references are the diverse approaches in experimental game practice and research. This paper discusses three lessons that I want to share to through this examination of how to enrich interactive experience. Before this discussion, I should explain that the boundary between experimental games and interactive media arts is somewhat overlapped, since both create interactive experiences based on interactive computational systems. Thus, from certain perspectives, experimental games can be regarded as interactive media art. But in this discussion, I would like to look at how one domain of research and practice can influence the other by leaving the genre classification.

Sophisticated Interactivity

Firstly, the approach to interactivity in game research and practice that has been examined methodically and rhetorically helps to improve the approach of interactivity in media art. As I discussed, computational interactive systems are based on closed feedback loops. A programmed code is constructed as a subroutine procedure that can be called on at any time during program execution. It is encapsulated into a single command (i.e. a function or a method call) and contains a series of computational instructions in itself. "Procedurality" is one of properties in digital media and "agency" is involved to manipulate such a procedural system. But as Murray notes, "mere ability to move a joystick or click on a mouse" is not sufficient cause for agency, because the genuine agency means the embodied participation in an electronic environment [11]. In *Persuasive Games*, Bogost asserts that video games can creatively produce the sophisticated interactivity by incorporating the procedural rhetoric.

Due to the "responsive behaviors" in its medium, it can generate tighter symbolic coupling between user actions and procedural representations[2]. When in game play, "play" means "the free space of movement within a more rigid structure"[14], in a procedural representation like a videogame, the possibility space refers to the myriad configurations that the player might construct to see the ways the processes inscribed in the system work. Thus, while interacting with the system, the player literally fills the gap between subjectivity and the game processes and performs a great deal of mental synthesis. And the videogame's method of selectively modeling appropriate elements of that world in "abstraction" creates the "empathetic and dialectical engagement" and "vivid experience" of interaction[2]. This mental and subjective engagement and abstraction in the interactive experience needs to be examined in any artwork considering interactivity. The current technology-oriented interactivity based on the simple level of human-computer interaction can refer to this kind of sophisticated interactivity.

Critical and Aesthetic Attitudes

Secondly, the critical and aesthetic attitudes recently presented in game design practice are also useful to enhance the media art interaction to a more critical and reflective level. This lesson can be related to the former lesson about the sophisticated interactivity sought through persuasive games. But if the former discusses the methodical side of its approach, this section is to explore it with the more critical and aesthetic level and from the cultural and societal sides.

Recently, diverse experimental games such as "newsgames" and "persuasive games" and the related theoretical research have been introduced[1,2]; i.e. "September 12th"[12], "Madrid"[12], "Cutthroat Capitalism"[3], "Every Day the Same Dream"[5] and "McDonald's videogame"[5] force players to understand the system dynamics by experiencing it. Also, by experiencing it, the players can think of the event happening in the real world more with a more critical perspective. This becomes an example of journalism and criticism can be incorporated in game design to depict and express their subjective perspective[1,2] and to engage the game players in looking at the same event with a reflective mode. In this way, these games share critical and aesthetical attitudes toward their community and environment.

With a slightly different perspective, "pervasive games" also use the strategy to look at the community and neighborhood with critical insights and reconstruct them as a game environment. By using their bodily engagement in the play, in these games players explore how to creatively combine the physical with the digital, life with play, virtual with real[8]. These processes also become a good example showing critical and reflective approaches to think of their subjectivity in the context of play and design at a societal and aesthetical stance.

The Wide and Creative Use of Technologies

Lastly, the wide and rich use of media technologies in games helps to think of the inter-relationship between media and technology for creative media art practice. Games always lead the media technology throughout history. However, particularly the recent trends found in game interface methodologies provide significant insights.

The pervasive games widely use the pervasive technologies and ubiquitous computing. Therefore, the use of media in these games is flexibly expanded and interestingly approached. Also casual games led by game industries have developed diverse hardware interfaces. The game interface, such as Nintendo Wii[13] and Microsoft Xbox Kinect[9] involve intuitive user interactions, and thus invite the casual players or non-game players to play games[6,8]. These interfaces lead to think of how bodily engaged interactivity can be connected with the mental interactivity.

Technology is a new expressive design material that can generate and mediate our future interactions. The novel interface technologies developed in game design will continue to influence on the related research areas such as HCI and media art by expanding the inter-relationship between media and its technologies.

Conclusion

As game design and research have culturally, technologically and theoretically widened, its new possibilities and critical interaction methodologies become to influence on other domains of research and practice, particularly on interactive media art. Although the relationship between the critical distance and participation needs to be examined more thoroughly in the future discussion, the game strategies to involve the sophisticated and reflective interaction from the players deliver useful lessons to be referred.

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Gamification and Exertion

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Abstract
Engaging in exertion activities – these are activities that require intense physical effort from users – is beneficial for physical health. Unfortunately, many exertion activities are often considered not very engaging, and turning them into a game – by means of gamification - has been suggested as an approach to make them more compelling. We discuss design strategies particularly suitable for exertion activities that can facilitate this process and highlight the role of technology based on our experience of designing exertion games. By identifying such strategies, we believe better exertion games can be designed that ultimately results in people profiting more from the associated benefits of exertion.

Keywords
Gamification, games, gaming, health, exercise, exertion interface, exertion game, sport, whole-body interaction, exergame

ACM Classification Keywords
H5.2. Information Interfaces and presentation (e.g., HCI): User Interfaces.

General Terms
Design, Human Factors

Introduction

"Gamification" is an emerging umbrella term for the use of video game elements in non-gaming interactive systems to engage users in (sometimes mundane) tasks, hence making the tasks more "fun" in order to change people's activities for the better [3].

Many previous approaches towards gamification focus on the facilitation of cognitive activities, in this paper, we want to draw attention to the gamification of physical activities. These physical activities require intense physical effort from the user: typical examples are discussed under the term exertion interfaces [6]. Exertion interface interactions resemble sports and exercise activity, and designing for such exertion experiences presents unique challenges, but also opportunities for the interaction designer [7].

As exercise is often seen by some users as not very appealing [10], utilizing a gamification approach to physical exercise might be a viable approach to making these activities more attractive to users, facilitating participation, and as a result, support the associated health benefits. However, what is yet known is how to design for gamification if physical effort is involved, and how designers can utilize the unique opportunities technology offers, while addressing the associated challenges of an exerting body.

This paper aims to contribute to this knowledge by discussing design strategies enabled by technology for the gamification of exertion activities we identified from our own experience of designing exertion games. The result is an initial understanding of the opportunities technology offers to designers who want to create more engaging exertion experiences.

Gamification and exertion

Gamification in an exertion context is not new. The authors recall physical education experiences where the teacher has used game elements to make physical exercises more engaging. Furthermore, in our personal interactions with children, we found a common approach to get children to engage in a mundane physical task is to turn the task into a game to make it "more fun". We are interested in what happens in this process, what unique characteristics the involved exertion affords, and how technology can support this process.

Traditional approaches to turning exercise into a game generally involve the creation of a competition aspect around the activity. This often means that "let's do X" turns into "let's see who can do X the fastest". An exertion activity that is centered on a competitive element has previously been used to define sports [1], and as such, we propose that the notion of gamification for exertion activity describes the process of turning exercise into a sport. There might be exceptions to this statement, fed by the fact that the definition of sport is not universally agreed upon [5], however, we believe this view can serve designers as useful guide.

One requirement to enable such a competition is to allow participants to compare athletic performance. In order to compare athletic performance, the activity needs to be measurable and hence quantifiable [2]. In conventional sports, traditional devices such as measurement tapes and stopwatches have been used to quantify athletic performance.

New opportunities for the gamification of exertion activities

In addition to these existing "conventional" tools for measuring athletic performance and hence enabling comparisons, we believe digital technology allows for additional means of gamification.

Comparisons over distance and time

Digital technology allows measuring and comparing athletic performance over distance, supporting distributed participants, and over time, meaning that the measurement is persistent and can be compared against future performances. A commercial product that utilizes comparisons over time is the Garmin system that offers a ghost runner feature that indicates how fast a user is running based on his/her previous run, indicated by a "ghost runner" that is trailing or running ahead of the athlete's current performance [4].

We have designed the Pushing Pixels system [9], which aims to push this notion of comparisons over time further by allowing body-builders to engage with other body-builders, such as a coach, in an asynchronous manner: the coach performs an activity on an exercise machine, which is tracked and recorded, and then played back once the user uses the same machine at a later time, being offered feedback on how much their performances match. This is done in order to facilitate the most appropriate execution of the movements to maximize athletic effectiveness and minimize injury risks.

Comparisons of alternative exertion data

The ability to measure and compare exertion data has been focused on athletic performance so far. However, novel sensor technologies and advanced analysis techniques allow for new opportunities to measure exertion activity, and hence to compare such data. For example, sensors cannot only measure athletic performance such as distance and time, but also how the human body responds to the exertion activity [7]. Games can be constructed around users' heartbeats, their respiration rate, their brain activity and so forth. Technology allows sensing new bodily information that was so far difficult to acquire and possibly also difficult to understand, but can now be readily utilized in gaming contexts.

For example, in Jogging over a Distance [8], we have used heart rate data of distributed joggers to enable a novel exertion experience that focuses on bodily effort, rather than on the traditional athletic performance that is centered on time and distance.

Handicapping for more engaging comparisons

Technology can also facilitate the handicapping of a user's abilities in order to enable "fairer" comparisons: competitions are not engaging if participants are of very different ability, and there is no suspense or excitement because the winner is essentially known before the activity begins [5]. To address this, athletes have previously used handicaps to level out athletic abilities, for example in golf. However, this usually involves making a stronger participant weaker. Knowing that one's abilities are artificially constrained might hinder engagement with the activity. Technology can address this by concealing such a handicap. For example, in a networked game participants might not be aware that their performance is artificially dampened. This might facilitate engagement, however, can raise ethical concerns.

In Jogging over a Distance [8], we have used heart rate data from the participants, but instead of using the beats-per-minute value, we have processed the relative increase to the participants' target heart rates as input to the experience. This meant that an experienced runner had to increase his/her heart rate by 10% if he/she wants to keep up with a beginner who has increased his/her heart rate by 10%, even though their absolute heart rates might be very different. With this design strategy, we enabled a novel experience that allowed very fast runners to jog with beginners, an experience not easily achieved without the technology.

Conclusion

In conclusion, we have argued that the notion of gamification is not new when it comes to exertion activities; however, technology enables new opportunities to facilitate this process. We have detailed a set of design strategies that benefit from digital technology to support novel game experiences. We are looking forward to discussing them as part of the gamification agenda, contributing an exertion perspective to the dialogue.

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The Gamification of Television: is there life beyond badges?

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Abstract
The television domain is an apt target for *gamification* given demand for new ways to track, engage and retain viewing audiences. While early applications in social TV show promise, we identify three challenges that need to be addressed. First, television is by nature a lean-back experience; game design must adeptly balance passive attention with active interaction behaviors. Second, a focus on loyalty requires fine-grained interactions to better profile the user; games are ideal for this purpose but are under-utilized in context. Third, badge fatigue is inevitable; we need new ways to evolve experiences to keep viewers interested and challenged. In this paper, we look at how recent trends in companion devices for television viewing provide new tools and opportunities for addressing these concerns. We present some ideas (attention-preserving toolkits, games-with-a-purpose, context-sharing frameworks) that we believe could be a good starting point for related research exploration.

Keywords
gamification, social television, engagement, toolkits

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

The television ecosystem is facing mass fragmentation [1] in both content and community, leading to growing demand for new ways to track, engage and retain the TV audience. Recently, social TV applications [2] have tackled the issue with a *gamification* strategy inspired by Foursquare. Gamification refers to the integration of game mechanics into applications to make them fun or engaging for users. Social TV applications like Miso and GetGlue apply this idea to the content domain, letting users 'check-in' to the TV shows, movies or videos that they were currently watching. Based on their check-in history, users can then unlock badges or gain exclusive access to content. An associated social network makes check-ins observable, allowing a user to befriend or follow others for content discovery or conversation.

Because the application identifies the viewer, his social influences, his affinities (what he likes) and activities (what he watches, and when) it is prized by marketers and content providers. And, because data is voluntarily given (vs. implicitly inferred) it has potential for better analytics with fewer privacy violations. However, the current crop of applications faces multiple challenges in sustaining user engagement beyond the initial novelty phase. In the following sections, we articulate three key challenges faced, and present some thoughts on ways in which these can be addressed with more research.

The Attention Challenge

Interacting with these applications requires a significant *residual attention* from the user, both in setting viewing context (given interaction is on a different device from consumption) and in performing related actions (e.g., share, check-in). Both activities involve different levels of effort from simple button presses (check-in) to text entry (comments) and multi-step navigation (search). Content providers are justifiably concerned that tasks like this fragment user attention, and adversely impact user engagement with onscreen content. Further, this affects the lean-back experience expected by viewers.

Q: How can we support the lean-forward interaction behaviors of games, while preserving user attention?

The Analytics Challenge

Gamification has value to applications beyond loyalty. If we focus on this domain however, we can identify some unmet needs in the currently deployed applications. For instance, most treat check-ins homogeneously, giving a check-in the same weight regardless of when its time of occurrence relative to the show's airtime or duration. A viewer is also not given a reason or incentive to checkin more frequently. However, the behaviors are significant indicators of degrees of user engagement in a *content* ecosystem. To obtain better analytics for loyalty, we need to achieve a better frequency and granularity of check-in activity from users. This presents the perfect opportunity to explore the deeper value proposition of game mechanics to motivate different behaviors.

Q: Can we use games to persuade viewers to check-in more frequently, or take other actions (like, comment, share) to get finer granularity of analytics for profiling?

The Sustainability Challenge

Most social TV applications have focused on superficial features like badges to facilitate the onboarding of new users. We feel badge fatigue is unavoidable especially as copycat applications proliferate. Retaining users in the long term will require new experiences or incentives that engage and challenge their expectations. Because

the domain is diverse in user demographics and needs, there is unlikely to be a one-size-fits-all solution to this problem. Instead, we turn to Bartle's player types [3] as inspiration to categorize audiences and evolve the experience in suitable ways for each group.

Q: How can we characterize viewer personalities? Can we create a pluggable framework that tailors players' 'journeys' to suit dynamic needs or personality profiles?

The Companion Device Opportunity

Our exploration of these questions is motivated and inspired by the popularity of mobile devices (tables, smartphones) as *companion* devices for television viewing. These provide a second screen to users for performing interactions or transactions correlated to the content viewed on a first screen (TV). The rich sensing capabilities of these devices (e.g., touch, tilt, camera, motion, microphone) and ubiquitous presence on or near users, presents a unique opportunity for developing toolkits and games that support the needs outlined earlier. We also see gamification extending beyond loyalty to driving 'games with a purpose' [4] centered on the large television-viewing audience. In the next sections, we walk through use cases and ideas for early research exploration in these contexts.

Attention-Preserving Toolkits

Many gaming interfaces require little residual attention from players, with the popular ones becoming 'second nature' to users. It seems intuitive to adapt these paradigms for use with social TV applications as attention-preserving input capabilities for check-ins and other activity. The game industry has already taken the first steps to re-work game interfaces to better control and manage the TV-viewing experience. For instance, Nintendo's Wii-mote uses sensors to support natural player interactions with the screen through gestures. Microphones enable voice-activated interfaces that find usage today primarily for search (e.g., Google TV) but that could be adapted for control or navigation needs. Touch-based UI are just gaining popularity, supporting nuanced movements around the screen (touch-pad) or simplifying granular remote control for easy navigation (touch-screen). Finally, cameras are now emerging as interesting full-body motion sensors in platforms like Microsoft Kinect.

The maturity of this technology inspired us to explore *morphable interfaces* for attention-preserving inputs in social TV applications. Our intuition is that residual attention varies with the type of content (e.g., live sports takes more attention than game shows or soap operas) and required action (e.g., commenting takes more effort than check-in). By providing a toolkit with support for image recognition, dictionary-based voice recognition, and touch- and motion- based gesture recognition, we can enable any applications to select and activate an optimal input strategy. Thus, a user can check-in by simply shaking his phone, or scrawling a pre-defined character on the screen; both behaviors can be achieved discreetly, without requiring users to take their attention off the program. We can envision more complex requirements (e.g., text entry) as a combination of voice recognition and a gesture to activate (and deactivate) the microphone. The toolkit can be programmed to give discreet feedback (e.g., using audio) on the success or failure of performed actions, eliminating need for visual cues that require user attention. By identifying key use cases, we hope to create a standard library of 'input templates' that can be customized or extended for use in such applications.

Games With A Purpose

While morphable interfaces reduce user effort in taking an action, they don't motivate users to perform them in the first place. We need new ways to engage the user and persuade him to create more and better data. We see this as an interesting application of games with a purpose [4] where users are play games, ostensibly for entertainment, but actually contribute useful work. In this section, we presenting some use cases for context.

Games For Analytics: To motivate users to check-in more or disclose other activities (e.g., like), we need to make the experience fun. For instance, we envision a drinking game with phones, where users can now drink a 'virtual beer' whenever a specific call-to-action word is spoken onscreen (e.g., 'interception'). The action is observable, and can trigger an automated check-in for that show or that call-to-action. Or, we can ask users to "boo" content they don't like, including ads; basic voice recognition can automate a 'dislike' check-in in context.

Games For Search: The television is a visual medium with poor granularity in content metadata, making it difficult for users to discover relevant content. We can use the social TV user base as a crowd-sourcing task force to create useful clips [5] or knowledge [6]. We see potential for translating games like Peekaboom [4] and Verbosity[4] to this platform for just this purpose. Not only can this sustain user engagement outside live viewing hours, but it can create opportunities for new incentives that motivate further participation. Thus, we can 'unlock' the ability to rate a clip or vote down an answer only after users have achieved a certain history of engagement (check-ins, likes) with that content.

Games For Recall: A key part of evaluating viewer engagement is recall; how much of an impact did that content have on him? Call-to-action ("Check-in if you see this ad again") or guessing games like Peekaboom ("Name this celebrity" provide ways to elicit this data from viewers while still making it a fun and interesting way for them to engage with that community.

In conclusion, we observe that social TV applications are in their infancy, but are not currently exploiting the complete potential of game mechanics for engagement. Our research goal is to explore frameworks that allow such diverse 'games' to be deployed over the existing social TV application fabric, to support analytics but also drive sustainable engagement in the long run.

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Playing in Taskville: Designing a Social Game for the Workplace

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Abstract
Raising awareness and motivating workers in a large collaborative enterprise is a challenging endeavor. In this paper, we briefly describe *Taskville*, a distributed social media workplace game played by teams on large, public displays. Taskville gamifies the process of routine task management, introducing light competitive play within and between teams. We present the design and implementation of the Taskville game and offer insights and recommendations gained from two pilot studies.

Keywords
Workplace games, collaboration, design, reflection

ACM Classification Keywords
H.5.2 User Interfaces – Evaluation/Methodology, Interaction Styles; H.5.3 – Group and Organization Interfaces – Computer Supported Cooperative Work

Introduction
In today's workplace, we are increasingly likely to encounter diverse, distributed teams working together on complex problems. Advances in communication technology, the adoption of flexible working schedules, and a growing emphasis on multidisciplinary teamwork have combined to produce radical structural and procedural changes in contemporary enterprises [7]. While these changes may benefit a company's bottom line, the individual worker may experience measurable,

Anatomy of a City in Taskville

Each city in Taskville has a mayor, deputy mayor, and two city council members who are represented by the players of that city with the most points.

Once a task is submitted, a building parachutes down into the game world. The type of building is determined by the number of hours spent on the task and whether or not it was a collaborative task.

Collaborative "buildings" such as the above park are larger in area with the size determined by the number of collaborators.

Tag clouds with keywords from submitted tasks float around giving viewers an idea of what individuals have been working on.

Figure 1: A city in Taskville. Colored flags indicate the owner of the building while the minimap in the lower right corner shows the relative locations and sizes of the different cities.

negative consequences including feelings of disconnection, increased conflict and decreased co-operation [6].

Larger and more widely distributed company initiatives can reduce individuals' awareness of their co-workers' activities and routines, significantly complicating group work [2]. Furthermore, feedback — in the form of either acknowledgment of work completed or constructive criticism of work attempted — is valuable in any environment, as it increases individual motivation to continue working [5]. However, smaller, routine tasks performed by an individual may not receive such feedback in larger scale projects, curtailing enthusiasm and dampening the motivation to complete these tasks.

Appropriately gamifying strategic aspects of everyday workplace processes could potentially address some of these concerns. In this paper, we describe the development of a social workplace game aimed at enhancing reflection, understanding and collaboration between colleagues. Key game components include the use of a popular social media platform (Twitter) as a game input device, a playful rewards system (city council) and underlying mechanisms for detecting collaboration.

Related Work

Introducing games into the workplace has a considerable history. Two notable areas of research include using games as human resources tools [4] or as entertainment interfaces for repetitive tasks like computer process management [3]. Videogames have also been used to help workers maintain appropriate levels of alertness [8], while recent research on mobile platforms has analyzed how games can be interwoven with daily activities [1].

Introducing Taskville

We have designed and implemented a prototype social game (Fig. 1) to address key challenges in contemporary distributed and diverse workplaces. The Taskville game incorporates a city-building metaphor where the completion of tasks leads to the growth of cities in the game world; each city represents a group of individuals within a broader organization. It is straightforward for individuals to use this metaphor to see the progress of an enterprise over time, including contributions from themselves and their coworkers.

The gameplay in Taskville is rendered on large semi-public displays, and players participate in the game by completing real world tasks and reporting their completion via Twitter. When an individual submits a task, a building parachutes into their group's city. The

flag color on the building indicates the owner, and the type of building is determined by two factors – number of collaborators and task completion time (see *Anatomy of a City in Taskville* in the side bar). Taskville's retro visual style, which frequently elicits praise from viewers, was inspired in part by SimCity 2000

To motivate continued play, Taskville incorporates competitive play elements, manifested in three ways in the game design. First, players compete with themselves to improve their own neighborhood from day to day. The second form of competition is intra-group competition, where players within a group compete to become the mayor of their city. Finally, there is inter-group competition, where groups compete to have the largest city in the game world.

User Feedback and Lessons Learned

We conducted two, one-week long pilot studies with participants from two physically separated research groups at a large university. There were 16 active participants in the first study and 12 active participants in the second study, with some participant overlap between studies. We installed the Taskville client on a semi-public display in the lobby space of both research groups. Overall, we were encouraged by the amount of participation, with 306 tasks submitted between the two studies.

We conducted an unstructured group interview session with participants after completion of each pilot study, allowing participants to discuss their experiences with Taskville. Overall, players enjoyed Taskville and felt that it made them more aware of the work that occurs in the workplace. The interviews highlighted several key insights for future workplace game designs:

Intra-Group vs. Inter-Group Competition

One surprising finding was that players were more invested in *intra*-group competition than in *inter*-group competition. Players stated that they were more interested in being mayor of their city than “beating” the other city. One player stated that "[nothing] posted at [the opposing group] ever sparked, like, a 'oh, I've gotta retaliate' thing'", with another commenting that "I only cared what people in [my group] were doing -- because I could affect this environment."

This suggests that individuals are often more concerned about activity within a self-contained group than occurrences at a broader organizational level. As a result, focusing on design components that reflect in-group dynamics may have a greater impact than emphasizing game attributes revealing inter-group activities. This could potentially be accomplished by providing each user group with a full region to themselves and displaying other groups indirectly as "highway connections" leading off the edges of the map, as the SimCity series has done for some time.

Privacy Considerations

The version of Taskville used in the first pilot study allowed participants to individually select buildings with an input device and reveal the generating task. This raised concerns among players that Taskville would be used as an evaluation tool, with one player commenting that Taskville can be useful “as long as we’re not doing Survivor-style — 'you did not build enough buildings, [so] go find yourself a new job.'”

Managing privacy expectations in the workplace requires careful consideration of multiple factors. While privacy can be important in games to a certain extent,

it becomes vastly more so when placed in the context of the workplace, where supervisors and other co-workers can easily monitor events occurring in the game. This presents issues when designing the game as working towards the goal of raising awareness requires some amount of transparency from the tasks submitted. To address the specific concern from earlier, we replaced the controversial query function with literal tag clouds of the tasks that were submitted over a period of days. These aggregated tag clouds float across the game world allowing individuals to see group accomplishments without sacrificing individual privacy.

Task Definition

Employees are often assigned complex tasks which may be recursively broken down into smaller sub-tasks. It can therefore be hard to define what exactly constitutes a single task. For example, is a short, informal fifteen minute meeting with a few colleagues a task in and of itself, or a component in a larger, more significant task? We left it to the players to determine what they deemed was an appropriate task to submit. This led to some spirited debates about the definition of a task. One player considered a task to be complete when switching to a different activity: “Whenever I did a change, that’s when I was like 'I’ll log in this task that I did.'” Another player defined tasks as an activity that resulted in a finished deliverable of some sort. This became an interesting problem for Taskville, as two players spending the same number of hours working could have different numbers of buildings depending on their personal definition of "task". Care must be taken to ensure that the system is flexible enough to maintain a balanced competition, regardless of a user's approach to playing the game.

Future Work

Taskville demonstrates the gamification potential of low-key social media workplace interventions. Moving forward, we are interested in examining how the system scales to different levels of an organization, and examining the competitive aspects in greater detail. While we have identified a number of graphical and gameplay issues to address in future revisions, our current results point to promising insights about the nature of game-playing in diverse, collaborative organizations.

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Leveraging the engagement of games to change energy behavior

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Abstract
In this paper we present an ongoing research project that seeks to improve home energy behavior by connecting it to gameplay within an online multiplayer game. Overall, the project seeks to examine how the engagement mechanisms common in popular games may be leveraged to promote desired real-world energy behaviors among players. By inputting real world home energy data into a compelling social game, such information may be transformed into a more palatable and relevant form of feedback. Further, by tying energy-friendly real-world behaviors to in-game rewards, users may be incentivized to complete them. A completed game prototype, *Power House*, is described, and will be available for play during the workshop.

Keywords
games, engagement, feedback, energy behavior, choices

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

games, engagement, feedback, energy behavior, choices

Introduction

Recent estimates are that 22% of home energy use could be eliminated if people were more discerning with their energy behaviors – for example, electing to use energy efficient light bulbs or remembering to adjust thermostats and turn off lights when not in use [1]. Further, consumption reductions may be substantially more effective than many supply side solutions. Recent research suggests that a 10% reduction in energy use could decrease fossil fuel consumption by an amount approximately equal to a 25-fold increase in wind & solar power or a 100% increase in nuclear power [2].

To this end, billions of dollars have been spent on smart grid and smart meter technologies, based on the idea that people will use new energy information to make wiser energy decisions. However, despite the availability of rich mines of data, there is still a problem: the process by which consumers interact with this data is not engaging. The information is dull, the interfaces are complex, and the feedback is temporally distanced from behavior (Figure 1.). As a result, incentives for the users are unclear.

Further, because it is dull and time-delayed, energy information stands little chance in competition with richer, livelier media. Indeed, the delivery, presentation, and context of energy information has much to learn from television, movies, and social network and particularly game applications.

Figure 1. A sample of current interfaces for displaying home energy data

Games as Engaging Interfaces

Popular game environments offer insight for energy applications. Games engage people with elements like self-representation, timely feedback, community connections, ranks and levels, teams, virtual economies, and compelling narratives [3]. A multiplayer game that connects such elements to the information gathered by home smart meters could prove more engaging than current UIs. Indeed, many previous attempts to apply games to serious contexts – health, business productivity, learning – have proven successful for firms such as IBM, Cisco and the U.S. military.

The game mechanics listed above can be leveraged to structure and incentivize energy efficient behaviors. Such a game would track home energy use, then input that data into game interactions. Such a media

experience would mix the real and the virtual, allowing a player's home, and actual behaviors in the home, to function as a joystick for gameplay. Further, game play can include established real world social networks.

Power House: The Energy Game

To test this idea we constructed a commercial-quality multiplayer game experience - *Power House* - based upon ongoing research conducted at Stanford University in the areas of psychophysiology, neuroscience, and game mechanics [4].[1]

Power House is an online game that connects home smart meters to a game that is grounded in real world social networks. Player energy use is tracked via personal accounts with local energy providers. This information is then inputted into the game environment, where it influences the player's in-game abilities, and has consequences for player options, rewards, and reputation. Real world energy behaviors produce particular in-game advantages and disadvantages, transforming otherwise dull and distant information into feedback that is palatable, timely and relevant.

Dashboard

The Dashboard functions as the main informational display for players (Figure 3.). Similar to many current energy information UIs, the Dashboard allows players

Figure 2. The title screen from the multiplayer energy game *Power House*

to view a graph of the last 24 hours of their home energy data, as well as compare the current consumption level to saved historical data. Unlike common UIs, the *Power House* Dashboard also contains a full summary of the player's in-game status.

In addition to setting a profile icon, players can view current scores, the results of competitions with other players and teams, and the number of virtual credits earned (a synthetic currency that can be spent either on virtual items or real world rewards provided by energy-minded companies and foundations).

Several other components of *Power House* are accessible from the Dashboard. Players can open the Chat Forum to make comments or answer questions posed by the player community. Additionally, players are able to view a visual display of their friends in the

[1] The Power House game was initially developed at Stanford University by Byron Reeves and was funded by the ARPAe Program in the Department of Energy. The design and commercial production of the game is part of a collaboration with Seriosity, Inc. (www.seriositycom) and Kuma Reality Games (www.kumagames.com).

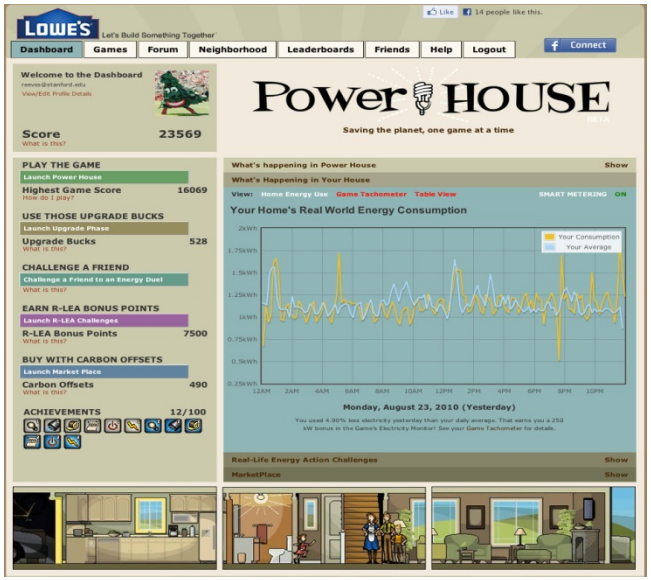

Figure 3. The player Dashboard in Power House, from which users can access personal energy data, in-game performance leaderboards, and a chat forum. From the Dashboard players can also issue energy challenges to friends and report real world energy achievements.

Figure 4. Players can view their virtual Neighborhood, which displays the virtual homes and accomplishments of their social network of friends.

virtual *Neighborhood* (Figure 4.). This screen presents player achievements, as indicated through in-game items such as solar panels or windmills on their in-game houses.

Further, players can access the *Leaderboard* display in order to compare rankings of their individual or team performances to those of their online friends. (Indeed, *Power House* permits players to invite members of their social network to play using *Facebook Connect*.) Additional features of the Dashboard allow players to cash in virtual credits, challenge friends to real life energy competitions, and to also report the completion of real life energy challenges for further points and rewards.

Gameplay

The *Power House* game experience is comprised of multiple online mini-games. In one such game, the player helps members of an onscreen family navigate through their house and complete common daily activities including cooking dinner, washing laundry,

exercising, watching television, and surfing the web. To do this, the player must turn on (and more importantly, turn off) lights and appliances, all the while observing the amount of electricity each action requires. The gameplay increases in difficulty as each additional member of the virtual family arrives home and the player must keep track of the actions and desires of each. Players learn about energy requirements of different actions as they play. Periodically, play is interrupted and players are offered an opportunity to learn more about energy and to challenge other players to save energy.

The objective of play is to satisfactorily track and assist each virtual family member for as long as possible. Scoring is based on the player's ability to minimize the amount of energy consumed by the family. Notably, the information provided about the virtual energy consumed (including the amount needed per appliance, the amount needed based on time of day, and crediting for swapping out old appliances for Energy Star replacements) accurately reflects real world levels.

Research Experiment & Schedule

Research trials designed to evaluate the relative impact of *Power House* on home energy behavior (as compared to more customary energy information interfaces) are set for spring, 2011. Trials are anticipated in both the U.S. and Europe. Participant sample populations will be matched across treatments on factors including socio-economic level, geography, and family size to control for variations in weather and baseline energy consumption levels.

Preliminary results should be available by the CHI workshop date. This will mark the first presentation of the game at an industry-academic venue. A public URL will be made available at the conference workshop.

Figure 5. One of the online mini-games found in *Power House.* Players must help a virtual family minimize energy consumption as they go about their daily household routines.

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