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# Gameful Systems: Play in the digital age for young and old.

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**Abstract**

Games have been used as a tool to introduce older people to digital technology. Here we are developing a gameful system to facilitate the social interactions between older people and young adults in a community run club.

We discuss opportunities for gamification as it relates to our current study using a local running group as platform for supporting older people in gaining confidence in integrating digital technologies in their everyday life. We discuss the over arching issue of older people, digital technology usage and participatory design. This provides the background for addressing points of using gameful system to foster empowerment and connection in the intergenerational running group.

**Author Keywords**

Game design; vulnerable individuals; methods.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**General Terms**

Human Factors

## Introduction

A 2009 United Nations report states that by 2050 there will be more people over 60 than under 15 years of age in developed countries [17]. Despite the increase of older people in the population, they are still overlooked in the development of digital technologies.

While the growing older population is diverse and can no longer be divided into 'silver surfers' [4] or 'digitally disenfranchised' [16], studies have shown that on the average the 'grey generation' is a small portion of digital users [11]. Older people have ambivalent attitudes toward new technologies due to limited experience of the technology's usefulness in their everyday life [15].

The central theme of our research project is to bolster older people's confidence in engaging with digital technologies through a meaningful integration into their lives. We are working with a local London, UK running club whose members regularly visit isolated older people in their neighborhoods: checking on their well-being, encouraging social interaction, delivering newspapers and doing other helpful jobs. Our research work supports the relationship between the runners and the older people (coaches).

The relationship between the running group's member and the older people (coaches) provides a platform for building a gaming experience within the community. The challenge is that the coaches in general do not use digital technology (internet, smartphones,). This limitation provides an opportunity for developing a gameful system that both supports the runner/coach relationship and assists integrating digital technology in an older person's lifestyle in a meaningful way.

## Background

There is a body of research that points toward the potential benefits of integrating non-medical digital technology into the lives of older people [1][4][9]. Despite the potential of these digital technologies in supporting health and social engagement, it has been found that older people are not likely to adopt new technologies [4]. Older people's lack of adoption has been attributed to the perceived barriers of the complexity of digital devices (mobiles and laptops), previous 'bad' experiences and lack of motivation [1].

For older people, the technology they are familiar with is being phased out. This cycle of transitioning technology is not new. What makes the digital age different is the pace of the change. In the digital life, the evolution from relevant to obsolete is marked by months not years [3].

Typically the government and organizations provide digital literacy support for older people predominately through technology classes at local libraries or day centers which has at best limited reach in the community [8]. While these initiatives are based on good intentions, they are short sighted since the scheme does not consider barriers of mobility, motivation and perceived usefulness [15].

There have been research projects using games as tools for memory and physical coordination therapy in the home and at care homes [2][7]. This approach follows Huizinga's definition of play as a separate occupation from everyday life [6]. Today gameplay is integrating into our daily lives, through schools [12], and social networks [10].

Selwyn proposes that successful digital literacy support of older people will be through trusted sources that are deeply involved in the local community [15]. Our project tests Selwyn's theory through a real world implementation by engaging a local running club in East London, UK as the platform for developing a gameful system to integrate digital technology into the community.

### **GoodGym Gameplay**

GoodGym is a 3-year-old, non-profit organization that fosters the mutually beneficial pairing of runners, who need be motivated to exercise, with older people (coaches), who would benefit from a weekly visit.

The participatory design research approach [14] is being used in our work with GoodGym. We conducted two exploratory studies. One focused on understanding GoodGym's administrative operations. The other was to gain an understanding the various coach and runner relationships.

We chose GoodGym for our research as a community organization whose goal is not explicitly aimed at teaching older people how to use computers. The nature of coaching and running lends itself to gamification. The runners track their running times to their weekly visits their coaches. GoodGym is in early stages: we are developing the gameplay along with the development of the organization. This provides the opportunity to playtest ideas, implement the ones that work or discard the ones that are not successful. These factors made this community an attractive place to explore Swelny's theory of bottom up digital literacy with our own twist of gamification.

### **Older People and Play**

In the GoodGym community the lower hanging fruit is developing gameplay among the runners. They typically have smartphones and engaged in social networks. As runners, they have an interest in improving their running times and desire to compare their progress with the other GoodGym runners.

The coach (older person) and runner relationship is where we have opportunities for exploring integrating gameplay in older person's everyday life. The coaches typically do not use Internet and consider mobile phones as a device for emergencies only. We are starting with a game system that is tested through paper prototypes where the coaches can award badges and express their encouragement to their runner.

Our next iteration is to experiment with developing digital interventions that the coaches can use to communication with their runners, provide encouragement and the runners can share their progress. We hope that by working with the coaches, we will develop a simple, meaningful tools and a playful experience that supports an existing activity will encourage further adoption of digital technology.

### **Conclusion**

We aim to expand the boundaries of the current implementation of lifestyle gamification. We hope that we will reveal new opportunities for gameful systems to lower the barrier to entry to new digital experiences across all age groups.

We have presented the challenge we have taken on to ease integration of digital tools through gameplay for older generations. Our research is about both the

meaningful integration of older people in the digital age and laying the groundwork for our future selves as older people. We hope to be able to learn and share strategies for game designer, researchers and participants in the development of our emerging gameplay based society.

### Acknowledgements

We are appreciative to GoodGym and their community in developing this participatory research. This work is supported by the Media and Arts Technology Programme, an RCUK Doctoral Training Centre in the Digital Economy.

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# Gamifying Citizen Science: Lessons and Future Directions

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**Abstract**

Gamification is a promising mechanism to motivate the contributors to citizen science projects. This paper describes our experience designing Biotracker, a gamified citizen science data collection platform. We also present important challenges facing future designers of gamified citizen science apps.

**Author Keywords**

Gamification; Citizen Science; Floracaching

**ACM Classification Keywords**

K8.0. Personal computing: General games

**Introduction**

Gamification is the use of elements of game design in non-game contexts [5]. Empirical research demonstrates that Gamification can encourage some people to use an application more often [14] and to derive greater enjoyment from their use of an application [6, 7]. Gamification is already being utilized in domains that collect user-generated content such as mobile social reporting and citizen sensing [4]. Citizen science provides another opportunity for gamification; in fact, a recent position paper on the future of citizen science identified “motivations driven by interest in technology and rewards, such as online gaming badges

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and competitions” as a potential future direction benefitting volunteer motivation and retention [10].

Citizen science is a collaborative process where volunteers work with professional scientists to study real world problems [3]. Different types of citizen science projects include action projects, where citizens intervene in community concerns, conservation projects that support natural resources management, investigation projects where data is collected to advance scientific goals, technology-mediated virtual projects, projects that support educational outreach [15], and biodiversity curation projects [13]. The motivations of citizen science volunteers are complex—researchers recently identified 12 types of motivations for a single project, noting that the majority of participants had multiple motivations—and those motivations evolve over time [12, 13].

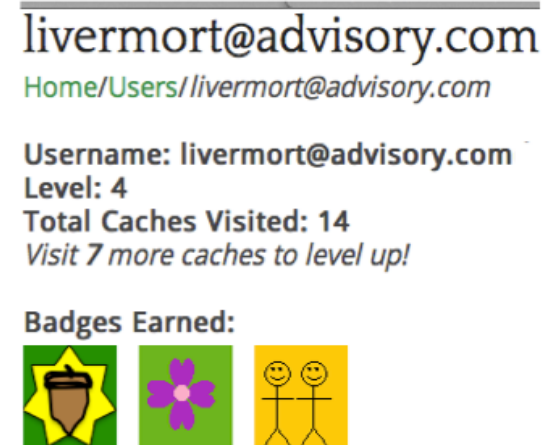
The success of Foldit (<http://fold.it/portal/>) and Phylo (<http://phylo.cs.mcgill.ca/>) has proved that serious games can inspire citizen science volunteers. Gamified platforms are being built using the same motivational elements at a lower cost of time and effort. Tiger nation combines computer vision with elements of gamification to identify and track wild tigers [9]. Happy Moths uses badges, leaderboards, and occasionally a narrative to inspire users who perform classification tasks [11]. Another platform, Biotracker, is described below.

### **Building a gamified citizen science app**

Biotracker is a gamified citizen science data collection platform. The Biotracker app, a major component of the platform, has the ability to track location data, create user profiles, allow users to upload multimedia, and incorporate game-like elements such as badges

and a leaderboard. As such, the app is a collection of technologies that can be molded to fit the needs of a specific project.

Biotracker was inspired in part by Floracaching, a serious geocaching game for citizen science that encourages players to gather plant phenology data. Two prototypes of Floracaching were recently evaluated at 2 Universities with 58 participants, as detailed elsewhere [2]. Floracaching users were both plant experts (n= 22) and technology enthusiasts (n= 36). Players shared their motivations for using Floracaching, the activities they enjoyed, and suggestions for improving the app through surveys, focus groups, and behavioral trace data. A screen shot of the Floracaching prototype is presented in Figure 1.



**Figure 1.** A Floracacher’s user profile. This user earned badges for visiting 5 oak trees, finding a plant on a conservation list, and for using the app with other people.

Our work designing and evaluating Floracaching allowed us to study firsthand the motivational effects of game elements in citizen science and infer design implications for the gamified Biotracker app.

### **Research questions and design challenges**

#### *Designing to support both experts and casual gamers*

One noted challenge in citizen science projects is gathering and retaining enough participants to make a project's goals worthwhile [11]. A gamified app might encourage a gamer audience to contribute to a project that they might otherwise ignore. Consistent with [12], we learned that some of our gamers did enjoy Floracaching precisely because it was a game-like application that contributed to citizen science. As one explains, "With Geocaching it's cool, and it's fun, but it's like 'what's the point' whereas for this, you're contributing to science while you're doing it." Other participants said it would be motivating to use the app "if it were more like a game with badges, achievements, etc." or "if there was a way to 'win'".

While gamification is designed to increase motivation, hardcore citizen scientists may eschew game-like aspects in favor of a more serious interface. For example, one plant enthusiast who tested Floracaching considered the game-like elements "distracting;" another advocated for more tools designed for plant experts such as a taxonomic key. As such, part of the design challenge for Biotracker is to make the app appeal to both citizen scientists and casual gamers.

Designers of the Citizen Sort classification portal appeal to their dual audience by offering a classification suite including Hunt and Gather, a true tool without

motivational elements, Happy Moths, a game-like tool, and Forgotten Island, a game world that supports classification activities [11]. Additionally, the designers of Happy Moths evaluated both a bright, game-like interface and a lower key "natural" interface, learning that gamers preferred the game-like interface while nature enthusiasts preferred the more "natural" look. This suggests that designers could potentially use different skins to appeal to different user groups. Unfortunately this approach requires considerable cost and effort. Finding ways to have a single interaction experience that appeals to both groups thus is a worthwhile goal.

#### *Ensuring that gamification does not have an adverse effect on data quality*

As citizen science relies upon the efforts of volunteers who receive minimal training, scientists emphasize the importance of a rigorous process that produces high quality scientific data [3]. As users of gamified applications may attempt to "game the system," for example by gaining points for sub-par contributions, the use of gamification in citizen science may exacerbate scientists' concerns about data quality [9]. A few solutions have been proposed. Repetition can be built into a game so that an answer or piece of data is not accepted until submitted or verified by multiple players [1]. Gamified activities or even complete games can also be built to ensure data quality; for example, Odd Leaf Out is a sorting game that combines human efforts with a computer vision algorithm to identify mislabeled images of leaves [8].

### **Conclusion and Workshop Goals**

While many serious games exist to support citizen science activities, designing gamified citizen science applications is an emerging challenge. We have

identified the following challenges to gamifying citizen science, which we believe also effect those working in different domains:

- How can gamified apps be built to appeal to an audience that enjoys game-like interfaces, and an audience that may find them distracting?
- How can gamification enhance the experience of an audience that already displays powerful intrinsic motivations?
- How should gamified apps be modified when supporting data quality is a crucial task?

It is our hope that a discussion of these and similar questions will help us design a better app.

### Acknowledgements

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# Game Mechanics in Support of Production Environments

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**Abstract**

In this paper we illustrate how we use gamification in *production environments*, such as call centres, in order to help agents and supervisors manage their performance. Our approach is based on the incremental introduction of game mechanics in the work environment to support situational awareness with respect to aspects such as current performance levels, goals, and related incentives. We illustrate our approach and the research questions we are investigating also considering related work on gamification and ongoing discussions in academic and commercial environments.

**Author Keywords**

Game mechanics; gamification; situation awareness; agency.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation.

**General Terms**

Design, Human Factors, Theory

**Introduction**

In recent times, there have been discussions about the use of games and game elements in non-game contexts, referred to as Gamification [4]. Gamification

can take several forms, from the layering of basic game mechanics onto routine performance tracking, to the full integration of productive tasks into a virtual gaming environment [6]. In either case, the primary objective is to increase the motivation and involvement of workers in activities such as training and work related tasks [2, 5]. However, significant amounts of research remains to be done in order to understand the effectiveness and level of acceptance that game mechanics have in the work environment.

More recently, there have been discussions about the pros and cons of gamification [7]. These discussions have raised the specific concern that replacing intrinsic rewards with explicit ones may actually reduce motivation over the long term [7]; or that games may be used as an additional layer of control, thus increasing pressure on agents rather than reducing it [1]. Given that real examples of the successful implementation of game mechanisms in work environments (as opposed to learning or training environments) are hard to find, a certain measure of skepticism is fair.

While the concerns about the effectiveness of gamification are legitimate, we believe that used judiciously, it can provide benefits in particular work environments. We are building a technology [2] that uses elements of gamification [3] to support knowledge workers that operate according to a “production” model where work is organized as a process broken down into repetitive, measurable, tasks distributed across a hierarchically organized workforce with a rigid organization of labour (shifts, strict time keeping, and monitoring strategies). In this paper we use outsourced

call centres as an example of this type of knowledge work.

Knowledge work is characterized by the complex reasoning that workers often bring to the activities they undertake. When this work occurs in a production environment, the push to routinize and distribute the tasks can have the effect of reducing the visibility and value of the skills that each worker brings to the job. This is compounded by a design of processes and information systems that may not facilitate the skilled part of the knowledge work in question.

In our research, we have focused on the organizational processes and information systems used in the performance management and monitoring of the call centre. Information Management Systems available to agents may provide access to phone switch data. However, to reflect the performance trends of specific agents or teams, the data needs to be aggregated into reports. The creation of these reports is time consuming and dedicated to specific organizational processes, such as reporting on the call centre's overall performance or in the course of coaching sessions with individual agents. The net result is that agents and their supervisors only periodically receive feedback on their individual and team performance and not in the course of taking phone calls, which is when this information would be the most salient to monitoring their own performance in relation to organizational and personal goals as their shift unfolds, as well as, in balancing customer demands (for example, in terms of time on the phone) with organizational policies. Agent team supervisors, on their part, have to spend a considerable amount of their time aggregating performance statistics and generating reports, when they should instead be available to help agents with

their phone calls. To address some of these issues, we have designed a system, Agentville [2], that offers the visualization of the salient information and its trends as it unfolds in as close to real-time as possible.

### Agentville: a platform for gamification

In a call centre, agent performance is typically measured through Key Performance Indicators (KPIs), which are metrics derived from the telephone switch and assessments performed by quality analysts. An example of a typical KPI is Average Handle Time (AHT), which represents the average time an agent spends on a phone call with a customer. Each call centre is expected to keep the average value for these KPIs within a certain threshold – agents are in turn expected to manage their phone calls so that their average values fall within those thresholds.

The Agentville widget (Figure 1) provides agents and supervisors with near real-time information on the values of their KPIs, which are already captured and processed in the call centre. As such, Agentville is not an additional level of performance tracking, but makes existing tracking transparent to agents and supervisors. This provides them with the information they need to manage their own performance in regards to the expectations of their organization [2]. The Agentville system provides a platform within which we plan to integrate elements of gamification, such as levels and leaderboards and more importantly challenges and competitions.

According to our observations of call centres, games, such as challenges and competitions, are typically implemented in a very low-tech manner. Scoreboards are typically wall displays which may or may not be visible to all agents from their workstations, and are

usually not updated regularly. The absence of more dynamic and accessible visualizations does not encourage engagement on the part of the agents, and it negates the potential for using the game mechanisms themselves to focus the agents' attention on particular aspects of their own and their team's performance.

Games are also designed to drive performance on particular metrics or services according to organizational requirements. If these do not change on a regular basis, they tend to always target the same skill set, favouring the same subset of agents. This means that they can be perceived as unfair to agents who do not feel they have any realistic chance to win. These games may also drive certain metrics too hard at the expense of others, as certain qualitative metrics (customer satisfaction measures) are inversely (or non-linearly) related to certain quantitative measures (for instance, the amount of time an agent spends on the phone with a customer).

Given a platform that provides near real-time, shared performance data visualizations to agents and their management, we see the potential to integrate additional game mechanisms in a manner that increases their agility and realizes their original intent more effectively. That is, primarily, through the more dynamic focusing of agents' attention towards these goals with added incentives.

More specifically, the forming of the competitions involves the viewing of the various KPIs over a period of time to support the decision of what type of competition should be formed. The viewing of this data, coupled with the visualization of the occurrences of past competitions, supports learning for the creators of the

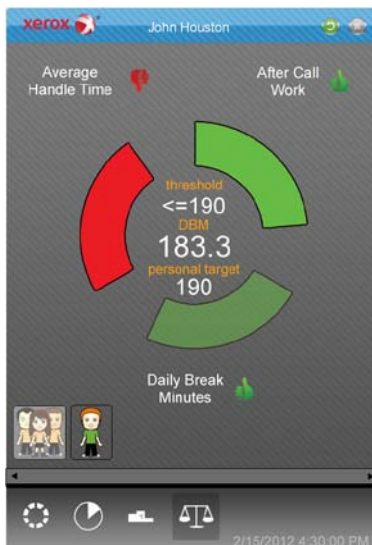


Figure 1. An agent's widget in Agentville.

competition. Through this process the creator will reason on any changes in the KPI and the capacity of agents to change. As for supporting the learning and development of the agents, through the participation in these competitions, we believe, they will come to better understand the priorities of the call centre.

Additionally, we see the use of competitions and challenges as a way to facilitate the sharing of both the changing goals of a call centre and the contribution to these goals by the agents. Currently, call centres respond to either long term goals (keep a metric under a certain threshold) or individual exceptions (an agent being on the phone too long). Long term goals are addressed with a set of best practices, while individual exceptions are handled by dispatching 'runners' or calling the agent directly. There is a lack of ability in recognizing trends, coupled with a lack of agility in responding to unfolding situations. The game mechanics of competitions and challenges enable the more efficient communication of both goals and the progress towards reaching these goals.

## Conclusion

We see gamification as a means and not as an end. We do not make assumptions that introducing a game in a workplace will systematically make work fun and we do not make assumptions about the impact of reward mechanisms (which are not introduced by game mechanisms themselves but rather by pre-existing performance-based management and compensation mechanisms) on intrinsic motivation. We do "assume" (as a working hypothesis) that in the context of a tightly monitored work environment it may be more "motivating" for agents to:

- Have more transparency into the organization's performance management strategies and expectations, and where their current performance is in relation to them;
- Have a sense of what they contribute to their team and the organization through their individual efforts;
- Understand what their opportunities for improvement are and have more agency in monitoring and managing their own performance.

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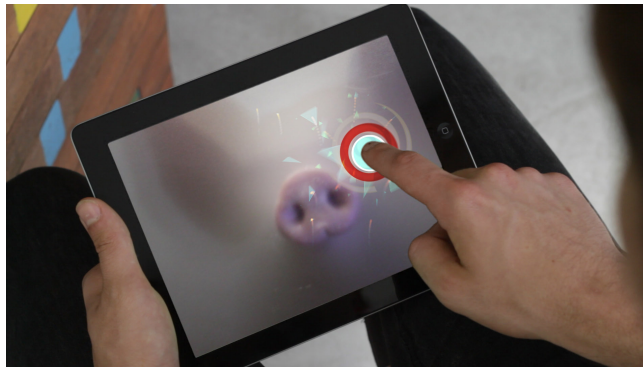


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# New Games for Extant Contexts

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**Figure 1:** Pig Chase (<http://www.playingwithpigs.nl>)

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## Abstract

We describe the alternate approach and process we have to make gameful systems to achieve goals within existing contexts. Our approach is a middle ground between those who say games cannot be instrumentalized and those who say that games are a panacea. We argue that by sensitively and rigorously employing a set of tools from the broader design space it is possible to create experiences that are both fun and tend towards a goal.

## Author Keywords

Games, play, gameful systems, gamification, design, process

## ACM Classification Keywords

H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous. See:

<http://www.acm.org/about/class/1998/>

## Introduction

Hubbub (<http://www.hubbub.eu>) is an international studio that makes new games for social and organizational change. Hubbub conceives, designs and develops wholly new games to fit into existing contexts. These games are fun to play but often there are ulterior goals attached to the brief as well. Our aim is to deliver on those goals while staying true to the playful nature of games.

Games developed include *Pig Chase* for the conscious interaction between humans and pigs, *Code 4*, a large scale game to be played within corporations and *Beestenbende*, a game for families in a science museum.

We do not believe in the prescriptive trend that currently passes for gameful design in the broader industry. We think that an approach is necessary that is more subtle and respectful to all parties, not just the commissioning stakeholder. Our initial findings indicate that such an approach works better as well. Players like to play these games and the goals we set from the onset are met.

We have created games for contexts varying from academic settings, artistic endeavours but also for companies large and small. In all cases we use a similar toolbox of context immersed game conception followed by a rapidly prototyping hands-on design and development process.

In the following sections we'll describe our process for creating games, discuss pitfalls, contrast our way of working with normal development practices and conclude with issues we think are pressing.

## Process

### *Conception*

Concepting a game starts with a brief that sets the direction for initial data gathering and analysis of the problem space. This usually involves a visit to the site and an exploration of the existing rulespace.

We make an inventory of what is important to our stakeholders and target audience and synthesize this into a set of requirements to be used during ideation. We then embark on sketching either with or without the client to quickly cover a broad swath of terrain and identify potential avenues of exploration.

When we have determined promising concepts, we develop these into prototypes. This is done initially using simple means: playing cards, dice and poker chips. After that we

develop increasingly high fidelity paper and software prototypes with whichever tools are convenient to quickly achieve the required level of fidelity.

### *Playtesting*

When working on games and gameful systems, playtesting is an even more essential navigational aid than it is for evaluating other interactive products. Regular products will be approached by users with a need to fulfill a goal. This need is often absent for the end user —'player' in game parlance— of a game. Players in a game don't care a lot about what the commissioning party thinks they should do. First and foremost they expect something that is fun, non-confusing and aesthetically pleasing. This sets a high bar for the development of such a system.

It is impossible to determine whether something is fun or not without trying it. However useful expert reviews can be to spot usability errors and muddled metaphors when designing interactive products, they are mostly useless to determine whether something is fun.

Playtests should start early during development, involve the actual target audience on-site and feedback should inform further development. Tests should validate current issues and the level of detail that has been recently developed. If applied correctly, the feedback from these playtests will cause the project to converge towards the end result of a successful game.

### *Delivery*

Iterative development with regular playtests continues until final delivery. During the principal development stage many of the roles (front-end and back-end engineer, graphic designer, producer, interaction designer, game designer) that were covered by a skeleton team may be fleshed out further into one or more people per role.

Eventually the game is deployed and run in its given context by a team consisting of people from the target organization and a crew provided by us consisting of among others technical support and a puppet master who manages the player experience and any non-player interaction.

### **Contrasts**

We do not subscribe to the notion that players can be made subservient to institutional goals and that games can be used to fix any problematic issue within an organization. We believe that the essence of games and play require a more open ended and generative approach where it is hard to specify or predict beforehand what direction development will take or what outcomes players will achieve.

This does not mean direction is impossible, just that it will need to be subtle. A game should not aim directly towards the end goals set by the stakeholders. Instead it should step back at least one level and create interesting outcomes whose interplay creates the desired effect.

To do justice to all parties, everybody should be involved as early as possible and their requirements should be acknowledged. The game should wear its stated aim on its sleeve and not want to trick players into doing something. Ultimately both the game and its outcomes are whatever players make of it.

Playtesting determines what works and what doesn't and should be applied more rigorously across the field. This would serve both as a useful guide and uncover the failure of many naive approaches to game development.

### **Pitfalls**

A brief overview of the field would suggest that there are many pitfalls when it comes to the development of gameful systems. The amount of successful approaches does not reflect the amount of hype surrounding applied games.

Stakeholder goals may be averse to the approach we detail here. From the outset of the process we propose, we know as little of the outcome as our client does. What we do know is that by following this process we will create a gameful system that does justice to both the stakeholders and players. This requires a leap of faith on the side of the stakeholders, but the early playtests and continued collaboration are designed to build the necessary trust.

Many practitioners in our opinion do not understand the resources required to create a gameful system that delivers on all of the goals of play, usability and aesthetics. We know that in many interactive projects user testing is neglected almost as a rule, but we argue that none of these can be skipped upon, least of all play.

Depending on the context, it may not be immediately obvious to prospective players that play is an allowed or encouraged activity. To ease adoption it may be necessary to encourage a playful mindset and have the stakeholder clearly communicate about the game and its intended goals.

### **Conclusion**

By using the above approach we have created games that we consider to be successful. Still there are a lot of issues that require further study and discussion.

It is unclear whether large organizations can or want to truly adopt open ended play. The nature of these



organizations values predictability, economies of scale and legibility, principles both our process and games are often opposed to. Organizations are of course also in flux and the barrier between their processes and the play deployed within them is a gliding one. What will be interesting is to research how this barrier moves, what causes these movements and what stresses that movement causes.

The approach detailed above harnesses play and creating games into a repeatable and reproducible process. It is inevitable that these practices and methods will at some point become commonplace. To continue to create appealing gameful systems, it will become necessary to go out and uncover new playful elements to add to this repertoire.

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# Skill Atoms as Design Lenses for User-Centered Gameful Design

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## Abstract

This paper describes the use of skill atoms as a design lens for gameful design that focuses the optimal structuring of challenges inherent in a user's goal pursuit.

## Author Keywords

Gameful design; skill atoms; gamification

## ACM Classification Keywords

H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; H.5.2 [User Interfaces]: Evaluation/Methodology, User-Centered Design; K.8.0 [Personal Computing]: Games

## Introduction

There has been little systematic work on the actual design process of “gamified” or gameful systems [7]. In

addition, existing industry gamification applications and design methods have received criticism on at least four accounts:

- **Not systemic:** They merely add game design elements, whereas game design approaches games as *systems* where experiences emerge from the dynamic interaction of users with all system components [6,11].
- **Reward-oriented:** They focus on motivating through rewards instead of the intrinsic motivations characteristic for games, like competence [6,14].
- **Not user-centric:** They emphasize the goals of the system owner, often neglecting or even being detrimental to the users' goals [1,6,14].
- **Pattern-bound:** They limit themselves to a small set of feedback interface design patterns (points, badges, leader boards), rather than affording the *structural* qualities of games that give rise to gameful experiences [6,14,17].

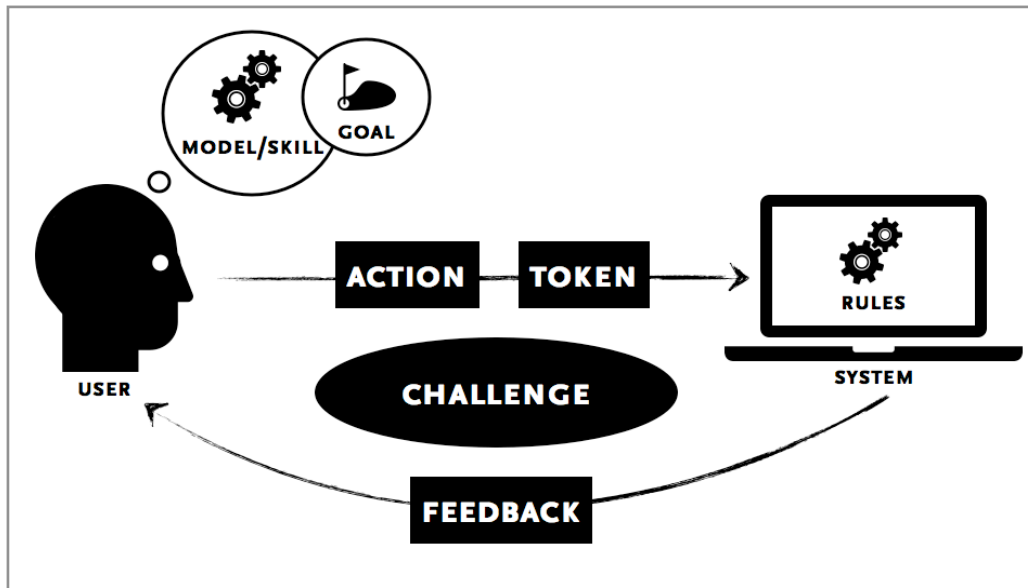
The question thus becomes how to devise a method for gameful design that is (1) systemic, (2) appealing to game-characteristic motivations, (3) transcending the application of existing patterns and (4) user-centric. We suggest that using skill atoms as a design lens to structure a system around challenges inherent in the users' goal pursuits fulfills just these criteria.

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**Figure 1.** A skill atom.

**Goals:** Goals articulate a certain game state the player wishes to achieve.

**Actions:** What a player can perform to approach her goals.

**Tokens:** Entities a player can act upon; their configuration embodies the game state.

**Rules:** Algorithms determining the effects of the player's actions on the game state.

**Feedback:** Information by which the game informs the player of its current state in response to her actions.

**Challenge:** The central skill that has to be mastered.

**Model/skill:** The player's understanding of the game and capacity to achieve her game goals.

**Box 1.** Components of a skill atom

### Skill atoms

The concept of skill atoms [5] stems from an ongoing effort in game design to formalize the central building blocks of games into a practically useful 'grammar' or 'Unified Modeling Language' [2-5,9,11-13,15]. Authors variously suggest that games are nested, interlinked systems of systems, with "skill atoms", "game atoms", or "ludemes" being the smallest self-contained system, which itself consists of recurring elements, yet cannot be broken into these without losing its 'gaminess'. These 'atomic' units thus fulfill the first criterion of systemicness. Cook's "skill atoms" [5] stand out as the most holistic yet parsimonious model that is also explicitly linked to challenge and competence.

A skill atom describes a feedback loop between player and game that is organized around a central challenge or skill that the player is trying to master [5]: A player takes an action, which forms an input into the game's rule system, whose results gets put out as feedback to the player, which the player integrates into her understanding of the game. Through interacting with the game – multiple 'run-throughs' of the skill atom loop – a player masters the central skill of the atom: understanding its rules and working strategies to affect

it, training the required hand-eye coordination, etc. [5] Because Cook's model describes *phases*, not *components*, we slightly amended his model, inspired by Dignan's *Game Frame* [8]. A skill atom thus consists of goals, actions, tokens, feedback, a rule system, challenge, and the user's model/skill (see box/figure 1).

### Challenge

The skill atom model explicitly grounds in the assumption that humans are intrinsically motivated to learn, and that the mastery of skills for either intrinsic reasons of curiosity and experiencing competence, or the skill's utility for some other context, is what drives game play [5]. The flipside of this is "burnout": Once a skill atom has been fully mastered, engaging in it generates no intrinsic interest in the player anymore. To sustain interest, a game therefore has to vary and increase its challenge, for instance by integrating several atoms into a more complex composite [5]. This notion of challenge, curiosity, and competence as central to game play motivation is congruent with current psychological research [16] and thus fulfills the second criterion.

### User-Centricity

To organize a design around a challenge immediately raises the question: *What* challenge? Like game-based learning, gameful design cannot focus on whatever challenge is most entertaining. It has to align with some outer purpose. Also, because challenges are not engaged with for their own (entertainment value's) sake, throwing challenges in the user's way might actually increase friction and frustration. In game-based learning, one recent promising approach to this issue is "atomic intrinsic integration": A game ought to be "incorporating the learning material ... within the

### The lens of skill atoms

An intrinsically motivating gameful system offers nested and interlinked feedback loops of goals, actions, tokens, and feedback around the skill-based challenges inherent in the users' pursuance of her goals while engaging with the system.

- What are the needs your user pursues in engaging with this system?
- What are the central skill-based challenges your user is motivated to master in that pursuance?
- Does the system articulate these challenges in goals that guide the user and connect to her needs?
- Does the system articulate clear actions the user can take to achieve these goals?
- Does the system articulate clear tokens to act on?
- Does the system offer clear, immediate, actionable feedback whether the user's actions were successful in achieving her goals and fulfilling her needs?

**Box 2.** The lens of skill atoms.

core mechanics", delivering it "through the parts of the game that are most fun to play." [10]

Now in gameful systems, the purpose is not conveying learning material, but facilitating user activity. And to fulfill the third criterion (user-centricity), this activity has to flow from the user's goals and needs, only *then* asking how it might pay onto the goals of the system owner. By analogy to atomic intrinsic integration in learning, then, to design intrinsically integrated user-centric gameful challenges means to tease out what goals and needs a user pursues, and what challenges are *inherent* in that pursuance, that is: are not due to poor usability or similar, but represent the core skill(s) the user has to master to achieve her goals through the system. These challenges should then be translated into the core skill atoms of the gameful design.

### Design Lenses

Design lenses are a concept initially developed for game design [18] that was quickly adopted in user experience design, specifically to transfer game design insights [19]. A design lens articulates a single design principle in a form that is inspiring and guiding design without prescribing known solutions – like a design pattern would. Practically, a design lens combines a concise statement of the design principle with a set of focusing questions that allow the designer to take on the "mental perspective" [19] of the lens. This fulfills our fourth criterion.

Summarizing the above considerations in the form of a design lens, we arrive at the "lens of skill atoms" (box 2). This lens effectively allows viewing any interactive system from a game design perspective – as if it were a game. It firmly focuses the designer's attention on

the user's goals and provides a conceptual model of a systemic whole that serves as the starting point for deeper evaluation and ideation, using further design lenses that focus on either the systemic whole or individual components. E.g., one could use the lenses of "balance," "flow," or "interest curve" to evaluate and evolve the system as a whole, or use lenses like "goals," "meaningful choice" or "visible progress" to evaluate and improve single components like goals, actions, or feedback [18]. All of these do not delimit designers to the mere application of existing design patterns. Rather, they enable designers to view the system and its components 'gamefully', asking the kind of design questions game designers would ask.

### Outlook

The above model was tested and iteratively refined in 14 design projects and workshops across various domains and non-game designer audiences (n=104) (see box 3 for an illustration from a recent workshop). It yielded promising results, but also came with several limitations. First, it focuses almost exclusively on affording experiences of competence, although there are more motivations and pleasurable experiences characteristic to games [11,16]. This limitation is not inherent, however: Skill atoms arguably tease out the fundamental game-like structure within a given system or activity that can then be 'tuned' towards any kind of experience [11] by bringing the experience in via design lenses or replacing "challenge" as the organizing principle with that experience. More problematic is that the model focuses exclusively on the gameful *structuring* of a system, ignoring how to afford a playful *framing* of the user's engagement with it [6]. We are currently exploring the use of "play design lenses" and "curiosity atoms" as a solution to this problem.

The task was to ideate a gameful system that would support new employees to quickly get to know and build social ties with their co-workers. Analysis suggested that this was indeed a personal need for new entrants, and that a central **skill** missing in certain user groups was to actively pay attention to their co-workers beyond immediate project needs. This translates into the central **challenge** of the design to notice things that had recently changed about one's co-workers, prompting two user **actions**: Putting in your own recent changes (e.g. "Got a new hair cut two days ago"), and answering every morning a change question with a multiple choice set of co-worker names and avatars (e.g. "Who got a hair cut two days ago?"). Change statements/questions and avatars thus constitute the **tokens**. As short-term **feedback**, guesser and author of a change both get a notification upon a correct guess; long-term, guessers can see percentage bars next to each co-worker's avatar indicating how well they notice that person, implicitly indicating whom they did not yet know very well. One **goal** was to be the "best noticer", i.e. having the highest percentage of correct guesses in a weekly resetting challenge, according to the **rules**.

**Box 3.** An illustration of using a skill atom for design ideation.

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# Like this: How game elements in social media and collaboration are changing the flow of information.

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**Abstract**

Game systems have been implementing a range of features as part of their design to encourage engagement and interaction from users. With the growth of online social networking services (OSNS), it has been observed through indirectly studying behaviors that users have repurposed features of OSN—such as statistics and user profiles—in a game-like fashion to drive the flow of information. This paper brings to discussion (a) how the utilization of these elements and (b) how the types of elements in relation to the type of OSNS influence the flow of information, and (c) what that potentially means for the future development of OSNS.

**Author Keywords**

Flow of information, game systems, cultures of exchange, gamification, gamefulness

**ACM Classification Keywords**

H.3.5 [Online Information Services]: Web-based services; H.4.m [Communications Applications]: Miscellaneous; H.5.3 [Group and Organization Interfaces] Web-based interaction

**General Terms**

Design

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## 1. Introduction

"Data is the new soil" [11] of the social ecosystem that influences the creation, exchange and distribution of content – what we define as the *flow of information*. With everyone vying for interest in their social capital [2] [12], users are finding ways to utilize features of online social networking systems (OSNS) in gameful ways to influence the flow of information. OSNS such as Twitter, Google+ and Facebook are transforming how we contribute to it, through various design features appealing to different types of users. These user types are not only engaging with these features in different ways, they are also repurposing them in what could be considered a type of "excorporation" [9] that is influencing the flow and distribution of information. This often elicits an emotional reaction [10], encouraging user engagement and thus, the flow of information restarts.

So far there is miniscule research on aspects of this phenomenon with OSNS introducing these game like elements in various ways to their services, users' interaction varies between networks as discussed by boyd, Cha and Medler (see [3], [5] and [12]).

With this paper, we want to activate a discussion about the role of game elements in two OSNS–Twitter and Facebook–and how these game elements have changed the flow of information within an exemplary service. We are also interested in how participants of these OSNS are turning the service into a gameful activity for themselves. We will achieve this by comparing two game elements, user profiles and statistics, briefly investigating the way users' utilize these elements and how this affects the flow of information.

## 2. Game Elements

Game elements can be drawn from a range of different levels [8] such as game interface design patterns, mechanics, principles and models. Elements from these dimensions include badges, leader boards, goals, play testing, avatars and profiles encouraging competition and self expression between players. One aspect that both online gaming and OSNS have in common is the sheer mass of participants. Just like there are different types of players in games, there are different types of OSNS users.

We hypothesize that Bartle's research [1] in classifying the characteristics of players of multiplayer online games and Yee's empirical study of Massively Multiplayer Online Role Playing Games (MMORPGs) [15] can be applied to users of OSNS. We believe this mainly because both online games and social networks seem to exhibit similar types of user interaction models both amongst each other, but also when interacting with the OSNS rule system. It should be cautioned that while Bartle's player types–consisting of four characters, killers, achievers, socializers, and explorers–were devised on the basis of gamers, they are not fully transferrable to users of OSNS, as socio-technical contexts differ. That being said, the fundamentals of Bartle's four player types can be extrapolated, and be applied to the context of social networking (Table 1) and have been applied to other online media constructs, for example gameful website navigation [14]. There are clear parallels between game-based and gameful characterizations; minimally, such a mapping can become a potential starting point of a discussion seeking to understand why and how users' utilize features of OSNS in a gameful way, and how this affects the flow of information therein.

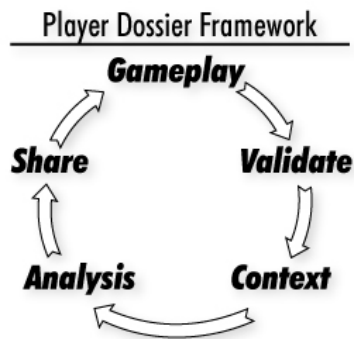
Table 1		
Player Type	Definition	Assumed influence on the flow of information in OSNS
Killers	Focused on competition, winning and rank.	Killers types care most about competing with others striving to impact the OSNS and its ecology—not only destructively, though. Do I have more followers and retweets than my friend, or this competing colleague? (How) can I influence the information culture of a certain OSNS? These types of question drive our assumed OSNS killer character to push out information and attract like-minded users creating a self-fulfilling prophecy [13] rather than delegating the flow of information into select niches.
Socializers	Focused on socializing and developing networks	Members of this characterization are possibly the most influential in driving and increasing the flow of information to wider networks. Their focus is on interacting [14] with many people as possible rather than personal goals. Socializers can also act as a point of cultural exchange, directing the flow of information towards particular areas of interest based on their own social networks and topics discussed therein, thereby delivering targeted, “filtered”, information to users.
Achievers	Focused on status, goals and completion.	Achievers seek to collect points, level up, or other types of quantifiable measurements of “succeeding” in a OSNS. While they are self-motivated, aiming to achieve status, these users potentially push information towards more defined areas of interest to gain something more intrinsic from it such an increased rank within the community via posting, retweets, followers and so forth.
Explorers	Focused on exploring and discovering	Explorers want to discover and understand [14] an OSNS. Users in this category may not have as much influence on the flow of information as the other player types, however they possess the most rich and concentrated of the information available having taken a backseat and exploring what a flow such as the Twitter stream offers, rather than contributing to it.

317  
TWEETS

516  
FOLLOWING

203  
FOLLOWERS

**Figure 1.** Twitter statistics



**Figure 2.** Player dossier framework taken from Medler [12]

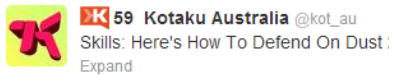
**Table 1.** Bartle's player types in mapped to social networking user types

Given the diversity of user types, different types of features appeal to different users' and affect the flow of information in different ways with some elements such as statistics appealing to one user type and profiles and avatars to the next. The variety of users may provide a diverse range of implicit or explicit gameful design options for developers of OSNS to consider when creating services to target a particular user type(s) to drive the flow of information in a certain way.

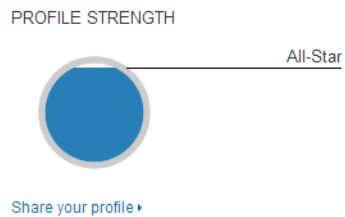
For example, statistics within games work as an indicator of a number of gameplay aspects - progress, experience, achievements and rewards. They belong into the game design and interface category, i.e. the concrete notion of game elements [8], and will likely appeal to more of the "achiever" playing type, but also

will attract "killers", because these aspects invite competition. Twitter is an OSNS that utilizes statistics via a user's tweets, followers and followees (Figure 1) operating as part of what Medler describes as a "player dossier framework" - "identifying how gameplay is transformed into data that can be analyzed and shared" [12] (Figure 2). Due to the simplicity of Twitter's features, users' can min-max their participation quite easily; they may maximize what they desire, character-wise, by increasing their tweets, utilizing hashtags and receiving mentions and retweets. Since 2009, social media analytics company Klout has been offering to measure this kind of influence using the Klout score (Figure 3). A user's score is indicative of the user's network size, her degree of participation in an OSNS and her impact upon the greater community. This score





**Figure 3.** Example of a Klout score as indicated by the number "59"



**Figure 4.** LinkedIn user profile completion indicator



**Figure 5.** GameSpot users' profile

may encourage an OSNS achiever to participate more in order to gain a better Klout rank, and this way, influences the flow of information.

Unlike to statistics, OSNS profiles are potentially more appealing to our assumed OSNS explorer and socializer mappings. We define a OSNS profile as follows: *a users identity featuring personalized information about themselves*. Whether a user "plays" or "uses" [8] an OSNS, profiles are a core element to building a social networking site [6]. OSNS operators typically require users to create an online identity, filling it with facts and figures as a means to display their self-perception, or an alternate version [3] of themselves as part of their an online identity. Designers of OSNS' such as LinkedIn and GameSpot have implemented reward systems to encourage users to contribute more information to their profiles (Figures 4 and 5) and as a result of this "gamified design", LinkedIn saw a rise in profile completions [7].

Let us look at another aspect: the profile of a Facebook user reveals as much or as little of what a user likes/do not like, where they have been and what they have been up too - much like character biographies in games. Profiles can be thought of as a hub that initiates a flow of information from various resource nodes such as page "likes", friends, places of employment and so forth, to allow users' to "traverse the network graph" [3]. When a user "likes" a page, this action is represented with a type of "badge" on a user's profile, indicating to their network that they find something positive, interesting, worthy of support, and, generally speaking, mentionable. Groups are utilizing this to request those who have "liked" their page to suggest it to friends or to "share" it as part of a "gamified

challenge" [16]. These types of challenges result in a sociographical reward to further the flow of information about a product or service, and becomes subject to raising and sustaining social capital, whereas the initiating Facebook group (or brand, or band) manages that the user helps market it.

### 3. Discussion and Conclusion

In this contribution, we have maintained the angle that "gamifying" or "gamification" does not have to be about making an ordinary task such as collaboration an explicit "game" and rewarding the user with badges and achievements. Rather, incorporating game elements as part of a OSNS to facilitate the flow of information than to drive it. If empirically studied, we believe that a lot can be learned from how game-like elements are used in OSNS', and how this influences the flow of information. The ways users excoreporate features may activate discussion and could offer insights into designing and developing engaging services to encourage productivity and product interest for not only for personal accounts but also in business and commercial settings driving the flow of information.

A gameful approach to the flow of information can be important to all users of an OSNS because it has the potential to change the way information is created, exchanged and distributed. Businesses could adopt a similar approach to drive information to a product and help spike interest with their company, using gameful principles. Whilst these examples have been of an outward influence - on the internet, there is potential for this kind of adaptation to be used as part of an intranet to encourage collaboration within organizations and educational institutions - rewarding users' for "competence rather than compliance" [4].

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# Gamification in Business: Designing Motivating Solutions to Problem Situations

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## Abstract

Designing a gamified solution to a difficult business problem requires informed application of game design patterns, with an understanding of the unique corporate environment. We present a framework that can be applied in other gamified endeavors. Our approach includes a systems-oriented process describing environmental conditions affecting intrinsic motivation and game design patterns. Objectives considered the 16 basic human desires [11], along with the human need for autonomy, competence, and relatedness [4].

## Author Keywords

Gamification; motivative interaction design; game design patterns; collaborative engagement; problem solving

## 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

Our research introduces a *gamification* design model aimed at improving project staffing in business. Goals were not focused on delivering “fun”, rather to offer a positive and engaging experience deemed interesting and important to employees. Approaches addressing the primary research question, “*Do applied game elements improve a problem situation?*” eventually led to founding of a gamification process and motivation framework.

Once the business problem and common language were established, the project followed “game” design advice of Schell [15]. Numerous brainstorming sessions were

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hosted where we “documented everything we could think of” (p. 71); game design principles alone were insufficient. In games, players are generally compelled to play for intrinsic reasons. In the corporate context, additional considerations were necessary to give a positive, connected experience beyond just building a game and hoping people would play. Object-oriented systems development processes were customized to include contextual elements and psychological needs of employees. A gamified use case and class diagram provided structure to align game design patterns with operational conditions and employee motivation factors. This paper highlights key milestones along our path to gamification design.

### **Theoretical Foundations**

Our evolving gamification design model emerged from a study of corporate wiki collaboration [7]. Two intrinsic motivation theories guided an understanding of psychological aspects associated with participation behavior. Specifically, the theory of 16 basic desires [11] was employed to understand innate human desires, and the self-determination theory [4] to understand internally regulated action along a spectrum of extrinsic motivation. The motivation theory along with foundations for collaborative engagement in business, are introduced below.

#### *Theory of 16 Basic Desires*

The theory of 16 basic desires [11], a psychological content theory of motivation, provides utility for analyzing and predicting human behavior. Reiss’ model, derived from Maslow’s [10] theory of human needs, and William James’ [9] theory of internal desires, describes basic desires for: Order, Power, Independence, Curiosity, Acceptance, Saving, Idealism,

Honor, Social Contact, Family, Status, Vengeance, Romance, Eating, Physical Activity, and Tranquility. While basic desires are largely genetic in nature, the manner in which humans act upon these desires is shaped by the intensity of innate desire, cultural influences, and individual experiences. Intensity of each individual’s desires falls on a spectrum, assessed using the Reiss Profile of Fundamental Goals and Motivational Sensitivities.

#### *Self-Determination Theory*

The self-determination theory (SDT) [4] framed a motivation model for understanding what and how human behavior is initiated and regulated [4,13,14]. The SDT recognizes social and environmental conditions that affect personal volition and engagement in activities. The SDT combines both content (psychological needs) and process (cognition) motivation describing needs for autonomy, competence, and relatedness. An individual’s motivation for action is defined along a spectrum of amotivation, extrinsic motivation, and intrinsic motivation measured by perceived locus of causality (external to internal regulation) [6]. Needs for autonomy and competence allow the “prediction of the social circumstances and task characteristics that enhance versus diminish intrinsic motivation” [3 p. 233].

#### *Collaborative Engagement Foundations*

In a study of wiki collaboration in the workplace, Gears [7] employed both the theory of 16 basic desires [11], and the SDT [4], to understand factors motivating employee participation behaviors. Strong basic desires for power, independence, idealism, and curiosity were found to prompt engagement behaviors such as adding,

changing, and commenting on content. Contextual influences were associated with participation and non-participation wiki behavior along the SDT continuum ranging from external control to internal autonomy. Deployed in a grassroots and egalitarian manner, employees participated in the wiki when they perceived value, were not concerned about malicious wiki behavior, found time to participate, and for some, received support from their manager.

### Approach

Our multidisciplinary team began with *analysis of candidate business problems*. Several challenged areas were identified and evaluated for risk, benefit, scope, impact, and feasibility. Following numerous interviews, focus group discussions, analysis, and design team collaborations, a business situation was targeted for *gamification*.

Our understanding of *gamification* followed Deterding, Dixon, Khaled, and Nacke [5], defined as a process that incorporates game design elements in non-game contexts to improve the user experience, and in this research, improve a challenging situation. The consequence of gamification was not a complete game, rather purposefully deployed game design patterns [1] in conjunction with psychological motivation theory, and environmental conditions. Conversations about design elements (independent building blocks) centered on game design patterns used in gameplay.

### Systems Analysis and Design

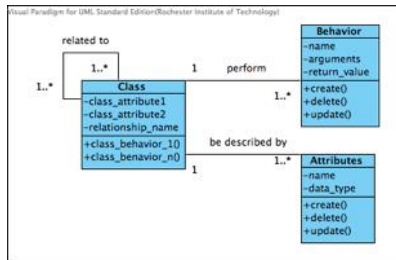
An object-oriented systems analysis and design process was instrumental in guiding the project. Use cases, class diagrams, and process models were developed to

gain understanding of the domain, define requirements, and design gameful interactions.

A “gamified” essential use case [2] (refer to Table 1) specified goals, objectives, beneficiaries, business rules, behavioral norms, preconditions, actors, and system interactions. The use case provided a canvas to articulate business rules that could not be broken; personal, social, and corporate norms that could be challenged; and conditions necessary for a successful outcome.

GAMIFICATION USE CASE
<b>Goals:</b> Primary purpose(s) of the experience. 1) Improve the problem situation, 2) Stimulate interest, increase communication, reduce frustration, 3) Create a gamified environment that would be taken seriously by employees.
<b>Objectives:</b> Derivable accomplishments offered in the experience. 1) Freedom and motivation to provide input into the process (autonomy) [4], 2) Feel a sense of accomplishment towards the business goal (competence) [4], 3) Feel a shared sense of purpose (relatedness) [4], 4) Allow opportunity to participate without negatively impacting employees.
<b>Business Rules:</b> Constraints or policy that <b>cannot</b> be broken. 1) Managers make the final disposition.
<b>Behavioral Norms:</b> Personal, social, and corporate norms that <b>can</b> be challenged. 1) Content ownership norm – ownership of corporate documentation belongs to the author [7].
<b>Preconditions:</b> Circumstances the domain that must be true before interactions to enable positive outcome. 1) Participation is not required [7]. 2) Participation should NOT be directly related to pay and performance. 3) Non-participants are NOT negatively impacted. 4) Participants recognize the value of the experience [7]. 5) Participants are given time to participate [7]. 6) Participants are not concerned about misconduct or abuse by others [7]. 7) The established environment is egalitarian (open, democratic, free of hierarchy and dictatorial control, etc.) [7]. 8) Managers support participation [7].
<b>Actors:</b> Performers involved in the problem domain. 1) Project Contributor 2) Project Manager
<b>Normal Course of Action:</b> Gameful interactions specified in the RMI Framework. Integrating game design patterns [1] with intrinsic desires [11].

**Table 1.** Gamified Use Case



**Figure 2.** Class Diagram Meta-model

The class diagram in Figure 1 depicts domain objects, their attributes, behaviors, and relationships to other objects. Business rules were identified in the analysis, along with actor responsibilities. For example, “A Project Manager assigns Resources to many projects.”

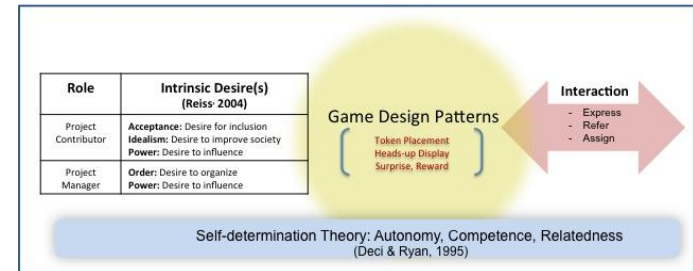
Objectives considered the human need for autonomy, competence, and relatedness [4]. Behavioral Norms and Preconditions considered domain settings associated with participation behaviors in open corporate wikis [6,7]. It is conceivable that the preconditions could apply in any gamified design.

Interactions in the Normal Course of Action considered intrinsic desires of actors described by Reiss [11] in selecting game design patterns.

Over time, the class diagram became a de facto game board where employees were referred to as players, responsibilities as actions, and the problem domain as a playing field. An intentional detour from systems thinking evoked a shift in mindset from business to game play, balancing creative thinking with corporate reality.

#### Framework for Gamified Design

A Role-Motivation-Interaction Framework (RMI) was introduced to facilitate the architecting of gameful interactions (refer to Figure 1). Designers projected the “basic desires” of employee described by Reiss [11]. This recognition, along with acknowledgement of employee/player psychological need for autonomy, competence, and relatedness [4,12] aided in the selection and customization of game design patterns [1] (specified in the Use Case Normal Course of Action). Consideration of intrinsic desires and extrinsic motivators created opportunity to design for meaningful choice. “Meaningful choice” in this context intends to stimulate a sense of employee inclusion and perceived benefit to the situation, without negatively affecting pay, performance, and relationships.



**Figure 1.** Role-Motivation-Interaction Framework

Token Placement (refer to table 2) was selected to satisfied the desire for *Acceptance*, *Idealism* and *Power* by Project Contributors. Indicating *n* number of *interest* tokens, employees satisfy basic desires for inclusion (Acceptance), a sense of fairness and to promote ideas (Idealism), and to pursue challenges (Power). Participation is not required preserving autonomy when employees identify with an initiative to express interest.

Interaction	Role: Basic Desire	Game Design Pattern
Express interest	Contributor: Acceptance, Idealism, Power Manager: Order, Power	<b>Token Placement</b> -Distribute fixed number of tokens among interest areas. <b>Surprise or Award</b> -Complimentary unplanned action.
<b>Autonomy:</b> Employees choose to express interest if they identify with a project initiative; participation not required. <b>Competence:</b> Provides employees with the opportunity to express interest in projects that exercise and enhance skills (token placement); recognition for something valued (surprise or award). <b>Relatedness:</b> Enhances feelings of belonging in the organization; involved in matters that affect employees and the business. <b>SELF DETERMINATION</b>		

**Table 2:** Interaction Example

Employees feel a sense of competence through manipulation of the tool and knowledge in a project area, and relatedness through community collaboration

and inclusion. A surprise or reward for expression of interest(s) supports the desire for competence, mastery, and acceptance.

### Conclusion

This research proposed a gamified system development process and role-motivation-interaction framework designed to improve a problem situation in business. The 16 basic human desires [11], along with the human need for autonomy, competence, and relatedness [4] anchored the framework influenced by corporate dynamics. Game design patterns [1] were customized to offer employees a positive and engaging experience.

### Acknowledgements

We would like to thank employees who contributed their time and interest, critical to understanding of the playing field. A special thank you extended to Dr. Elizabeth Lawley for knowledge sharing, support, and encouragement.

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# Gamification: Moving from ‘Addition’ to ‘Creation’

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**Abstract**

This paper proposes an approach to gamification that moves away from thinking of gamification as an ‘additive’ process and towards thinking of it as a ‘holistic’ process. To do so, this paper proposes a definition that treats gamification as a complete system in itself, positioning it as *the process of adding an actionable layer of context*.

**Author Keywords**

gamification; game design; engagement

**ACM Classification Keywords**

K.8.0 [Personal Computing]: Games; J.4 [Social and Behavioral Sciences]: Psychology, Sociology

**General Terms**

Design, Theory

**Introduction**

From nearly the moment gamification entered the spotlight in 2012 it became infamous in both industry and academic communities alike. Its strong positioning in these communities has encouraged and stimulated hearty discussion concerning what gamification is and what gamification can (or cannot) accomplish. This paper explores the state these discussions have left gamification in and proposes an approach to



gamification that can overcome many of its perceived limitations.

### **Gamification**

Many academics and industry professionals have addressed gamification, and have taken a stab at defining it. Many of these definitions, although different in opinions on usefulness, are found to have a unifying theme. Take into consideration the following definitions:

Sebastian Deterding, Rilla Khaled, Lennart E. Nacke, and Dan Dixon during CHI 2011 tackled the challenge of defining gamification by proposing it be defined as: “the use of game design elements in non-game contexts” [3]. Gabe Zichermann, a voice more on the industry side of the discussion, defines gamification as “[t]he process of game-thinking and game mechanics to engage users and solve problems” [6]. Similar to these lines of thought, other players like Michael Wu and Joey Lee and Jessica Hammer define gamification as “the use of game attributes to drive game-like player behavior in a non-game context” [5] and “the use of game mechanics, dynamics, and frameworks to promote desired behaviors” [4].

What all of these definitions (and many more similar to them not included in this paper) have in common is the focus on the use of elements (mechanics, attributes, etc.) with a basis or foundation in gaming (game design) in existing environments. In many cases, this definition is extended to include the purpose for the use of these elements: to change behavior.

On a pure industry side, gamification companies use definitions similar to the ones mentioned above, yet

with more of a focus on the purpose of use. Badgeville views gamification as “a modern business strategy that uses proven techniques from social gaming to measure and influence behavior” [1]. Bunchball is similar, yet focuses even more on the end result, the change in behavior: “The overall goal of gamification is to engage people to participate – to share and interact in some activity or community by offering a compelling, dynamic, and sustained gamification experience, and which can be used to accomplish a variety of business goals” [2].

Once again, the focus of the definition is on the transplantation of *game* mechanics into different situations and environments to illicit a change in user behavior. The word ‘game’ appears in almost all definitions – academic and industry. But what is the word doing in such definition? On the surface it appears to have a natural fit as gamification is derived from *game* design. But what does it mean? What constitutes a ‘game’ mechanic? Is feedback a game mechanic? Is competition? I would challenge that the word ‘game’ has no more a place in a definition for gamification than it would in game design itself. It alludes to a fact that somehow gamification uses self-standing pre-existing entities (game entities) in its design process, which I argue is not the case.

### **Challenge**

By considering the commonalities between gamification and game design, many current definitions for gamification begin to appear lacking in depth. It becomes harder to view gamification as the *addition* of solitary, stand-alone ‘game mechanics’ or ‘game elements’ *into* an existing environment. One would be hard pressed to find a large quantity of definitions

defining game design as such (e.g. game design as the use of game mechanics). Therefore, I would argue that gamification appears more as a process of *merging* a deliberate arrangement of mechanics *with* an existing environment.

Although the difference in phrasing may be viewed as slight to some, it is anything but when considering the practical application of gamification. The difference between adding and designing is incredibly dramatic – especially for expectation management (of both clients and consumers). To put it another way, the danger of many current definitions is that they lend themselves to viewing gamification as a pre-package solution as opposed to a process that needs to be designed.

For example: Competition does increase engagement. Thus a leaderboard (a traditional example of gamification) can be a practical mechanic to implement in many situations. But what about the situations where the main goal of the environment or experience is to increase cooperation? Now, even a situation which may successfully support a leaderboard (in theory) may not have the end result of increased engagement as the mechanic isn't the right mechanic for the environment.

### **Definition**

Taking this discussion into consideration, I propose to redefine gamification. Gamification can be seen as *the process of adding an actionable layer of context*. Gamification is the addition of a layer of structure (in

games frequently known as goals and rules), a *context*, in which the user can interact with, or in other words, *take action*. A definition such as this strengthens the approach, making it less about *addition* (adding pre-existing mechanics into the existing environment) and more about *creation* (developing a new environment from the combination of mechanics and the existing environment). By approaching gamification as such, it becomes a more versatile concept.

### **Conclusion**

Ultimately, it is unlikely that a true consensus will be reached concerning the definition of the term gamification. From an industry perspective, reaching unanimity on the term is not crucial to the advancement of the development of the technology. What is paramount to achieving innovation in the field, as discussed in this paper, is the reconnection of gamification to its origins in game design.

If we move away from the thought that gamification is successful simply as the addition of stand-alone game mechanics (like leaderboards or achievements) to existing situations to increase engagement, we can find new and perhaps more successful methods outside of these existing stereotypes. By designing gamification experiences as though designing a game – considering the dynamics of the relationships between all parts of the experiences – designers can create an engaging environment that provides a complete experience using elements conducive to the pre-existing environment.

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# Applications as Stories

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**Abstract**

Narrative engages people both emotionally and intellectually, shaping the way we perceive, interpret, and interact with the world. Our group is putting that power to new uses by experimenting with applications that are also stories: applications that use the principles of narrative to grab and keep people's attention, that guide novice users through the process of becoming experts, and that provide experiences that are as emotional and reflective as they are efficient and powerful.

**Author Keywords**

Narrative; Stories; Application Design; Progressive Disclosure; Motivation; Learning

**ACM Classification Keywords**

H.5.2 [Information Interfaces and Presentation]: User Interfaces—Graphical user interfaces

**Introduction**

Stories are fundamental to the way we perceive and construct meaning. By linking experiences, contexts, and emotions into chains of cause and effect – into stories – we build an understanding of our world, ourselves, and each other. Though the power of story has been studied extensively by researchers in fields such as rhetoric [11], narrative psychology [13], and education [5], further research is needed regarding the role narrative might play in human-computer interaction.

At present, games are one of the few types of computer applications that use narrative extensively. Indeed, it can be argued that any application with a strong narrative component is by definition a type of game, or at least that it has been “gamified”. Functionally, the role of story in a game is to engage the player through fantasy and suspense [9]. Story overlays the bare mechanics of a game with meaning and significance.

We want to explore the potential of story-driven gamification and determine whether it is possible to apply the strengths of narrative to other kinds of applications. Our first step is to uncover and harness the elements that make a game narrative compelling: player identification with an avatar or protagonist, dramatic pacing, context, mystery, causality, exploration, and the player's role in shaping and directing the story [12][7].

### **Applying Narrative to Applications**

There are several ways in which it might be beneficial to structure and present applications as stories. In our work, we intend to apply narrative concepts to help guide people from novice to expert use. Specifically, we are exploring the narrative concepts of *non-linear timelines*, *suspense*, and *subjective treatment*. We are also interested in the psychological phenomenon of *emotionally enhanced memory retention*.

#### *Timelines*

An important aspect of any narrative is the progression of the story, or *timeline*. Stories can progress linearly so that events occur in the same order that they occur through time, but many compelling narratives make use of non-linear timelines that involve flashbacks, multiple storylines, and varying perspectives. In our work, we explore the use of non-linear timelines to guide the experience such that people develop new skills in an order determined by their abilities, choices, and interests.

Because stories are typically built on a principle of progressive disclosure, a story-based application might naturally guide a user through the application's features

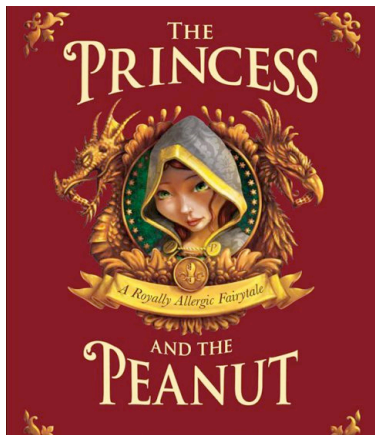
in a way that makes it easier for the user to focus on essential features, preventing them from feeling overwhelmed by the application's full complexity. By sequencing interactions, from simple to complex, novices could be guided through a learning process by which they gradually attain mastery of a complex application [2][8]. Most successful games already employ these strategies, using the structure of a story to introduce new interaction techniques sequentially while providing positive feedback on the player's increasing mastery via their role in the narrative.

#### *Suspense*

One of the major advantages of building an application as a narrative is that a good story can be motivating. The desire to uncover what has happened (for example, in a mystery) or what will happen next (for example, in an adventure story) routinely keeps people turning pages or playing games late into the night. These two types of suspense are also known as the hermeneutic code and proairetic code [10]. The motivational effects of suspense could be used to encourage people to explore a technology's capabilities more thoroughly or to continue using an application more consistently over time.

#### *Fantasy and Subjective Treatment*

Many stories are presented from the point of view of one or more characters. This is called *subjective treatment*. In identifying with a character, a person may be drawn into a story. They begin to care about the world the character inhabits and the obstacles that character faces. This may motivate the player to overcome difficult challenges and to pursue complex or time-consuming goals.



**Figure 1.** The application we are creating will have a story based on that of *The Princess and the Peanut*.

In games, a player often experiences the game world from the perspective of an avatar that they control. By linking attributes of the character to attributes of the player we hope to increase player identification with their avatar and, by proxy, the application. Game elements, such as the development and 'leveling up' of the avatar, may further increase a player's emotional tie to their avatar [4].

#### *Emotion and Memory*

A narrative framework can be used to present new information in a form that is concrete, emotionally-charged, and contextually motivated. This may accelerate learning, as new information is easier to understand and remember when it is made concrete and emotional [1][3]. If a narrative can tie the new information to a player's own goals and identity, that information might be learned even more easily [6].

#### **Our Project**

To test and refine our ideas about narrative, we are working with a mobile app development company, Visdatec Inc., to enhance their augmented reality smartphone application MyFoodFacts<sup>1</sup>, by providing an interactive story to encourage people to use and improve their skill with the application. MyFoodFacts is an iPhone app which scans barcodes on food packaging and identifies products that contain dangerous allergens. By implementing an application that designed around a narrative, we will gain a better understanding of how to design narrative-driven applications. We will also evaluate the overall strengths and limitations of such an approach through testing of our prototype. To provide this narrative, we are also working with the author of the children's book *The*

*Princess and the Peanut* (Figure 1) and adapting the story for our mobile application.

The application will use non-linear, player-driven timelines to present players with the information they need, when they need it. Mysteries and cliffhangers will be designed to keep players interested in exploring and using the application. The plot of the game will map the most important features and instructional content to the most emotional, shocking, and/or humorous events in the story, so as to make the most important content also the most memorable. Avatars in the game will reflect the players who control them, with an avatar's special powers and limitations relating to the player's own allergies.

We are using an iterative design process to develop our game, and running user studies at each stage to gauge the effectiveness of our techniques and of our narrative. We will gather qualitative data about our prototypes through a combination of observation, interviews, group discussions, and questionnaires. We will also gather quantitative data about whether the use of narrative affects motivation and the long-term retention of new interaction skills.

#### **Challenges and Open Questions**

Although the potential benefits of incorporating narrative into computer applications are considerable, there are also some limitations and uncertainties that need to be considered.

There may be a tradeoff between efficiency and the inclusion of narrative elements, as a narrative might require time to convey. That tradeoff may make narrative-based applications less beneficial for applications that people approach with a highly specific

<sup>1</sup> <http://www.myfoodfacts.com/>, Visdatec Inc.

goal or activity in mind. One of the great advantages of narrative is that it can provide the user with direction and motivation; if a person has already decided on a specific, concrete plan of action, our approach may, in some cases, be perceived to interfere with their goals. As a result, story-based design may be more appropriate for software that users may find daunting complex or unfamiliar or for software aimed at those who have a nebulous goal – such as self-improvement or safety – who may benefit from assistance in creating a successful plan of action and sticking to it.

It is difficult to create an engaging narrative that people will be interested in. It is even more difficult when the goal of the narrative is not just to entertain, but also to help people accomplish their goals. Methods need to be developed for capturing and reflecting a person's aspirations, and channeling those aspirations into motivation, learning, and engagement. While interactive narratives and player-created avatars may help a story to be more universally appealing without becoming hopelessly generic, such methods may not be sufficient in themselves. Applications, like games, must balance guidance with autonomy.

### **Acknowledgements**

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# Gamification as a Methodology: A Multi-Part Development Process

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**Abstract**

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

**Author Keywords**

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

**ACM Classification Keywords**

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

**Introduction**

In this paper we propose that daily commute can be thought of as a game and that gamification as proposed by Deterding et al [4] can be applied during the concept testing, design and simulation phases of a project. The work is drawn from the I-GEAR project which is on-going in the central European country and city of Luxembourg which has a population of around 90,000 people with 120,000 commuters coming daily from the surrounding countries of France, Germany and



Belgium [8]. Traffic problems arise on the key arterial roads between the city and each country with the result that Luxembourg ranked the 10th most congested city in Europe [9]. The problem is further compounded by the high car ownership rate in Luxembourg (the highest in the E.U. with 678 cars / 1000 inhabitants, totaling a 347261 cars in early 2010; as compared to the U.S. with 821 / 1000) [3].

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

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

### **Background and Challenges**

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

related topics, I-GEAR focuses more heavily on how gamification can be employed to reduce congestion.

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

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

From a human factors perspective, introducing a pervasive game into a car while a person is driving could have a major impact on safety and may also jeopardize trust [5]. As a result there is a need to develop user interfaces that require minimal interaction by the driver and hence minimal attention. By extending the gaming context and the commuters' participation within it even with minimal or no interaction with the application the commuter still feels

being part of the game. Mobile applications such as FourSquare already do this to some extent in that they maintain the users' status and participation within the game without the need for constant active participation, however points and status expire if the player does not undertake actions regularly. We address human-factors issues as a critical part of our methodology: requirements elicitation and thorough user testing in a lab environment helps reducing any risk to a minimal level. As a final step, a series of controlled road tests will provide final validation or minor changes to be implement before release.

### **Gamification of Mobility**

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

### **Approaches Used in Project Driver Diaries**

The driver diaries will collect a comprehensive picture of the mobility behaviour of road traffic participants in Luxembourg and identify motivations, behaviours and constraints of drivers. A range of data collection techniques will be used: **a website** with the project description and an online questionnaire about demographic information and basic mobility behaviours and routines; **a mobile app** that collects GPS and behavioural data about the participants' mobility for the duration of two weeks, mainly around their commute to work and back home.

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

### **Simulator**

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

## Conclusions

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

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# Design Principles for the Conceptualization of Games for Health Behavior Change

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**Abstract**

This paper presents a list of principles that could be used to conceptualize games for behavior change. These principles are derived from lessons learned after teaching two design-centered courses around Gaming and Narrative Technologies for Health Behavior Change. Course sessions were designed to create many rapid prototypes based on specific topics from behavior change theory coupled with iterative human-centered and games design techniques. The design task was composed of two broad goals: 1) designing efficacious technologies, with an emphasis on short-term behavior change and 2) using metaphors, dramatic arcs and game dynamics as vehicles for increased engagement and long-term sustained change. Some example prototypes resulting from this design approach are presented.

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**Keywords**

gaming, serious games, gamification, drama therapy, narrative therapy, narratives, behavior change, identity, personalization

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

**General Terms**

Design, Experimentation, Human Factors

**Introduction**

Persuasive technologies such as phone apps or serious games share common goals of creating an engaging and efficacious experience towards behavior change. Either by modifying or adapting current interventions or by designing new applications based on behavior change theory, these techniques have the potential to reach millions of people who can benefit from a pervasive medium. Most designers and HCI professionals deal on regular basis with apps focussed mostly on usability and engagement. In parallel, many health and biomed researchers focus mostly on high efficacy. Appropriate usability design may not be sufficient to guarantee long-term engagement - many times needed to gain adequate efficacy levels - however it is a needed condition for initial engagement/adoption. In this paper we present a preliminary list of principles for conceptualization of games for behavior change derived from key lessons learned after teaching two semesters of design-oriented classes, focused on games to improve wellbeing and health.

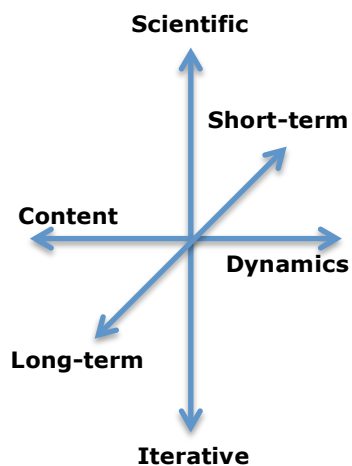
**Previous work**

Several studies have shown that CCBT (Computerized Cognitive Behavioral Therapy) such as MoodGym [12], Beating the Blues [13], among others, compare very well with face-to-face therapy. However, engagement and attrition levels are not acceptable. Indeed, even though 2/3 of depressed patients say they would prefer therapy over drug treatment, only 20% of patients referred for in-person psychotherapy actually start it, and 1/3 of those will drop out [9]. Web-based therapy also has very poor engagement, although apparently for different reasons [8]. Dropouts may be due to (i) lack of commitment by patients (ii) lack of a regular schedule for system use (iii) difficulty or tediousness of using the tools.

Gaming has important characteristics that enhance some cognitive elements such as selective attention [5], which can play an important role to behavior change, as they could help people pay more attention to the main message. Another very important characteristic gaming offers is that it also makes the learning process fun [7], which in turn generate better engagement. Complementary, games also help increase motivation [10] and emotional engagement. [6]

Previous work from Baranoski, et. al. [2] has already shown success using games for health behavior change. Some other gaming examples focused on health are the Personal Investigator [4] leveraging CBT for mental health, and Superbetter.us [17] which leverages real-life social support embedded into a superhero story.

Complementary to the gaming literature, the use of persuasive technology to improve usability and



**Figure 1 – Efficacy + Engagement game design dualities**

engagement for physical activity has been studied with the Ubit system [3], which showed increased exercise levels by improving goal tracking, as well as using metaphors to improve people's engagement. Many other examples around exercise, sleep and stress reduction, such as Nike Plus [14], HearthMath [15] and FitBit [16] seem to indicate that systems associated with a lifestyle change have also higher levels of engagement among their niche adopters. In any case, it is yet to be seen if these technologies are set to be adopted widely.

the use of games to improve engagement we find the Lumosity [18] suite of games used for cognitive training. Cognitive techniques are wrapped around mini games, improving engagement, ensuring improved efficacy over time [11].

### **The challenge: Efficacy + Engagement**

The challenge to merge efficacy and engagement can be dissected into the following design dualities (Figure 1) :

*Scientific vs. Iterative methods:* A gap exists between current clinical intervention development methods based on the scientific method (hypotheses + statistical validation) and iterative gaming and app technology design. Usability design demands an approach that favors exploring ideas based on prompt user feedback through the construction of prototypes. However, it is necessary to keep in mind that the overall goal is to generate efficacious behavioral change that helps overcome health or wellbeing problems. Merging these two approaches is one of the constraints used to design our course sessions.

*Short vs. Long-term focus:* Short vs. long-term change is treated differently from a behavioral perspective. The former demands knowledge around decision-making, emotional elements and personal skills, while the latter demands a deeper understanding of identity and personality. A good way to mix behavior change goals with identity and personalization are narratives and games. These two elements incorporate concrete micro tasks associated with roles and missions that can be translated into smaller behavior change skills, while the metaphors, scenarios and stories support a deeper immersion into new identities.

*Content vs. Dynamics:* When designing interventional technology, efficacy is usually regarded as the main goal. Engagement usually plays a secondary role, which could have a major impact in the adoption of the technology. Commercial apps do look for a more complete user experience, which pays attention to execution as well as engagement and identity details. However, success is usually measured in terms of revenue generation, rather than behavioral metrics. Merging both the content (i.e. narrative) as well as the dynamics of the game into a coherent design that help develop real life skills is yet another design challenge to be considered.

### **Design methodology**

It is important to note that the methodology followed during the conceptualization process in the course is focused on maximizing creativity provided the aforementioned constraints. To help students acquire sensibility around behavioral efficacy, specific behavioral theories are used as the basis of design challenges to promote rapid prototyping in very short sessions. A specialist, who many times has little design

### Behavior Change Topics:

- Intro to Behavior Change
- Intro to Life Stories
- Body-Mind Connection
- Positive Psychology
- Narrative Psychology
- Sports Psychology
- Anxiety, Depression and Cognitive-Behavioral Therapy
- Behavior Change in Society
- Drama Therapy
- Neuroscience Games
- Trauma Narratives
- Improv-based Games
- Communitarian Mental Health Interventions
- Digital Storytelling
- Social Networking for Behavior Change

**Table 1 – Behavior Change and Narrative Topics taught in addition to Gaming Development and Human Centered Design Topics**

experience, presents the theoretical component in a one-hour talk (Table 1). Students can ask questions associated with the topic being presented, and the specialist intervention closes with a brief discussion around the way such behavior change theories can be used to design new technology. Table 1 shows a list of the theoretical topics presented. During the second hour a design challenge is presented to the students. They need to go from problem assessment to a complete game concept with rules, usability scenarios, title and introduction. In many cases we even ask them to create a suggestive billboard to position the idea. Students need to begin by expressing a behavioral problem through its disempowering narrative and find the counteracting empowering narrative, which leverages the behavior change concept taught by the specialist. The students must storyboard both narratives (disempowering and empowering). They must also externalize relevant intangible elements such as the problems themselves and/or the feelings associated with it by converting them into enemies, scenes, obstacles or other gaming elements. Additionally, they need to externalize the skills needed to overcome such problems by portraying them as weapons or as specific game dynamics. At all times, students are encouraged to make sure game progression is elicited and not only end goals, to make sure change is embraced by the users. Finally, students are asked to test each other's games, present their game as if it was being launched on TV or act their games out.

### Prototype examples

Among many others we chose a few examples of the work done in class:

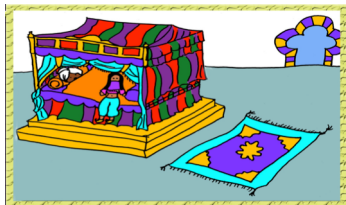
- *Monsters* (Figure 2) – a simple two-player game based on monsters and weapons. Concepts around externalization and empowering metaphors drawn from drama therapy and narrative therapy are used to make “visible” enemies and the weapons to destroy them. These elements have clear links to the problems and skills needed to solve them. For example, a monster representing stress can be seen as a flaming monster, and player 2 can be used to help you blow the torch by teaching you how to breath correctly to calm you down. Figure
- *Scheherazade's World* (Figure 3) – a game that aids in the prevention of suicide by creating a community for at-risk young women to share their stories. The One Thousand and One Nights tells of a king named Shahryar, who would marry a new wife each day and sentence yesterday's wife to death. Unlike previous wives, Scheherazade had a secret weapon to keep her alive. Every night, she would tell the king a story, only to end with a cliffhanger each night. Because the king wanted to know the rest of the story, he would spare her life for another day. Through stories, she was able to survive. This game is based in part on Narrative Therapy and Drama Therapy aspects, as well as Digital Storytelling.
- *Semester Adventure* (Figure 4) – a simple game to reduce stress and improve time management around test exams, where the player follows an adventure as a warrior that needs to reduce stress by gaining powerful tokens by improving his/her time management skills, i.e. fulfilling tasks on time, which are portrayed as enemies to be beaten. This game leverages personality theories based on life stories, which indicates that people assume new roles based on the way they define themselves. A



**Figure 2 – Monsters Game Screen**



Bedroom – Write stories here



Sultan's bedroom – Listen to Scheherazade

**Figure 3 – Scheherazade's World Game Screens**

"warrior" narrative helps people to be active and assertive, while a "victim" makes the person passive and receptive of disgrace.

## Principles for Conceptualization

### ***Understanding disempowering narratives***

- a. *Narratives are lived* - not only used to tell stories about one self. People confront ideas and situations based on the way they portray themselves. This is observed in trauma patients who cannot overcome the generalization of their disempowering narratives. Understanding the narratives new empowering narratives underneath unhealthy behaviors will help design new empowering narratives that change unhealthy habits, eliminate over-generalizations and organize thoughts around the appropriate context.
- b. *Focus on strengths* - Design around behavior change can benefit from understanding people's current strengths, rather than imposing an ideal model for functioning under a specific situation. A key concept that describes the basis for behavior change is what Bandura defines as self-efficacy [1]. In a nutshell, self-efficacy explains using current strengths. However, discovering strengths may demand an exploration not only of thriving experiences, but also difficult experiences, where strengths are used to be resilient and survive emotional or physical pain or disgrace.

### ***Externalizing problems***

- c. *Interpretation and introspection* - Problems are rarely completely understood by users. Designers should strive to provide tools, time spaces and cues to help people interpret problems and introspect. Games with forced pauses and prompts for

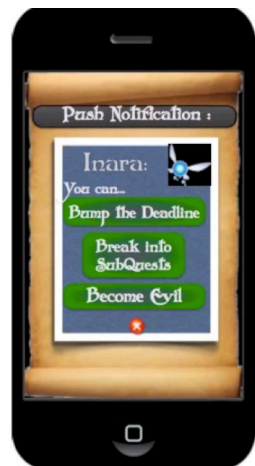
reflection could help increase people's awareness of their own thoughts and further understand their problems. Furthermore, health behavior change games must be designed to be adaptive to changes in problem definition, as the game helps the user discover the root cause of a superficial problem.

- d. *Problems as fictional enemies* - Externalizing problems into concrete game elements (i.e. objects, monsters, obstacles, etc.) help people understand that a problem does not occupy every aspect of their lives. It also helps the user understand the characteristics of the problem, which in turn will help understand the possible solutions around it. Designers should provide users the possibility to externalize their problematic feelings into a concrete game or narrative element that can later be destroyed or controlled. The element representing the problem should have a clean metaphor, for example, stress into an oppressive rock, or depression as glue that impedes you to move, in order to help the user understand the characteristics and affordances of the problem at hand.
- e. *Materializing Skills into weapons* - As well as tangible problems, weapons that represent the skills required to overcome the problem should be materialized. Such tools must carry a clean meaning that is memorable and supports the notion that change is possible via the use of the metaphors associated with such weapons.

### ***Game Dynamics as Interventions***

- f. *Progress as a proxy for self-efficacy* - Eliciting progress should be a key element of game design for behavior change. Many times users need to realize first that "change" is actually possible. If no progression is clearly observed, the sensation of





**Figure 4 – Semester Adventure Game Screen**

inefficacy is perpetuated and therefore, any additional effort to develop skills or change motivations could be futile. The initial game levels must demonstrate to the user that change is possible.

- g. *Social Validation* – Sharing and celebrating with others helps assimilate the new changing reality. Without social affirmation around change, progress may seem part of our imagination. Designers should use social affirmation to promote self-efficacy. Using social influence could be used as a vehicle to get some concrete change, but it runs the risk to leave the user believing that they were imposed a new reality by others and therefore reducing gains in self-efficacy, which ultimately drives change.

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# Industry Design Case: Introducing Gamification Persona Tool

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## Abstract

In this article, we aim to show our industrial experience of constructing a user centered gamification design framework for productivity software, developed empirically by testing out Game User Research and traditional User Experience Research methods and tools. Moreover, we highlight the benefits and lessons learned of creating Gamification Persona when using it as the main tool in order to gather and keep visible the right users' goals during the gamification process. Therefore, we argue that introducing Gamification Persona tool will facilitate the development of a final product which will better encompass users' goals, rather than simply focusing on their initial engagement with the product. This article is based on valid arguments from our industry experience and design cases of gamifying Microsoft Dynamics Enterprise Resource Planning software.

## Author Keywords

Gamification; Games User Research, User Centered Design; Emotional Design; Gamification Persona; Productivity Software.

## ACM Classification Keywords

Design, Miscellaneous.

## Introduction

Despite the popularity which gamification gained in the digital world, there has not been yet presented a design framework that guides professionals through the gamification design and implementation process from a user centered point of view. Many of the gamification frameworks mostly guide designers towards easy fixes that would rapidly raise user engagement, or modalities to make an application look more appealing and give it the necessary 'eye-candy' gaze that video games have, or ways to keep the users 'hooked' in it [10]. In parallel, we can still notice the misunderstanding gamification fellows have about player user experience, especially player engagement, and what are the game elements which offer fun and sincere enjoyment.

Within this context, we argue for the need of a gamification framework that focuses on users' goals closely intertwined with the business goals. Furthermore, we prove through empirical research and design cases that introducing Gamification Persona as the main tool during the gamification design process is an effective approach for determining and keeping these goals visible throughout the implementation process. This article summarizes valid arguments of extensive empirical research conducted for *Gamification of Productivity Software: A User Centered Design Approach* [6], a master thesis project completed in joint collaboration of IT-University of Copenhagen and Microsoft Development Center from Copenhagen, Denmark.

## The Need to Construct New Tools

Gamification is still a fairly new concept and its implementation demands for a new design process.

First, we analyzed the intent of gamifying, which is to improve in a way or another users' experience by applying game elements into non-game applications. We consider that one of the most important elements from games that provide an extra level of user's satisfaction is the emotional kick that video games are the "emotional drug of choice for the next generation of junkies" as Sykes [9] defines them. The affective interaction facilitated during gameplay creates such a satisfying experience that players build addictions for. Therefore, we decided to investigate the emotional experiences of productivity software that a user would like and that would also improve the outcome of his work. From the start, this study did not try to change work processes or disrupt work efficiency in order to improve emotional state of users, but rather it focused on employees' personal satisfaction when using an application. Therefore, from the designer's role, we took an attempt to create a framework of methods and tools that facilitated the creation of more satisfying user emotional experience and follow Elizabeth Sanders advise to construct new tools:

*"Designers will transform from being designers of 'stuff' to being the builders of scaffolds for experiencing."* [8]

Furthermore, Dan Dixon [4] call for a closer investigation of gamification user types matched the already defined intent of our project to construct "scaffolds for building everyday creativity" (Sanders, 2006) in the form of Gamification Persona, the main tool we used in our gamification design process. We argue for the need of creating a common language between game designers, gamification specialist, user experience designers and researchers, business analysts, programmers and testers in order to capture

the user requirements and to ease gamification implementation during the product development process. The need of facilitating this common language of designing for a gamification user was proven necessary during the implementation process of gamified features into Microsoft Dynamics NAV and AX applications, two of the Enterprise Resource Planning (ERP) software developed by Microsoft.

### **Defining the Tool: Gamification Persona**

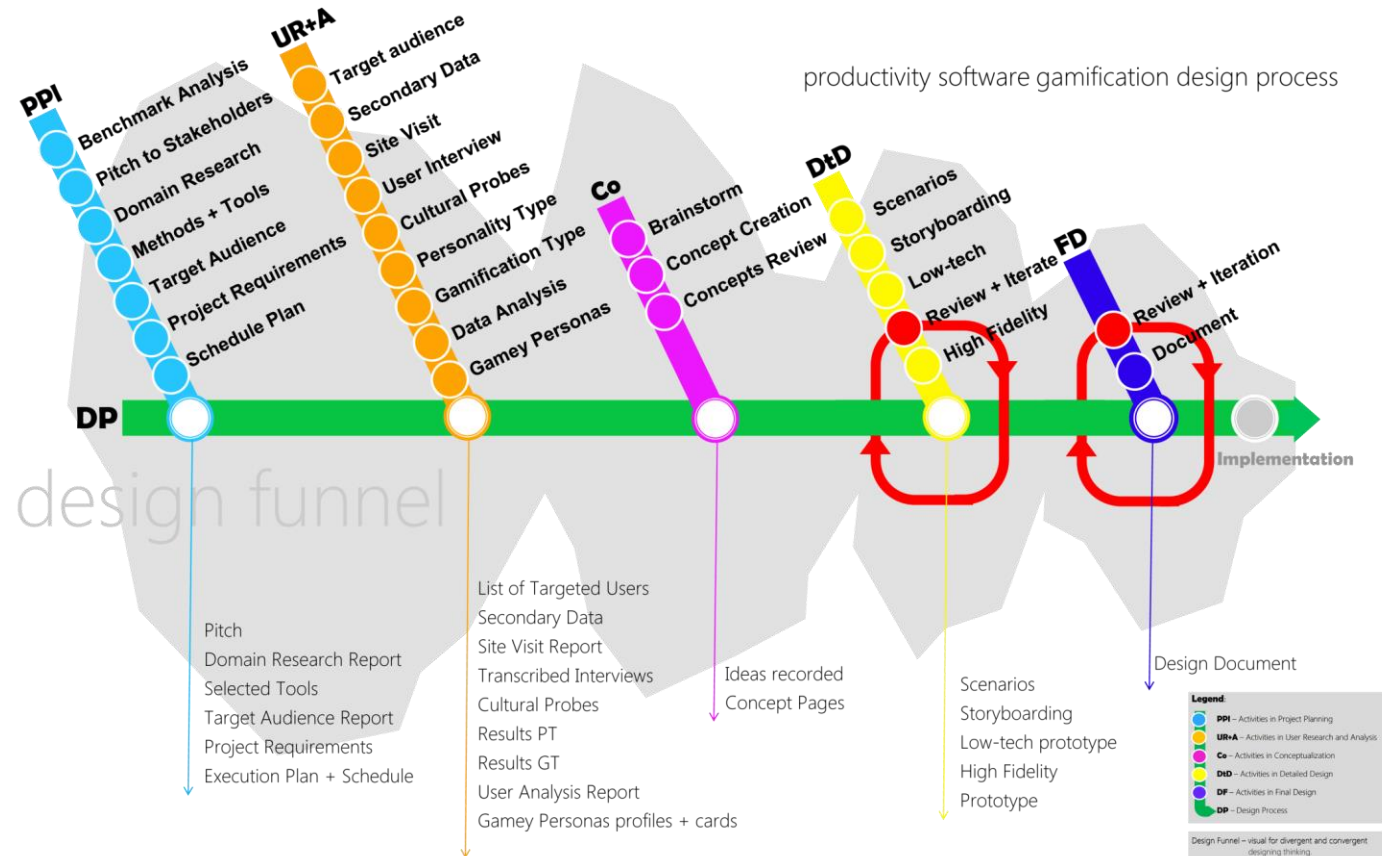
In addition to Cooper's persona [2] [3], the profiles descriptions for Gamification Persona encapsulated detailed information about users' personality types and the emotional states they enjoy or reject within the context of, both, their work and their leisure time. Gamification Persona profile description encapsulates and provides the necessary vocabulary about user's goals, user's emotional states and user's personality types with regards to games in addition to the traditional persona profile descriptions.

The birth of Gamification Persona took place at the beginning of the design process in the User Research and Analysis phase. We adjusted Pruitt and Adlin [7] scheme of constructing persona and carefully analyzed the structure of Canossa's Play-Persona [1] in order to fit the fun and engagement needs of a gamification user profile. Few particular methods used in game design to researching and gathering player data were tested and adjusted into the process of defining and constructing Gamification Persona. These methods are Cultural Probes, Personality Type surveys, Player Type questionnaires, and specific User Interview's questions targeting games topics.

In practice, we built the gamification Persona profile as an additional layer of the already existing Microsoft Dynamics persona profiles descriptions summarized in the Microsoft Dynamics Customer Model. We called Secondary Data this existing Microsoft resource and use it as the starting point of our gamification user type investigations. A list of steps and all deliverables of Gamification Persona profile construction under User research and Analysis (UR+A), the second phase under the grand scheme of the productivity software gamification design process shown in figure 1.

### **Gamification Persona in the Design Process**

In order to prove the validity of Gamification Personas tool and its benefits, we created Gamification Personas profiles for ERP users and used them as the main tool during the user centered gamification design process of Microsoft Dynamics ERP products. Regarding games and ERP use, a great volume of user data was gathered and analyzed during the UR+A phase. We faced the challenge of merging users' goals (in terms of games especially) with business requirements into a format that would be easy to use by all parties involved in the product development.



**Figure 2.** Productivity Software Gamification Design Process.

We needed a layout of each Gamification Persona profile that would sum up the design requirements, limitation, as well as the metrics to measure the success of the gamification solutions. Previous experience of Microsoft Dynamics persona use has shown that it is not efficient to use an extensive detailed profile description during the design and development process. Therefore, we adopted the

approach of creating Gamification Persona posters, also suggested by Pruitt and Adlin [7] in their description of persona lifecycle during product development. Lene Nielsen [5] also suggests this approach. In our case, we adjusted the poster method to a card format (e. g. A5 page size) in order to accommodate a flexible and dynamic discussion environment. For each Gamification Persona detailed profile, we created a card

that summarized the main users' goals in terms of their experiences with the product, their personality type that relates to their player type, and the emotions felt towards the investigated product, as well as, emotions they like experiencing while playing games. Refer to the image below for an example of the Gamification Persona cards.



**Figure 2.** Microsoft Dynamics Gamification Persona card

During the process of gamifying Microsoft Dynamics NAV and AX applications, the Gamification Persona cards have been used from Conceptualization phase while brainstorming and reviewing ideas, through Detail

Design phase while composing scenarios of use, sketching storyboards and low tech-prototypes and kept a close look at them during the Final Design phase while defining the high fidelity interfaces and writing the design document. The cards provided the necessary information during brainstorming sessions. In addition, the cards were a good tool to keep user's goals visible and ease the communication throughout the gamification implementation process. Furthermore, Gamification Personas detailed profiles and cards provided accurate metrics to measure the success of the gamification design solutions while testing the design concepts and prototypes with users.

### **Lessons Learned and Further Research**

We attempt to satisfy the need for a gamification design framework that will guide professionals in creating meaningful, enjoyable, and emotional satisfying user experience that lasts, such as the player experience in games. The tools and methods we empirically adopted for the constructing of the gamification design framework and the Gamification Persona are proven to be the suitable lenses of game and psychology theories that one should adopt when implementing gamification. In our case, these lenses facilitated the foundation of a successful outcome noted in gamification design solutions for Microsoft Dynamics NAV and AX ERP applications.

The most important lesson learned from this project, was that gamification needs its own framework of design tools and methods, apart from games design or traditional user experience design. The tools can be adopted from relevant domain, but it requires adjusting and fine-tuning to better describe the needs and goals of a gamification user, rather than simply combine a

player needs with a user requirements. Therefore, we ask for your contribution in developing further the user centered gamification design framework by refining and adjusting the existing tools and methods, and also by proposing and implementing new ones.

### **Acknowledgements**

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# DESIGNING EVENTS AS GAMEFUL AND PLAYFUL EXPERIENCES

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**Abstract**

This paper outlines the outcome of our experiment with applying game design elements to a festival event with a strong conferencing component, to help facilitate attendee networking, enhance learning outcomes and provide a platform for collaborative problem solving. We provide an outline of potential key factors in how similar events might be gamified so that organisers can create engaging and playful experiences that can be used for practical purposes, rather than passive attendance.

**Keywords**

Gamification, events, conference facilitation, games with a purpose, game design, experience design, motivation, mass collaboration, games for change, knowledge city, urban liveability.

**ACM Classification Keywords**

H.5.1 Multimedia Information Systems

**Introduction**

With the inaugural launch of the Games for Change movement in Australia in 2012 ([www.gamesforchange.org.au](http://www.gamesforchange.org.au)), we as the producers of the event were looking to design the first Games for Change Australia-New Zealand festival as a holistic experience by using gamification or “the use of game design elements in non-game contexts” [1] to achieve the curatorial objectives (a) to engage attendees in meaningful playful and gameful activities, and (b) to engage in collaborative problem solving aligned with the topic of the event.

There is nothing new in the notion of ‘event games’ per se, however most reported examples of events have been focused on one or two of these factors, but not all combined. In particular, using a gamified event experience for collaborative problem solving is uncommon. The closest examples we profiled in our background research for our gamification design decisions included the GDC Metagame in 2012 [2], the SAP GoGame in 2012 [3] and the GMIC Sustainability Conference in 2011 [4]. Our particular interest was the use of a gamified experience to “crowd-source” collaborative ideation and problem solving. Specific examples that inspired us included the gamified Spigit platform ([www.spigit.com](http://www.spigit.com)) which uses a specific organisation or location for ideation and problem solving;



the Kaggle platform ([www.kaggle.com](http://www.kaggle.com)) that runs competitions to solve enterprise challenges and 'FoldIt' a game designed by the University of Washington to crowd-source solutions to folding the proteins of a strain of the AIDS virus [5]. Similar research on games with a purpose (GWAP) has reported several case studies where online games can be designed to solve large-scale problems [6] [7] [8]. Furthermore, using games and game-like environments to solve problems has received wide attention in the popular media [9] [10] [11]. This attention has raised public awareness and willingness to using games and gamification experimentally in non-entertainment contexts.

The common denominator of these gamified collaboration platforms and GWAPs is that they engage and motivate people into playing a game or activity to solve a meta problem. They all belong into what had previously been identified as the wider trend of a "ludofication of culture" [12].

### **Experiment Goals**

The goal of our experiment was to test whether a low cost and low-tech gamified intervention could take a typically passive, listen-only event and turn it into a proactive, engaging experience for attendees. The objective of this experiment would be achieved while participants contributed ideas to a meta challenge embedded in the conference's topic. The host city for Games for Change ANZ, the City of Melbourne ([www.melbourne.vic.gov.au](http://www.melbourne.vic.gov.au)), agreed to participate by posting three questions to attendees that were of significance and of interest to the City, and relevant to a Games for Change ANZ audience. The three questions were (1) "How do we make Melbourne a Knowledge City?"; (2) "How do we make Melbourne an Entrepreneurial City?"; and (3) "How do we make

Melbourne a Playful City?" These questions formed the objectives for the gameful web-based City Challenge Quest (CCQ), which we specifically created for the festival, see <http://www.gamesforchange.floktu.com>.

### **Gamification Design Decisions**

For the design of CCQ, and the overall gamification of the event, we considered the findings that have emerged out of decades of research in GWAP, and it became clear that the motivation for people to play a game was not driven by the fact that they will solve a problem, but to be entertained [6] [7] [8]. Therefore, fun, entertainment and enjoyment, while not detracting from the focus of the event, were given priority to meet our objectives of (a) engaging attendees in meaningful playful and gameful activities and (b) engaging them in collaborative problem solving. Therefore, some of the challenges that were added to the gamified elements included participating in playful improv activities as well as playing games during the breaks. This was facilitated through the addition of a Games Arcade to the festival, in which 30 different games were exhibited. Each attendee was given a QR code and each game's booth in the arcade was equipped with a QR code. As each attendee played a game, their code was scanned to add to their overall point score.

In the development stage, we considered the achievement goal framework [13] [14], thus leading to the setting of relevant and attainable goals as part of the event game. Furthermore, we investigated motivation design [15] and persuasion design [16] to ensure that considerations such as user interface, specific mechanics used and tasks/behaviours that were being encouraged (such as networking, playing physical games and

answering city challenge questions) were engaging, simple to understand and reduced friction.

The game ran as follows:

- Attendees were emailed with details about the game with a link to the web app to opt-in. Reminders were also given during the event
- The app contained pages that included quests, the leader board, a list of attendees and a survey
- Attendees were encouraged to add ideas, comments and 'likes' to the City Challenge Quest and to scan the QR codes of attendees they met as well as games they played.

Basic game mechanics used included:

- Achievement: Points were earned for adding an idea, comment, liking an idea, meeting attendees
- Socialisation: Encouraging networking, participating in social games and playful activities
- Recognition: Running a leader board
- Reward: A prize of an iPad mini was offered to the person that topped the leader board

Points that were awarded included:

- Post ideas = 30 points; Post comments = 20 points; Post likes = 10 points
- Play games, any of 30 different games = 20 points
- Meet attendees & view their profiles = 10 points

We debated the use of an extrinsic motivator such as the iPad mini to reward the top player for activities that were essentially intrinsically motivating. However, given that recent research suggests that extrinsic rewards can increase intrinsic motivation where the tasks to be performed require specific high task performance of personal and social significance [13] we decided to go ahead and integrate an external reward into this experiment.

## Results

A total of 56% of attendees opted-in to play (N=125 n=70). This compares to a 15% opt-in for the GDC Metagame in 2011 or a total of 2,500 players [2]. This also compares to a 15% opt-in for the GoGame SAP Knowledge Quest in 2011 or 900 players out of 6,000 attendees [17].

In a post- event interview, leading contributors said the reward had provided an incentive to keep going, not only to win, but to remain in the top section of the leader board while still being seen as a quality contributor among their peers. The distribution was that the top 5 players (or 7% of players) accumulated 70% of the points, or, the top 18 players (25% of players) accumulated 90% of the points. This distribution of contribution compares well to the results of the GDC Metagame [2] where 5-10% of players were considered "hardcore generals". Summary results of the City Challenge Quest were as follows:

City Challenge Quest	Ideas Posted	Comments Posted	Likes Posted
1.Knowledge City	22	193	1144
2.Entrepreneurial City	23	126	610
3. Playful City	30	141	726
<b>Total</b>	<b>75</b>	<b>460</b>	<b>2480</b>

**Table 1.** Attendee Contribution to the City Challenge Quest

Preliminary feedback from the City of Melbourne was very positive about the results as they could see a

connection between this type of engagement and their community participation objectives. The attendee survey questionnaire asked: *What did you think about our event game and the City Challenge Quest?* The following responses were received:

A. How it engaged	B. How it didn't engage	C. How to improve
Interesting way to engage	The game lacked urgency or real purpose	More people needed to play to make it compelling
Good example of gamification	I felt disconnected with the game	More polish was required to the app
Cool	It lacked appeal	Tweak and fix bugs in the app
Nice idea	Inadequate explanation of the game	
It was fun	Material prize was inappropriate	

**Table 2.** Attendee Written Responses to the Event Game

## Discussion

The experiment was affected by usability issues and this was a limiting factor on engagement and participation. These types of issues are supported by research that shows that aesthetics and technology interaction have an important impact on player motivation and enjoyment [18] [19]. Feedback on where the gamification elements did engage supports prior research [6] [7] that players were motivated by the promise of entertaining experience, rather than a problem solving activity. Finally, in a post-event interview, the top three contributors commented on the friendly, collaborative

and playful interactions between them during gameplay despite the fact that they were all were competing to win. This speaks to the importance of collaborative competition and is in keeping with the findings of the FoldIt gameplay [5].

## Conclusion

An event experience can be designed to (a) generate greater engagement through gameful and playful design and (b) to contribute to collaborative problem solving of a meta-challenge. Our experiment showed that the two critical components of running a gamified event experience to meet these objectives are (a) enjoyment and fun in user interfaces [6][19][21] and (b) the effective set up of a problem-solving environment [8][19][20][21] for players or attendees. When these two elements are developed in tandem with the objectives of the broader event, the requirement for the use of game mechanics is minimised to a select few. The only mechanics required are those that close the feedback loop with minimum friction, so participants remain focused on the activity rather than the underlying mechanics of the game.

## Future Research

It is not clear whether the use of an extrinsic motivator as a reward inhibited participation in the City Challenge Quest, as feedback was divided. While non-participants quoted this as a detractor, the leading players cited it as the key motivator for their participation and contribution. There is scope to further explore the role of extrinsic rewards to help drive intrinsic motivators for meaningful challenges in a collaborative event setting.

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# Challenges of Implementing Gamification for Behavior Change: Lessons Learned from the Design of Blues Buddies

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## **Abstract**

This paper reports some lessons learned from the first design stages of the gamified social network Blues Buddies, a persuasive intervention aimed at stimulating positive behavior in depression sufferers by influencing interaction and learning processes through gameful design. The challenges encountered are mostly at the level of the integration between persuasive design and gameful design, and in the design and development of a gamified system that stimulates positive instincts in people, according to the notion of a “compassionate” or “empathic” gamification.

## **Author Keywords**

Gamification, gameful design, behavior change, persuasive design, compassion

## **ACM Classification Keywords**

H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; J.4 [Social and Behavioral Sciences]: Psychology, Sociology

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## Introduction

The challenges of creating gamified systems to the purpose of improving mental health are very different from those related to gamified systems for the general public. Persuasive interventions for mental health require a subtlety and sensitivity that make popular gamification strategies - mostly based on reward and punishment, point systems, ranking and competition - seem inadequate to say the least. Deterding et al. suggest the alternative definition of *gameful design* to define more precisely the practices that now are gathered under the umbrella term "gamification", but also to propose an alternative to a term that for many is synonymous with gimmicks and commercial exploitation [1]. Here the term "gamified systems" is preferred, to underscore how systems that use game elements are first of all information systems, and the terms "gameful strategies" or "gameful design" are used to describe design employing game dynamics.

Blues Buddies is a social network that encourages people with mild to moderate depression to learn tools for dealing with the everyday challenges of their condition, to reach out to others in the same situation, and to develop skills that enable them to give and receive help. Unlike existing forums and self-help systems, Blues Buddies promotes one-to-one relationships between users and provides a shared learning experience and reciprocal support system, by integrating social networking activities with game-like activities. The specific nature of the project (Beta version is currently in development) as both a mental health intervention and a persuasive intervention raises two main questions: which guidelines to follow to implement persuasive design - design that uses psychology to influence behavior - within a gamified

system, and how to avoid the example of gamified systems that focus on dynamics like competition, exploitation or "tokenizing" of others, and develop instead "sympathetic" interaction strategies.

## Game-specific persuasion and persuasive design

Gamification, the use of game elements in non-game environments, often displays a persuasive intent, ranging from enhancing engagement and affective response with a product or system to the triggering of specific behaviors such as buying or interacting.

Several models are available to consider and evaluate persuasive design, but very few of them are comprehensive [2], and none is specific to games or gamified systems. The necessity is to develop models that focus on overarching models of behavior [3], but for persuasive games the main frameworks have been either the model that considers the game environment as a particular kind of HCI (without formalized relation to the issue of persuasion) [4] and the procedural rhetoric model [5], in which games express meaning rhetorically through the procedures they are composed of. These theoretical models didn't prove very suitable to the goal of understanding behavior change.

In fact, prior to clarifying the difference between fully fledged games and gamification, to understand persuasive strategies through gaming it is useful to clarify what is the strategy enacted by the game system in the persuasive process, and create a framework that considers first the persuasive approach and second the game aspect. According to Fogg's definition of persuasive technology, computers (and by extension games) can act as *actors*, by acting as

interlocutors and cueing social responses, as *media*, by transmitting a message from sender(s) to receiver(s), and as *tools* to perform tasks [6]. It has been argued elsewhere [7] that it would be useful to distinguish between systems that employ games as *computer mediated communication* to express an idea or convey a message and games that instead act like *human computer interaction*, providing the space or the interlocutors to create a dialogue between the users and the system, in a way analogue to what happens in online information systems [2].

By employing such distinction, it becomes visible that most of the systems defined as serious games that employ procedural rhetoric behave like computer mediated communication, while other systems that influence the players' actions during a process, such as learning or interacting or going through a medical procedure, behave either like HCI either like facilitation tools, to pursue the goals desired by the designers. Such a distinction makes the task of adapting existing tools for persuasive design to the design of gamified systems much easier, by allowing to pick the appropriate framework for each kind of interaction situation.

### **Compassionate gamification**

The emergence of academic studies on the subject of compassion and altruism, such as those developed in research groups like Ccare, EPARG, the Compassion Lab and others, indicates an acknowledgement of serious deficits in Western society with regards to social interconnectedness and mutual care, resulting in loneliness, alienation and health-damaging behavior [8]. Social networks and location-based services produce a shift in such tendency by creating different ways in which people can be social [9], but the further

development of such positive tendencies in online and mobile interaction is ultimately a software issue, as interaction systems only rarely are consciously designed to elicit that kind of responses. Compassion is a concept present in different spiritualities and philosophies, indicating a three-fold process: feeling of empathy or understanding of others' negative feelings or situations 2) caring for the other person (affective arousal) 3) readiness to act upon such feelings and diminish the suffering of others [10].

In the case of gameful design, it is necessary to reconsider current popular gamification strategies based on competition and win, public humiliation though leader boards and accumulation of points and virtual wealth in relation to the above three-fold process, and conceive alternative design models that favor altruism (the motivation to increase others' wellbeing regardless of one's own), positive feelings towards oneself and positive social interaction. Some elements emerged during the design of Blues Buddies:

#### *1) Emphatic feedback*

A social network targeting mostly depressive individuals needs particularly strong and contextual feedback, which requires a system that displays at least rudimental features of emotional intelligence. Research on affective computing has focused on ubiquitous interfaces for emotional sensing at a deeper level [11], but in gamified systems more attention is required the social-emotional aspects of interaction during online communication (also a key feature in affective computing theories, that at the moment is receiving less attention from research than physical interfaces). A good alternative seems instead to develop practices that favor emotional communication in web and mobile

interface design, less innovative from the technological point of view but potentially more influential for social impact [12].

### *2) Use of psychology theories*

Psychology theories are a central theme in the debate surrounding gamification, but there is need for further research and especially effective knowledge transfer between the fields of psychology and design. Techniques such as mood transfer, tension reduction, and social responsibility appeals are used to create positive feelings and stimulate exchange and reaching out, as well as techniques from learning theories.

### *3) Intrinsic motivation*

For people suffering from depression, extrinsic motivation rarely works; in designing Blues Buddies we adapted the notion of situated motivational affordances [13] to isolate the single interaction experience moments and develop their related affordances within the specific situation of social networking.

## **Conclusions**

There are many possibilities for creating gameful interactions that support positive values such as compassion and altruism through persuasive design; a first step is to learn more about the psychology of those processes and explore design alternatives beyond the current focus on the competition/collection model.

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# Playing while Testing: How to Gamify a User Field Evaluation

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**Abstract**

In this paper we claim that gamification can lead to interesting results in the evaluations of interactive systems. A case study will be illustrated.

**Author Keywords**

Gamification, Engagement, Evaluation, User Test.

**ACM Classification Keywords**

H5.2. Information interfaces and presentation (e.g., HCI): User Interfaces – evaluation/methodology.

**General Terms**

Human Factors, Experimentation.

**Introduction**

Since now, HCI community has paid attention at the gamification practices mainly as tools to enhance user engagement in the usage of a given application: "the use of game design elements in non-game contexts" [2] is intended as a set of design techniques that can improve the ability of a service to generate a long lasting involvement in its users. However, it has not yet given sufficient attention to the possibility of using gamification within the design process of digital artifacts: while some methods such as role play gaming and make-believe are tools available to the designers since long time, it does not seem a common practice to

use game mechanics during the evaluation stages of an interactive system. Laboratory tests allow researchers, through the experimental protocol, to guide users in the evaluation of specific and critical functionalities of a system: tasks motivate participants to use certain features rather than others, that perhaps would not be used in a less controlled situation. However, they create artificial contexts that could twist the results when we test applications with “social features” (e.g. comment, post, share, etc.). In fact, their usage requires intrinsic motivations that can be generated only in connection with social relationships and communication habits that are not easily replicable within a laboratory setting: they need a pre-existing community to run at their best and continuous social feedback to be meaningful for their users (e.g. the use of a comment feature has a sense only if the post has the possibility to receive a reply in a short time from another user). Therefore, the laboratory usability tests, as Greenberg and Buxton [3] had already pointed out, do not seem suitable for all contexts. Field tests, otherwise, allow users to try a system without constraints, in a context close to that of the “everyday life”. The lack of punctual tasks, however, subtracts control from the researchers’ hands, not allowing them to obtain reliable data on all the critical points of the system under examination. From these premises, gamifying a field evaluation session could be an optimal solution to balance the need to test an application “in the wild” [5] and, simultaneously, to motivate testers to use every features of a system, even in the absence of an experimental protocol: game missions can substitute the laboratory tasks, with the advantage that they can be internalized more easily and perceived in a less abstract way by the players, since they could be directed to the goal of winning the game or obtaining a

certain reward. Within the WantEat project [1], a suite of applications that aims to increase communication between objects and people in the food and wine domain<sup>1</sup>, we tried without success, using laboratory and field tests, to gather significant insights on the social features of WantEat Mobile App[4]. Hence, we set a gamified field test, inserting game mechanics in traditional evaluation methodologies, in order to create a large-scale engaging experience, in which multiple users, at the same time, were able to stress the system while enjoying themselves.

### **Gamifying a Field Test**

The gamified evaluation of WantEat Mobile App took place during the international food exhibition “Cheese 2011” (a huge event that appealed about 300,000 visitors), held in the town of Bra (Italy) between 16 and 19 September 2011. During the four days of the fair, the application has been installed on the users’ iPhones. Scattered through the fair were available 10 cheeses, recognizable by WantEat: main purpose of the evaluation game was to recognize at least five of these cheeses with the mobile camera, taste them and use the social features of the app to add information to these products. Every action performed (e.g. writing a review, applying a tag, etc.) allowed the user to earn 500 points: at 6000 points she was awarded with a T-shirt with the Application logo. Each participant received the game instructions and a map of the fair that highlighted the areas in which the application was

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<sup>1</sup> WantEat is an interactive cross-media system, consisting of smartphone, tablet and web applications. With WantEat mobile app users can a) frame with the mobile camera a product label, b) obtain information about the product and how this product is in relationship with other objects and people, c) add information to the product (e.g. with tags, comments, votes)

fully working. Contextually at the claim of the prize, users were asked to answer a questionnaire, through which, using 4 Likert scales accorded to four different dimensions (ease of usage, efficiency, engagement and usefulness), we tried to gather feedback about the experience with the application. In addition to the basic actions of 500 points, users could accomplish special missions that required a lot of energy and time, but allowed them to earn from 10.000 to 20.000 points: these objectives stimulated social cooperation between users, raising the level of challenge by promoting the exploration of the entire fair area. For example, users were suggested to exchange a special identification coin (provided with game instructions) using the application communication features, or to discover hidden objects and secret places that could have been recognized by the application. In this way, we encouraged everyone to play, offering a relatively easy goal to reach (6000 points) and, at the same time, optional objectives and incremental problems, that could motivate harder players to satisfy their willingness to play. A live leaderboard at the installation base maintained all participants informed of their current score. Furthermore, a web application was deployed to support the whole game: accessing with their accounts, users were able to retrace their application usage experience within the fair, seeing the earned points, the actions taken, the products tasted and the people met. The evaluation led to interesting results in terms of user engagement and participation: 157 people attended the field test. Users performed a total of 2134 actions. Analyzing the nature of the actions it was possible to find out that game mechanics have led the testers to deeply use the application: users commented, voted, tagged the products recognizable by the system, generating a social network from

scratch, in a limited amount of time (4 days). Participants also explored and used features that were not specifically required in the game instructions: this shows an interest for the service as a whole. More than half of the sample did not stop at 6000 points (the minimum amount to obtain the prize), continuing to play even if no reward was expected for the winner of the competition. The leaderboard and the structure of the available missions were sufficient to create a challenge able to motivate the users in the game. Moreover the comments posted were always relevant to the type of the product on which they were made: although it was possible to game the system, through the posting of empty comments or the mechanical repetition of the same action, users performed actions coherent to the product on which they were applied. These aspects suggest that the format of the game was internalized by the participants and that the challenge was welcomed in a profound way. The questionnaires gathered at the end of the test made possible to collect useful data and requirements for the further improvement of the application design. For example users rated positively the intuitiveness of the opinion expression mechanism about the products recognizable by the system (3.39 out of 4 SD 0.62) and the quickness of the tag and vote features (3.64 out of 4 SD 0.56), while expressed a low interest for capabilities facilitating new people encounter through products (2.43 out of 4 SD 0.83). It also emerged how users prefer to provide opinions and comments about the products they tasted rather than consider other opinions when they have to make a choice: it seems to be privileged the expression of personal identity through the posting action, rather than the use of information provided by others.

### **Suggestions for the Gamification of a user field test**

WantEat at Cheese 2011 highlighted how the gamification of a field test can yield to excellent results. In particular, it allows to overcome the cold start effect, a social network typical problem, which can prevent the participation of users, and the collection of useful and valid requirements during an evaluation session. It is possible to think that the gamification of an user test may also be a good remedy about the artificiality of the laboratory context: although the game situation does not re-create the daily experience of use with a non recreational service, which commonly takes place in not-playful contexts, it manages to generate genuine motivations that could be similar to those experienced by people during their everyday life, since they are moved by practical objectives and concrete aims (e.g. the desire to excel in a competition). In conclusion, from our fieldwork we can provide a first set of guidelines in order to gamify the evaluation session of an interactive system. First, the playful part has to be perfectly integrated with the non-recreational part of the evaluation experience: rewards, objectives and game mechanics have to be melted with the purposes of the testing plan, without appearing as an external layer added to a situation already self-contained. Then, the design of missions, constraints and opportunities should be carried out with a deep understanding of the context in which the experience will take place: understanding always precedes the design of the experience itself. Secondly, the gameplay should be well balanced with regard to the difficulty of achievable goals: an incrementally complexity of the game objectives, structured in easier mandatory tasks and in optional more challenging missions, provides the necessary motivation to all users to reach a minimum

level of participation and to continue the game experience if they like it. In addition, the definition of the missions of the game should promote cooperation and sharing among the participants. Creating differentiated targets that leverage on the competition, but need for their fulfillment of a social co-operation between users, is the right way to get active participation in the social network of the application under test. Finally, the importance of the gaming stage in the design of truly immersive gaming experience should not be underestimated: the careful articulation of sub-areas, in which sub-objectives can be achieved, and the balance between exploration and control on the surrounding spaces must never be lacking. From these first guidelines it could be possible to think a new method for evaluating interactive systems in the wild that gives a central role to game mechanics.

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# A Preliminary Taxonomy of Gamification Elements for Varying Anticipated Commitment

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**Abstract**

We present a preliminary taxonomy of gamification elements for designing ways to engage users of a computer-based service, given different levels of expected engagement and willingness to commit time to interaction.

**Author Keywords**

Gamification elements, taxonomy

**ACM Classification Keywords**

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

**Introduction**

A benefits portal is a website where employees can

access health plan offerings, 401K, career guidance and so on. But employees do not always use the benefits they are entitled to, to best advantage. In a preliminary interview study of 13 informants, we discovered that interviewees cared about the issues their benefits tackle, but were unfamiliar with their portal and its offerings. When they were asked to walk through their benefits portal, they always had trouble finding it, remembering login information and finding services, demonstrating a historical lack of engagement and commitment to its use. This resonates with findings from a recent online survey [1] which found that employees made poor choices at benefits enrollment and were “on autopilot” when making their selections.

To help improve matters, we plan to use gamification, as defined in [3]. We seek to address the needs of people who are necessarily committed to engaging with our content for more than a few seconds and to draw them into higher levels of interest, more frequent and extensive exploration and more and better use of their benefits resources.

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Element	Code	Rationale
<b>General Framing</b>		
Context	L	Context is always salient for whether someone is likely to invest time and effort.
Background	M/H	Time taken to absorb background may be too high to bother in low commitment context.
Narrative	M/H	See above.
<b>General Rules and Performance Framing</b>		
Guidance	L/M	Lightweight guidance can be carefully designed.
Internal Objectives	L	Simple objective / target can be explained by an image or short sentence.
Ambiguous Path to Objective	M/H	Puzzles need some commitment to be effective. Good puzzles may require a lot of engagement.
Renewal/Regeneration	M	Requires some commitment to return. Wouldn't work for one-off or rare visits.
Set for Completion	L	Even a small set can be effective, so OK for low commitment.
Notable Records of Achievements	L	Easy to read things like "High Score=1035" so OK for low commitment settings.
<b>Social Features</b>		
Relationships	L/M	Usually requires higher commitment. Possible to apply with preexisting social vectors.
Interaction Modes	L/M	See above.
Visibility/Accountability	L/M	See above.
Social Performance	L/M	See above.

**Table 1.** Taxonomy of Gamification Elements coded for Low (L), Medium (H), High (H) or Variable (V) *minimal commitment* requirements, based on the rationales.

Preliminary research did not uncover a straightforward summary of characteristic (as defined by [3]) gamification mechanics elements that are suitable for low-commitment (seconds) as opposed to medium- (minutes) or high-commitment (hours; MMOGs may entail up to 20 hours or more of play per week [12]). Our contribution in this paper, therefore, is to propose a basic taxonomy of common gamification elements in a framework that suggests the degree to which each element is likely to be exploitable at different levels of anticipated user commitment. We present this as an artifact for refinement through discussion and further research, rather than as a conclusive summary of the usefulness of gamification mechanics in different commitment contexts.

## Related Work

There do exist articles that provide systematic accounts or frameworks that are helpful, but not exactly what we were looking for. Hunnicke et al [6] present a Mechanics, Dynamics, and Aesthetics framework, which is designed to assist designers of games in understanding how to create an engaging experience by typing mechanics to the dynamics that afford the appropriate aesthetics for the game. However the mechanics are not itemized and classified. Yee [13] offers a framework for game play motivation, based on a factor analysis of a large survey of player motivations. However, this does not extend to the gamification features that satisfy the motivations. Deterding et al [3] provide a sophisticated definition of gamification, which places gamification elements in a model of multiple levels of design abstraction, but their objective is not to provide concrete examples of gamification elements themselves. Dignan [4] presents a 'game frame,' which is a conceptual framework or template comprising ten building blocks which he

argues make up a "behavioral game" (a gamified activity) and presents specific examples of "building blocks" of gamified experiences, which are exactly what we seek, but not organized concisely nor within an taxonomic structure with guidance on what level of commitment they are best suited to. Huotari and Hamari [7] provide a definition of gamification from a service marketing perspective, in other words explaining how gamification can be applied to enhance the perceived value of a service to a user and provide some good examples of gamification elements, but not a systematic collection.

Whilst providing helpful reference material, these works do not provide a concise, timesaving but reasonably comprehensive presentation of common gamification elements in terms of the various aspects of the user experience that they support. Nor do they differentiate the value of different types of element with respect to the level of user commitment required. In response we have drawn from these and other works and surveyed online resources such as the gamification wiki [5], relevant articles such as [8,9,10,11] to inform a simple taxonomy of gamification mechanism features that can be explicitly designed into or fostered by an experience. The lead author has also drawn upon 7 years of making and analyzing games and experiencing the success of their gamification elements. The taxonomy comprehensively covers all of the elements mentioned in works we have reviewed thus far and some additional ones based on the first author's experience as a game-design, development and analytics consultant. *Note that although all of these elements can be chosen, designed or be designed for, some, such as entertainment, may correspond to phenomena that can also occur without any explicit design intent.*

Element	Code	Rationale
<b>Intrinsic Incentives</b>		
Curiosity	L	Curiosity can be triggered quickly and leads to higher engagement/commitment.
Challenge	L	Simple challenges can be effective even in a low commitment setting.
Entertainment	L	Simple elements can work very quickly in low commitment settings.
Social Reward / Peer Pressure	V	In low commitment setting you depend on the context to create a social vector.
Personal Returns	V	Without context, significant explaining may be necessary for some returns.
Societal Returns	V	See above.
<b>Extrinsic Incentives</b>		
Deals / Discounts	L	Easily understood. Can be designed with complete control.
Financial	L	See above.
Goods / Services	L	See above.
Time	L	See above.
Lottery / Draw / Bet	L	See above.
Virtual Currency / Goods	H	Only works if user is committed enough to use it.
Virtual Abilities	H	See above.
Add to Record of Achievements	M	Can work as long as the user can be made to value personal or public record.
Validation	M	See above.

Table 1 Continued

Also note that some of these mechanics, at least defined abstractly as they are here, are more frequently used without the intention to gamify but are nonetheless very useful as gamification elements.

We sum up the main categories of the taxonomy in the following sections but a more comprehensive breakout of the individual items is provided in Table 1, where each is coded for the minimum user time commitment required for it to work. Even more detailed distinctions and explanation can be found in the Appendix to this paper. Unfortunately it is too large to compress into an extended abstract format.

We were able to establish six major categories of gamification element, which may be *designed into* the experience, *designed for* in the experience, or which may *provide context for* an experience. All of the gamification elements that we were able to identify from related work or from articles online were able to be placed into the following set of top level categories at a first subcategory or second subcategory level.

- **General Framing:** Provides context and motivation for participation, for example, who is offering the gamified content and why, such as a good cause, or to generate revenue. May provide a real or fantasy back-story and other information.
- **General Rules and Performance Framing:** Explains in general what is expected such as operating an avatar in combat or scoring as high as possible on a test of health knowledge. In so doing, this orients the user towards what constitutes 'good' performance in the gamified context.
- **Social Features:** Permit the user to interact with others, at the very least outside the experience

(perhaps to compare experiences), but often within the gamified experience itself.

- **Incentives:** These may be intrinsic (such as experiencing flow [2], extrinsic and, practical, material or, in the case of extrinsic incentives, purely virtual, having value only to players.
- **Resources and Constraints:** Are the bounds within which the user must operate to participate.
- **Feedback and Status Information:** Allow the user to understand what is going on, what they must do next, what they have done recently and perhaps over the entire course of their engagement. Gamification elements may also provide information about the actions of others.

In order to determine the appropriate level of minimal commitment for each category we need to dig deeper into the taxonomy. Table 1 shows the taxonomy in terms of the *minimum* level of engagement required for gamification elements (defined at the first subcategory level) to be effective; High=H, Medium=M, Low=L and Various=V; "Various" means depending on the specifics of the sub-sub category, which space precludes us from exploring in this extended abstract (but see Appendix for an overview of sub-sub category items and definitions of all items).

As mentioned, this taxonomy draws upon personal professional experience of game design and evaluation as well as existing academic literature, trade articles and other publications by game-design experts, it therefore condenses a lot of experience into one succinct summary. However, we believe its value would be much enhanced by the inclusion of scientific studies of these mechanics and their effectiveness and

Element	Code	Rationale
<b>Resources and Constraints</b>		
Available Game Accomplishments	L	All gameful experiences require something to do or accomplish.
Control Repertoire	L	All gameful experiences involve a means to control actions.
Choice Architecture	L	Easy to implement even in the simplest experience.
Specific Rules	L	Gamified experiences all require specific rules, otherwise they are just play.
Scarcity of Resources	L/M	Perhaps possible to design into low commitment games.
Temporal Aspects	L	Time-based elements are easily incorporated in low commitment settings.
Perceptual Aspects	L	Any gamified experience requires perceptual elements even if only sound
Topological Aspects	L/M	Possible but difficult to design good topological elements for low commitment situations.
Ability, Difficulty and Advancement	M	Requires commitment to confer a sense of increasing ability.
Change / Novelty	M	Difficult to design novel experiences in low commitment experiences.
<b>Feedback and Status Information</b>		
Graphical Indicators	L	Easy to design, and in fact critical for all gamification.
Audio Signals	L	Easy to design and often helpful for gamification.
Records of Achievements	L	Easy to design and possibly essential in gamification.
Updated Context	L	Simple context devices can be used even in low commitment settings.

Table 1 Continued

examples of games where each element has been used, ideally with success (in place of the simple rationales, based on practical experience and overview articles, as cited here). This might be an outcome of collaborative effort at a workshop or obtained through an extensive literature survey for a journal article.

We believe that further refinement and extensions, based upon past and future studies, could make this a highly useful resource for those who wish to design gamified experiences. The reason for this is that in our experience such individuals are often not game designers and lack the expertise to know what gamification elements there are to choose from and to judge accurately which might work best for their particular context and expected level of user commitment.

Further useful elaboration of this taxonomy might also address appropriateness of gamification elements in terms of other dimensions, apart from the user commitment required, such as application domain (e.g., dull tasks, wellness, education, commerce) and platform (e.g., desktop, mobile, tablet, web).

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## Appendix: Framework Details

The taxonomy in our framework consists of three tiers of categories of more or less purely gamification elements (i.e., some often can be found in other kinds of user experiences, but we argue these are still useful to include as types of gamification elements) that may or may not work well in low-commitment contexts. Definitions are provided in this appendix and Table 1 maps each top-tier and middle-tier item to minimal user time commitment requirements (L=seconds/low, M=minutes/medium or H=hours/high) for it to have a chance of being effective.

Note that our lowest level elements are still category abstractions not members. Consequently, the fact that members of the category can be gaming elements, rather than other types of user experience, may not be fully clear. For this reason, concrete examples of the gamification elements they refer to are usually given.

### General Framing

Provides motivation for participation:

- **Context:** arguably not designed but chosen, e.g. setting such as workplace or SNS, dot com service
- **Background** provides objectives and motivational information such as education about a topic of interest and persuasive argumentation for 'playing'
- **Narrative:** information that sets the scene, e.g. "You're stranded on a desert island ..."

### General Rules and Performance Framing

Orients action, explains how to achieve the objectives or how to evaluate one's own performance:

- **Guidance:** instructions, explanations for how to use feature or play; e.g. "find the lost magic scroll"
- **Internal Objectives/targets:**

- **Correct answers:** e.g. "Which of these is the odd one out?" "Which animal runs fastest?"
- **Choices:** e.g. pick subject matter for quiz, forks in roads, fight or flight
- **Task executions:** e.g. fill in the blanks, find the treasure, go through the maze, fight the monster.
- **Missions or quests:** complex task or series of tasks framed by a narrative
- **Beat other players**
- **Non-obvious but discoverable means to accomplish objectives/targets:** e.g. puzzles, mazes, mysteries, riddles, clues, locks
- **Renewal/regeneration:** the chance to play again, given many failed attempts end in "death"
- **Template/set for completion:** e.g. "your profile is only 35% complete," or "answer all the questions"
- **Normative or "best" records of achievements:** e.g. average score [157], high score [10964]

### Social Features

- **Relationships**
  - **Bonds:** e.g. partner, friend, contact
  - **Teaming:** e.g. guild in WoW, company weight loss team (typically cooperating)
  - **Cohorts:** e.g. class or race in WoW mainly sharing characteristics but may foster teaming or bonding
- **Interaction Modes**
  - **Communication & interaction channels**
  - **Commerce:** ability to trade with, sell to and/or buy from other players
  - **Gift giving**
  - **Commendations, voting:** e.g. "Like," props, connect, follow
  - **Collaboration/helping:** acting together or on one another offers performance benefit: e.g. form a team, or "heal" another
  - **Competition/rivalry/conflict:** acting against opponents or adversaries offers performance benefit: e.g. be first, "steal," "kill"
- **Visibility/accountability/reputation:** e.g. of profile or records of achievement or leaderboard
- **Information affording performance comparisons:** e.g. scores, ranking with friends, other players or with norms

### ***Incentives***

- **Intrinsic:** psychologically motivated anticipated real world outcomes, e.g.:
  - **Curiosity:** e.g. what is hidden behind the door?
  - **Challenge oneself/experience flow [2]:** e.g. can I match this score?
  - **Entertainment** (escapism, absorption)
  - **Social reward/peer pressure:** e.g. status, membership, connection, intimacy, relationship building, avoidance of negative social consequence
  - **Personal returns from gamified behaviors:** e.g. wealth, health, longevity, achievements, avoidance of negative personal consequence
  - **Societal returns from gamified behaviors:** e.g. save the environment, educate politicians
- **Extrinsic:** awarded by some entity such as game maker. Generally tied to intrinsic motivations e.g.:
  - **Material/Practical:**
    - **Deals or discounts:** similar to loyalty program
    - **Financial:** e.g. cash prize, voucher
    - **Goods/services:** e.g. tote bag, free massage
    - **Time:** time saved, vacation or time off; could be in day chunks or hour or minute chunks
    - **Lottery/draw/bet** for any of the above: as opposed to earning points to attain them
  - **Virtual:**
    - **Currency**
    - **Resources/property: Virtual Goods**
    - **Powers or abilities:** Increasing as the player progresses
    - **Add to record of achievements:** See below
    - **Validation:** Marks of approval from others, especially with visibility to others

### ***Resources and Constraints***

- **Available game accomplishments:** e.g. score, learn, find, collect, create, grow, combine, etc.
  - **Locomotion:** A special type of action that changes surrounding in-game context, e.g. move piece, rotate, turn, block, "fly," "ride"
- **Control repertoire:** e.g. click to cast die, select radio button, press arrow key, speak, gesture

- **Choice architecture:** brings together other gamification elements to structure available options at any given point for user/player to choose to make progress
- **Specific Rules:** required actions to accomplish objectives, e.g. turns, forbidden actions, penalties, handicaps
- **Randomness:** unpredictability adds interest
- **Scarcity of resources:** e.g. limited power or seeds
- **Temporal aspects** can add excitement or draw user back: e.g. withering of crops in Farmville or a countdown in many games
- **Perceptual:** e.g. views, concealment, text, hearing, feel; such as via joystick or vibration
- **Topological:** e.g. containers, openings, barriers, locks, paths, mazes, borders, different servers
- **Capability, difficulty and advancement:** over time, play and achievement changes settings of any of the above to maintain engagement and flow [2]
- **Change/Novelty:** new components or alterations are added over time to avoid stale experience

### ***Feedback and Status Information***

- **Graphical indicators:** e.g. to precisely reinforce a correct action or alert user to failure, sometimes called click-zen
- **Audio signals:** on their own or adding salience to the visuals
- **Records of Achievements:**
  - **Historical information:** e.g. checklist, performance gauge
  - **Progress** towards objective: e.g. 14/20 questions answered, 67% complete
  - **Badges or trophies:** e.g. scout badges
  - **Points, scores or ratings:** e.g. Space Invaders highest scorer
  - **Levels or grades**
- **Updated Context:**
  - **Resource indicator:** e.g. time left or dwindling power
  - **Indications of upcoming action, opportunities, challenges or threats:** e.g. approaching object, "daybreak," "nightfall"

# Persuasive Game Design: A model and its definitions.

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**Abstract**

The following position paper proposes a general theoretical model for persuasive game design. This model combines existing theories on persuasive technology, serious gaming, and gamification. The model is based on user experience, gamification design, and transfer effects.

**Author Keywords**

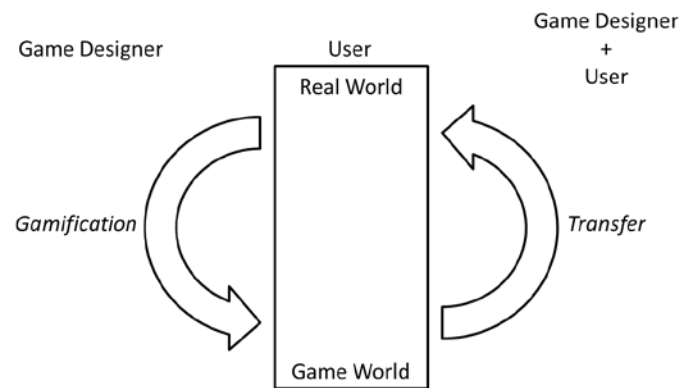
Persuasive Gaming; Gamification; Transfer; Game World; Real World.

**ACM Classification Keywords**

K.8.0 [Personal Computing]: Games; J.4 [Social and Behavioral Sciences]: Psychology, Sociology.

**Introduction**

The past decennia showed a large interest in the design, application, and theory of games. However, although nice overviews of game theory has been written (c.f. [13]), unified models of persuasive game design, the design of games aimed at behavioral change, are scarce. This paper describes a *Persuasive Game Design Model* based on three central concepts related to persuasive gaming: gamification process (c.f. [4]), game worlds [7] and behavioral change design (c.f. [10]). See Figure 1 for a schematized overview. Due to the scope of this extended abstract, the model and its definitions are only briefly presented.



**Fig. 1.** Persuasive Game Design Model.

### Real world and Game world

**Persuasive Game Design:**  
*Game design aiming to create a user experienced game world to change the user behaviour in the real world.*

Users experience the real world, but when they are playing a game the experience of the real world is changed into a game world experience. This change is never complete, but remains a mixture of both worlds. Game worlds and the real world are at the (unreachable) ends of a continuum. Some game experiences (e.g. soccer) are closer to the real world experiences than others (e.g. World of Warcraft) and

some real world experiences (e.g. stock exchange) are closer to a game world experience than others (e.g. waiting for the elevator).

An individual is driven by the same motivational needs in real world and game worlds: the need for *autonomy*, *competence* and *social relatedness* [12] govern his behaviour. But whereas the individual has to actively search for need fulfilment in the real world, game worlds are explicitly designed to fulfil these needs, resulting in a game world typical immersive and satisfying experience [11]. Moreover, a game world is experienced as a protective world [1], where his actions have less serious consequences than in the real world. Encouraged by such protective framing the user enjoys immersion in the game world on a perceptual (e.g. presence), cognitive (game rule compliance), action (game behaviour), emotional (enjoy the wide array of game emotions), and social level (social player relationships). The two experiential qualities, *immersive* and *enjoyable*, are dominant in a game world.

However, immersion and enjoyment are not exclusive for game world experiences. They may also occur whilst composing music or when one is watching a screenplay. So what differentiates a game world different from other 'flow'-like experiences? We would propose to describe these differences from a symptom-based view in the line of Goodman's definition of the aesthetic experience: : "A symptom is neither a necessary nor a sufficient condition for, but merely tends in conjunction with other such symptoms to be present in, aesthetic experience" [6, p.252]. The symptoms of a game experience are the presence of one or more game elements.

## Game-elements and Gamification

Gamification:

*Design of game-elements applied on real-world attributes to create a user experienced game-world.*

Game-elements are the motivational elements typical for game-design. Often the elements are rule-based - constituting the boundaries between the game world and the real world (c.f. [8]). Typical elements are challenge, phantasy, competition, and exploration. Experiencing these elements gives rise to a diverse and long set of specific game experiences [9]. These elements also appear in the real world, but to elicit user experienced game worlds, game designers can design them by processes like selection, addition, combination, enhancing or foregrounding. The designed game-elements do need some material to be applied upon (e.g. a competition on *something*). This 'material' is derived from the *real world context* and consists of attributes such as objects, social relationships, actions, attitudes, user motivations or experiences. Note that persuasive games are not restricted to the digital medium but its form is dependent on game-elements, the gamified real-world context, and the aimed transfer effect (e.g. [14]).

## Persuasive Gaming and Transfer

Transfer:

*Effect of user experienced game world on forming, altering, or reinforcing user-compliance, -behaviour, or -attitude, in the real world.*

Games can change behaviour in the game world and in the real world. The enjoyable and immersive game world can help, motivate, or persuade users to behave in ways they experience as difficult in the real world (c.f. games for social, physical, and mental healthcare – e.g. [2]). The designer can intend to change this behavior as in Fogg's [5] definition of persuasive technology: "interactive computing systems designed to change people's attitudes and behaviors". Or the persuasion might be the effect of the game rhetorics as in Bogost's [3] definition of persuasive games: "videogames that mount procedural rhetorics effectively".

Gamification and transfer are separate processes however: gamification does not imply transfer. We therefore represented these processes separately in our model. Transfer of the game world onto the real world can occur on different levels: the player's compliance, behaviour or attitudes may be formed, changed or reinforced [10]. Transfer effects can be directed when the original *to be changed* user-behavioural or -motivational aspects are gamified and take part in the game world (as gamified real-world attributes). In the gameworld these behavioural/ motivational aspects can be changed towards the target behaviour. When the target behaviour is realized in the gameworld, the transfer from the gameworld to the real world can be designed by the persuasive game designer. This transfer design is often neglected. Three main design methods can be applied to make this transfer as transgression from the game world to the real world: (1) Sudden change, in which there is no transgression. The game world experience functions as a prime for the behaviour in the real world; (2) Gradual change, in which the game world dissolves gradually into the real

world and vice versa. The game world may (a) finally vanish into the real world (dissolve) or (b) parts of the game world may remain present in the real world; and (3) Adaptive change, when the level of transgression from the game world into the real world is dependent from the actual user's behavioural change in the real world. Given the behavioural goals of persuasive games it is essential that the transfer effect of the game world is tested in effect studies (c.f. evaluations, N=1 studies, control studies, RCTs). Effect studies can focus on the game design as a whole or on the effect of individual game-elements generating generic knowledge for persuasive game design.

### **Defining Games: When are games?**

Following the central position of the user experience in the game worlds and the real world, the classification of a game primarily depends on its use and only secondary on the game product. For example, a game product like a baseball bat can be used as entertainment game (baseball), as a persuasive game (increase social relations), or as a non-game (weapon). At the same time, a non-game object like pavement tiles can be used as non-game (to walk), as game (to avoid the tile crossings) or as (rather dull) persuasive game (not to walk on the street). So ultimately, the decision if something (a product, rule system, or activity) is a game is dependent on its use. The question of *What is a game?* could therefore be changed into "*When is a game experienced as game?*" or shorter *When is a game?* (c.f. Goodman's *When is art?* question [6]). This question is positively answered by the user experience of an game world including the presence of game-elements symptoms. Persuasive

games additionally include aimed behavioural transfer effects.

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