

Creative Process Engagement in a Multiplayer Online Ideation Game

Maximilian Witt¹, Christian Scheiner², Susanne Robra-Bissantz¹, Kai-Ingo Voigt²,

¹Institut für Wirtschaftsinformatik, Abteilung Informationsmanagement
Technische Universität Braunschweig, Mühlentorstraße 23, D-38106 Braunschweig
m.witt@tu-bs.de
s.robra-bissantz@tu-bs.de

²Lehrstuhl für industrielles Management
Universität Erlangen-Nürnberg, Lange Gasse 20, D-90403 Nürnberg
scheiner@industrial-management.org
voigt@industrial-management.org

Abstract: This paper aims to discuss the use of a hedonic system, i.e. a multiplayer online ideation game (OIG), to integrate users into the generation of ideas for real-world problems. An OIG, which was played by the surveyed participants for total of more than 1070 hours, was therefore evaluated in a twofold approach: Firstly, we examined the degree of players' creative process engagement in a longitudinal perspective. Secondly, we conducted interviews in order to find reasons for a change in creative process engagement. We found an increase in two of three components of creative process engagement during the first and a decrease during the last intervals. The altered perception towards missions and game mechanics such as game points, social points, and stories provides a logical explanation for this development.

1 Introduction

Drawing on consumer psychology, [BA90, DW00, HO93] information system researchers distinguish „hedonic“ from “utilitarian” systems. The term hedonic derives from the old Greek word „ἡδονή“ and means „joy, pleasure, enjoyment“. These types of systems are designed to be an end in itself, to provide a self-fulfilling value to the user and accordingly trigger intrinsic motives [vdH04]. When designing a hedonic system, overall aim is to drive engagement and encourage prolonged use [vdH04]. Online games are examples for hedonic systems. In contrast, utilitarian information systems aim to increase the task performance of users. The term utilitarian derives from the Latin word „utilis“ and means „useful“. Van der Heijden [vdH04] argues that these systems have to provide as „little distraction as possible to

help the user perform his or her task“ (p. 696). When designing an utilitarian system the overall aim is to encourage productive use.

Within interactive software and WWW-Technologies, however, scope and application of information systems in today’s society have expanded beyond the dichotomy of utilitarian and hedonic systems: While in the past hedonic systems as games were used in a home environment and utilitarian systems were used in a office environment, in times of „liberatory postmodernism“ [FVV95] productive and active individuals also use hedonic systems at work and utilitarian systems at home, too [DH02, SM01]. Thus, a new class of interactive systems has emerged, where designers aim at productive and prolonged use simultaneously [MK01].

Examples for such systems are Internet-based tools such as toolkits for user innovation [FP04, vH01], communities [FS03, Fi09], or idea competitions [PW06, BM10] that enable individuals to voluntarily participate in idea generation (ideation). Researchers such as Füller [Fü09, Fü10] have observed an “inflationary increase” in the use of these tools and emphasize that organizations must concentrate not only on the utilitarian (i.e. productive use), but also on the hedonic nature (i.e. prolonged use) of these systems. It is argued that individuals who use a more hedonic system are also more intrinsically involved in creative tasks and processes [Am83, vdH04]. Consequently, they are more likely to devote all attention to the problems they encounter [Sh95, SGB00]. In considering this aspect, the use of a hedonic system might influence creative process engagement, which is defined as involvement in creativity-relevant processes, including (1) problem identification, (2) information searching and encoding, and (3) idea and alternative generation [ZB10].

This papers’ object of research is a hedonic system, which is also useful. This system is a multiplayer online ideation game (OIG), which aims to integrate users into the generation of ideas for real-world problems. Thus, it follows the idea of “games with a purpose, i.e., games that are fun to play and at the same time collect useful data for tasks that computers cannot yet perform” [HvA09].

This examined OIG was played at two large German universities in summer term 2011. As there are only a few publications that focus on the boundaries of games and idea management (e.g. [Fü09, To06, MR06]) and as the concept of OIGs is new an exploratory research design is chosen. The evaluation of the game is twofold. Firstly, we examine the degree of players’ creative process engagement over a period of ten weeks. Secondly, we conducted in-depth, full-structured interviews when the game had ended to discern reasons for the degree of creative process-engagement. We, therefor, also asked players to describe and explain their feelings regarding “game mechanics” such as game points, social points, and stories, because they are triggers to evoke actions and behaviours of players and thus possible reasons for engagement [FSH04, Co06].

2 Theory

2.1 Online Ideation Games

Researchers such as Hacker and von Ahn [HvA09], Füller [Fü10] and Cooper et al. [Co10] recently propose that online games have the potential to motivate people to deliver useful data. Yet multiplayer online games that are used to integrate individuals into ideation have so far been almost completely ignored in scientific research, although a few OIGs have been practically applied in recent years to solve real-world problems. Examples of such OIGs include MMOWGLI (www.mmowgli.nps.edu), Foldit (<http://fold.it>), or Breakthroughs to Cures (<http://breakthroughstocures.org>). With help of the game MMOWGLI, the United States navy aims to gather ideas on how to deal with piracy in the Gulf of Aden. In Foldit players help to obtain ideas for the folding of proteins, which can be a potential source for a vaccine [Co10]. And the game Breakthrough to Cures targets the motivation of players to generate ideas about the change of the medical research system and drug development.

An OIGs is based on specific building blocks termed “game mechanics”. We define game mechanics as triggers to evoke actions and behaviors of players [FSH04, Co06]. Thus, this definition follows Fullerton et al. (2004) [FSH04] and Cook (2006) [Co06], who see game mechanics as a necessary instrument to guide players towards a goal. Developers, who are responsible for the application and implementation of game mechanics into OIGs, do not ask themselves how individuals will play the game, but how the game has to be designed that individuals show specific actions and behaviors. Consequently, developers spark and induce engagement by enriching OIGs with game mechanics. Although, there is no common set of mechanics inherent in every OIG, the following mechanics occur more frequently:

- **Game points** are automatically given by the system. Participants gain them for reaching predefined goals of the game. **Social points** are given by other participants for example in form of a five-star- or a thumbs-up-thumbs-down-visualization. For example in MMOWGLI players get game points for submitting ideas and social points for receiving positive evaluations for their ideas from other players.
- **Levels** can be described as sections or stages. If levels are conceptualized as sections, they do not differ in difficulty. Levels in form of sections allow players to choose between different parts of the game and to break down the “gameload” [By05]. If levels are designed as stages, they represent a “discrete change in difficulty” [Mc09]. They indicate major encounters for the next game period [MJx09]. When reaching a higher stage, players often unlock features and abilities and become more powerful. An example for an OIG with levels in form of stages is Foldit, whereas the folding increases in difficulty from level to level.
- **Collecting** (e.g. badges) is a further game mechanic. Badges represent achievements for example in the form of virtual, graphic objects (like a trophy). Oftentimes one single badge is illustrated as a part of a set, which players hope to complete. “Breakthrough to

Cures” (<http://breakthroughstocures.org>) serves as an example of an OIG in which players can collect badges.

- **Exchange** is another game mechanic and can occur explicitly or implicitly. Alternating or trading characterizes explicit exchange. Implicit exchange comprises activities such as sharing, helping, and gifting.
- **Story** illustrates a further game mechanic. Two generic types of stories can be distinguished in a game environment. Static, predefined and passive stories (e.g. [Ab02, MW00, Lo00]), or dynamic, unplanned and interactive stories [Cr04]. The first type often appears in games in the form of background stories. The second type is found in games where players have the possibility to write a story on their own and thus influence the game itself. In Breakthrough to Cures for example a background story is used to present a future scenario that takes place in 2020: A widespread contamination has triggered a neurological disease that is expected to infect hundreds of millions of people.

2.2 Research Questions

Amabile [Am83] proposed that intrinsic task motivation is highly relevant in determining behaviors that may lead to creative outcomes. She points out, that “intrinsic motivation is one of the necessary preconditions for creativity, for it distinguishes what an individual can do from what he or she will do” [Am88]. Shalley’s research [Sh95, SGB00] indicates in this regard that when individuals are intrinsically engaged in their work, all of their attention and effort will be more likely focused on their jobs, making them more persistent and leading them to higher levels of creativity. This means that, using a hedonic system, which triggers intrinsic motives [vdH04], would positively effect creative process engagement, such as problem identification, information searching and encoding and idea generation [ZB10] over a long period of time. The first research question here, therefore, is:

Research question 1: Can a system, which aims to be hedonic and utilitarian simultaneously, lead to a permanent creative process engagement?

Operating from an instrumental perspective, one could argue that changes in creative process engagement over time can be explained with a changing perception of the game itself and especially the constituting game mechanics, which actually trigger the action and behavior of players. The explanation for this change lies in the individuals' desire to maintain equality between contributions and rewards [Ad65]. The following research question guided the evaluation:

Research question 2: What are the underlying reasons for changes in creative process engagement over time?

3 Empirical Study

3.1 Methodology

To answer the proposed research questions a twofold approach is chosen with both primary data of a longitudinal panel study and qualitative interviews.

The longitudinal study is based upon an online survey. Before the OIG started participants had to answer questions to the socio-demographic background (e.g. sex, age, family background). During the game another questionnaire was used to measure creative process engagement. Therefore the items of Zhang and Bartol [ZB10] were taken. These items are based on Amabile [Am83], Perry-Smith [Pe06] and Reiter-Palmon and Illies [RI04]. Zhang and Bartol [ZB10] distinguish three components of creative process engagement: problem identification, information searching and encoding, and idea generation. The construct comprises in total 11 items. Respondents were asked to answer the following question: “To what extent did you engage in the following actions when seeking to accomplish the mission [task] of the last week.” (1=“never”, 2=“rarely”, 3=“occasionally”, 4=“frequently”, 5=“very frequently”). Table 1 illustrates the items of creative process engagement.

Problem identification	
1	I spend considerable time trying to understand the nature of the problem.
2	I think about the problem from multiple perspectives.
3	I decompose a difficult problem/assignment into parts to obtain greater understanding.
Information searching and encoding	
4	I consult a wide variety of information.
5	I search for information from multiple sources (e.g. personal memories, Internet etc.).
6	I retain large amounts of detailed information in my area of expertise for future use.
Idea generation	
7	I consider diverse sources of information in generating new ideas.
8	I look for connections with solutions used in seeming diverse areas.
9	I generate a significant number of alternatives to the same problem before I choose the final solution.
10	I try to devise potential solutions that move away from established ways of doing things.
11	I spend considerable time shifting through information that helps to generate new ideas.

Table 1: Creative process engagement [ZB10]

This second questionnaire had to be answered within six hours after each interval of the OIG. Each participant logged into the online survey with a unique code. This ensured that the data could be allocated to a specific participant under the premise of anonymity and could be used

for a longitudinal panel analysis. A Friedman test is conducted to examine effects over time. As the Friedman test can only identify longitudinal effects, no statements can be given towards differences between single intervals. As such, paired t-tests are used to overt such changes as the Kolmogorov-Smirnov test shows normal distribution for all items on $p < 0.05$ of creative process engagement 1, 2 and 3.

At the end of the play time 22 participants were asked to answer questions to which answers game-specific and -related knowledge was necessary. Players had access to relevant experience and could gain first hand experience in an OIG. Hence, respondents were able to acquire useful cognitive frameworks and game-specific and -related knowledge [MN91]. The interview was conducted in a standardized written interview. Respondents were sent eight questions that had to be answered within a week (see Table 2). While the quantitative approach offers insights into developments and changes over time, the interviews allow a deeper understanding of the reasons for the changes in creative process engagement.

No.	Question
1	What were the positive experiences that you made while playing the game?
2	What were the negative experiences that you made while playing the game?
3	What should be improved in the game in order to increase the motivation?
4	What should be improved in the game to increase the information brokerage?
5	What should be improved in the game in order to ease the completion of the tasks given?
6	Please describe a moment that has been especially memorable to you while playing the game?
7	Which game mechanics have you perceived as positive and why?
8	Which game mechanics have you perceived as negative and why?

Table 2: Interview guideline

3.2 Sample Subject and Study Sample

The analyzed OIG is called EVOKE (urgentevoke.com). Players of this game had to submit ideas to ten different topics within ten weeks. The game took place in two periods of time. The first period began on 3rd of March 2010 and was open to everyone. Within this work persons were questioned, who played the game in the second period. In the second period, which began on 28th of March 2011, only selected and approved people from, in particular, schools and universities could join. EVOKE was developed by the World Bank Institute and directed by Jane McGonigal. Each player was given one week to complete a task, and background information was available within the online game environment. Further information could be found via incorporated links [Mc11]. Players could furthermore examine the solutions of other participants to gather supplementary information. Hence, no knowledge was necessary to be successful and to play the game. Players were, however, encouraged to broaden the base of information by self-research. All tasks had a social innovation background and were selected to address general, major social problems.

Exceptions were the first and the last task. In the first, participants were asked to get to know the background theme of EVOKE. In the last, suggestions are be made about how the OIG could be improved in the future.

The organizers of EVOKE recommended that only individuals from the age of 13 and up should take part to ensure that participants possess at least a basic understanding of the addressed social problems and basic skills to work in the website. In addition, only small restrictions were given as to how ideas had to be presented in the game. Players could submit their ideas for example in blog posts, videos, or photos [Mc11]. EVOKE contains the following game mechanics:

- **Game points** are given automatically for the completion of a topic. **Social points** are given, if other players positively evaluate the contribution.
- **Levels** are designed in sections. Each week a new level in the form of a new task is presented. It is, however, not obligatory to complete the former level to have access to the following.
- **Collecting** is realized in such a way that players can achieve six badges for the completion of intervals (e.g. completion of the first mission or achievement of the first 100 social points) or specific activities (e.g. completion of a secret mission). The degree of difficulty grows with every achieved badge. The six badges are illustrated as part of a set. As soon as a further badge was collected it colored.
- **Exchange** is included into the game with its very basic functions. Participants can give feedback on the work of others by commenting and writing messages.
- **Story** is used in a multifaceted way. The static, predefined and passive story appears in EVOKE in the form of a background-story visualized as comic strips and presented as intro-video before the game starts and drawings before every mission. The dynamic, unplanned and interactive, stories are embedded into the game in the form of short stories and blog entries.

The study sample comprises 27 participants who played EVOKE from start to finish. The average respondent is 26 years old. Twenty participants are male and seven female. Participants spend in total more than 1070 hours in the OIG. This means that in average every participant played EVOKE for more than four hours per week.

4 Results

4.1 Analysis of Longitudinal Data

Figure 1 depicts the evaluation of creative process engagement split in its components “problem identification”, “information searching and encoding”, as well as “idea generation” over time.

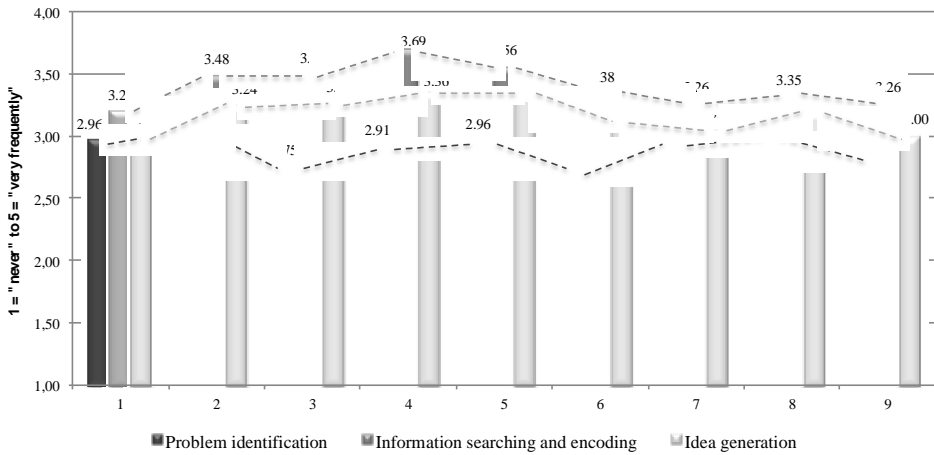


Figure 1: Creative process engagement components over time - means

The evaluation of creative process engagement is mainly located near the value of three. This means participants state that they are occasionally engaged in the activities of problem identification, information searching and encoding as well as idea generation. Problem identification is, however, the activity with the lowest degree of engagement during the whole idea competition, while information searching and encoding possesses the highest.

Regarding the stability of engagement over time the Friedman test shows significant changes for information searching and encoding and idea generation (see table 3). Hence, engagement in both components increases substantially while engagement in problem identification stays at the same level.

Creative process engagement components	Chi-Square	df	Asymp. Sig. (2-tailed)
Problem identification	11.937	8	0.154
Information searching and encoding	23.215	8	0.003
Idea generation	21.580	8	0.006

Table 3: Friedman test for creative process engagement components

Although the Friedman test is able to identify changes over time, no insights can be gained into differences between single intervals. This research gap can be closed by using paired t-tests as items fulfill the premise of normal distribution measured with a Kolmogorov-Smirnov test. The visible decreases in problem identification from interval two to three, from

five to six as well as from eight to nine are significant changes on a level of $p < 0.05$ in the paired t-test. The increase between interval six and seven is significant on $p < 0.10$. Regarding information searching and encoding the increase of engagement from interval one to interval two is significant on a level of $p < 0.05$. Until interval five the engagement stays stable to decrease then significantly from 3.56 to 3.38 in interval six ($p < 0.05$). In the component idea generation significant changes ($p < 0.05$) can be observed between the intervals one to two, five to six and eight to nine. In the beginning the engagement rises from 2.98 to 3.24 and remains stable until it falls from 3.36 to 3.12 from interval five to interval six and later from 3.19 to 3.00. Table 4 summarizes the significant paired t-test results.

Creative Process Engagement no.	Interval	Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1	2-3	0.309	0.546	0.105	0.093	0.525	2.935	26	0.007
1	5-6	0.235	0.569	0.109	0.010	0.460	2.144	26	0.042
1	6-7	-0.210	0.608	0.117	-0.450	0.030	-1.796	26	0.084
1	8-9	0.173	0.407	0.078	0.012	0.334	2.207	26	0.036
2	1-2	-0.284	0.512	0.099	-0.487	-0.081	-2.88	26	0.008
2	5-6	0.173	0.492	0.095	-0.022	0.368	1.824	26	0.080
3	1-2	-0.267	0.625	0.120	-0.514	-0.019	-2.217	26	0.036
3	5-6	0.237	0.451	0.087	0.059	0.415	2.732	26	0.011
3	8-9	0.193	0.398	0.077	0.035	0.350	2.514	26	0.018

Table 4: Significant paired t-tests

3.1 Analysis of Interview Data

To illuminate the above-described changes in creative process engagement interviews are analysed.

Missions (problems) were directly introduced and explicated to the players, which can explain the relatively low and stable degree of **problem identification**. The missions were “clearly and understandably formulated” (player 3), “described in detail” (player 6) and “neither too easy nor too difficult” (player 16, player 17). Consequently, it was not difficult for players to identify and understand the problem (player 13).

In fact, the game offered possibilities to engage in **information searching and encoding**. The analysis of the longitudinal quantitative data also shows that players devoted time and

effort for these activities. Engagement even increased especially at the beginning of the game (intervals 1 to 4) and then decreased during the following intervals until the end. Half of the interviewed players (2, 3, 4, 5, 6, 12, 15, 17, 20, 21, 22) state that they consulted especially in the first five intervals a variety of information. The sources were provided within the game and illustrate the problems from different cultural and national perspectives. Player 4 expressed the opinion, that he used large amounts of information, when saying: “By playing the game a lot of information was spread. (...) During the game there have been stories told about problems mainly from countries far away from Germany and while playing (...) players became aware of problems, which they considered as non-existent”.

The players name two reasons that might explain, why engagement in information searching and encoding decreased from interval 4 on until the end. First, missions were perceived as more unspecified and open-ended in later intervals. Hence, provided links could not offer large amounts of detailed and sufficient information anymore and players reduced their engagement twofold. They did not consult provided information sources and did not shift through information that supported the idea generation. Player 11 recapitulates: “Towards the end playing the game became a duty. Missions turned out to be less clear. It wasn’t possible to investigate a solution anymore”. Second, the game mechanic exchange could not unfold its potential. From the players point of view exchange plays generally a “pivotal role” (player 6) “to share information and receive feedback” (player 14) and thus might exert an influence on long-term engagement in information searching and encoding. An enduring exchange between players was, however, not possible, because only a small group played in the second period (player 2, 7, 10, 13, 22). Player 10 exemplifies this: “Actually, at the beginning of the game, I received some messages and comments from Spanish, Bolivian, and American players, but after week three the only ones to read my blogs seemed to be people on my friends list. The input, therefore, was rather small (...)”.

The game also allowed players to engage in **idea generation**. Players considered a variety of information sources (like blogs, videos, comics, websites) to generate new ideas and moved away from established ways of doing things (player 9, 12, 15). The following quotations illustrate why engagement with regard to idea generation increased in the first intervals: “I learned a lot about the different social problems and aspects from all over the world and I think I came up with a few creative solutions to a few urgent social problems”. And player 15 adds: “For me, Evoke was a success and generally achieved what it should: it made me more aware of social problems in this world and got me thinking about solutions to them”. Aside from these reasons, which also explain a decline in information searching and encoding, the following four explanations might elucidate the decline in engagement regarding idea generation.

First, at the beginning players engaged in idea generation to receive game points (player 9, 14, 18) ,but there was, however, no long-lasting positive perception of game points (players 1, 7, 9, 11, 12, and 22). Player 22 explains: “By and by it became clear to me, that there is no attraction behind it (...). Somebody, who took the task seriously and spent considerable time in writing contributions got the same amount of points as a person, who wrote just two lines. This cannot be!” Thus, the allocation of game points independent from their quality offers an explanation as to why engagement in idea generation might have decreased.

Second, though nine players (2, 3, 4, 6, 9, 12, 19, 21, 22) are convinced of a general, positive effect of social points towards engagement in idea generation, some also name drawbacks that might have undermined their positive effect. Player 2 and 11 believe that game points corrupted gradually the positive effect of social points, because game points were easier to reach than social points. This can probably be traced back to and was intensified by the fact that the second period did not offer players a vibrant community. “Thereby social points lost with time their attraction. And I didn’t feel like giving points anymore, too” (player 17). Furthermore , players started to game the system by cartelization among their friends (player 5, 10, 14). Player 14 asserts: “As I mentioned before, the awarding of points can be seen as unfair. Friends mostly rate their own friends, this often being independent of the quality of their posts.” In sum, some players felt that the method of how social points were implemented lowered engagement in idea generation over the long-term.

Third, the way in which collecting was implemented might explain the decrease of engagement in idea generation, because (as described in chapter 3.2) unlocking badges was linked to the successful completion of missions. Although e.g. player 8 stated that collecting badges is “(...) really motivating and interesting (...)”, players agree that collecting can encourage prolonged use only if the number of badges is higher than six (players 2, 5, 18, 20) and if there is a balanced growth in difficulty to achieve them (player 11, 12, 18, 22). While the first three badges in EVOKE could be gained easily, the following three badges were too difficult to achieve. Hence, it became too difficult to complete the set (player 5). Player 17 summarizes: “At the beginning achieving badges was fun, but after I have reached the first three [badges], this feature became quickly boring. One reason might be, that there were too few achievements. Additionally, there was a huge time lag between obtaining the first three and the last three badges”.

Fourthly, stories were highly appreciated of some player as they “motivated to develop new ideas” (player 5), helped “finding solutions” (player 12), and “delivered ideas for solutions” (player 17), but were seen critically by other players. Player 16, 20 and 21 held the opinion that the background stories in the form of comics did not have enough in relation to the mission aims. Player 20 even stopped reading the comics “after the third or fourth mission”.

Consequently, stories weren't used as a source of information in generating new ideas anymore, which could explain why engagement in idea generation decreased.

5 Discussion and Future Research

Our research examines the use of a hedonic system to integrate users into the process of ideation: An online ideation game aims to engage players to solve real-world problems within an online game. The findings of this paper show from an empirical, longitudinal panel basis that an OIG influences creative process engagement, i.e. information searching and encoding as well as idea generation. The Friedman test revealed significant changes for these two components of creative process engagement. Descriptive analyses and paired t-tests display an increase until the fourth the fifth interval and a decrease in the following intervals until the end. Results from full-structured interviews provide logical explanations for this development. Engagement in information searching and encoding might be negatively influenced by an altered perception of the missions towards the end of the game and an insufficient elaborated application of the mechanic exchange. Engagement in idea generation might be negatively affected by an inappropriate integration of game points, social points, collecting and stories.

Certainly, our study has several limitations. First, only a small number of selected people could join the second period of the game. Consequently, the game lost to some extent its multiplayer-character. Secondly, only a small number of players were surveyed. As a result this study does not strive for generalizations.

A number of implications follow for both theory development as well as practice. With regard to theoretical advancement, researchers have to investigate how to design and deploy OIGs effectively, so that creative process engagement is steadily fostered. The issue of how game mechanics have to be applied is in this regard of high importance. Examples for further interesting research questions are: How can game points be applied without undermining social points? How should social points be implemented to avoid cartelization? How does collecting influence long-term creative process engagement? How do stories have to be designed to give the adequate amount of information to positively influence creative process engagement?

From the perspective of practice, two essential implications follow. A first key implication for managers relates to the design of OIGs. OIGs must be implemented carefully. Otherwise they cannot unfold their potential and are less likely to trigger creative process engagement. It has to be bore in mind: Along the way to a sophisticated OIG, companies need to be courageous and enduring. Second, our results point to the importance of designing and

applying hedonic systems, i.e. online ideation games, to spark creative process engagement of users. OIGs are a capable response to the uncertainties and difficulties that are faced by ideation today.

References

- [Ab02] Abbott, H. P.: *The Cambridge Introduction to Narrative*. Cambridge University Press, New York, 2002.
- [Ad65] Adams, J. S.: *Inequity in Social Exchange*. In (L. Berkowitz (Ed.)): *Advances in Experimental Social Psychology*, Academic Press, New York, 1965; pp. 267-299.
- [Am83] Amabile, T. M.: *The Social Psychology of Creativity: A Componential Conceptualization*. *Journal of Personality and Social Psychology*, 45 (2), 1983; pp. 357-376.
- [Am88] Amabile, T. M.: *A Model of Creativity and Innovation in Organizations*. In (B. M. Staw & L. Cummings (Eds.)): *Research in Organizational Behavior* (Vol. 10). JAI Press, Greenwich, 1988; pp. 123-167.
- [BM10] Bullinger, A.C.; Moeslein, K. M.: *Online Innovation Contests - Where are we?* Proceedings of the Sixteenth Americas Conference on Information Systems (AMCIS), Lima, 2010.
- [BA90] Batra, R.; Ahtola, O. T.: *Measuring the Hedonic and Utilitarian Sources of Consumer Attitudes*. *Marketing Letters*, 2 (2), 1990; pp. 159-70.
- [By05] Byrne, E.: *Game Level Design*. Charles River Media, Hingham, 2005.
- [Co06] Cook, D.: *What are Game Mechanics?* available online at <http://lostgarden.com/2006/10/what-are-game-mechanics.html>, 2006. (accessed: 26/3/2008).
- [Co10] Cooper, S.; Khatib, F.; Treuille, A.; Barbero, J.; Lee, J.; Beenen, M.; Leaver-Fay, A.; Baker, D.; Popović, Z.: *Predicting Protein Structures with a Multiplayer Online Game*. *Nature* 466 (7307), 2010; pp. 756-760.
- [Cr04] Crawford, C.: *Chris Crawford on Interactive Storytelling*. New Riders, 2004.
- [DH02] Dahan, E.; Hauser, J. R.: *The Virtual Customer*. *Journal of Product Innovation Management*, 19 (5), 2002; pp. 332-353.
- [DW00] Dhar, R.; Wertenbroch, K.: *Consumer Choice between Hedonic and Utilitarian Goods*. *Journal of Marketing Research*, 37 (1), 2000; pp. 60-71.
- [FVV95] Firat, A.; Venkatesh, F.; Venkatesh, A.: *Liberatory Postmodernism and the Reenchantment of Consumption*. *Journal of Consumer Research*, 22 (2), 1995; pp. 239-267.
- [Fi09] Fichter, K.: *Innovation communities: The Role of Networks of Promoters in Open Innovation*. *R&D Management Journal*, 39 (4), 2009; pp. 357-371.
- [FP04] Franke, N.; Piller, F. T.: *Value Creation by Toolkits for User Innovation and Design: The Case of the Watch Market*. *Journal of Product Innovation Management*, 21 (6), 2004; pp. 401-415.
- [FS03] Franke N.; Shah S.: *How Communities Support Innovative Activities: An Exploration of Assistance and Sharing Among End-Users*. *Research Policy*, 32 (1), 2003; pp. 157-178.
- [FSH04] Fullerton, T.; Swain, C.; Hoffman, S.: *Game Design Workshop. Designing, Prototyping and Playtesting Games*. CMP Books, San Francisco, 2004.
- [Fü09] Füller, J.: *Anleitung zum Kreativsein*. *Harvard Business Manager*, (9), 2009; pp. 98-101.
- [Fü10] Füller, J.: *Refining Virtual Co-Creation from a Consumer Perspective*. *California Management Review*, 52 (2), 2010; pp. 98-123.

- [HvA09] Hacker, S.; von Ahn, L.: Matchin: Eliciting User Preferences with an Online Game. Proceedings of the 27th International Conference on Human Factors in Computing Systems, Boston, 2009; pp. 1207-1216.
- [HO93] Haim, M; Oliver, R. L.: Assessing the Dimensionality and Structure of the Consumption Experience: Evaluation, Feeling, and Satisfaction. *Journal of Consumer Research*, 20 (3), 1993; pp. 451-466.
- [Lo00] Lowe, N. J.: *The Classical Plot and the Invention of Western Narrative*. Cambridge University Press, New York, 2000.
- [Mc11] McGonigal, J.: *Reality is Broken: Why Games Make Us Better and How They Can Change the World*. Random House, London, 2011.
- [MJ09] McGuire, M.; Jenkins, O. C.: *Creating Games: Mechanics, Content, and Technology*. A K Peters, Wellesley, Massachusetts, 2009.
- [MK01] Moon, J.-W.; Kim, Y.-G.: Extending the TAM for a World-Wide-Web Context. *Information and Management*, 38 (4), 2001; pp. 217-230.
- [MN91] Meuser, M.; Nagel, U.: *ExpertInneninterviews - Vielfach erprobt, Wenig bedacht - Ein Beitrag zur Qualitativen Methodendiskussion*. In (Garz, D. & Kraimer, K. (Eds.)): *Qualitativ- Empirische Sozialforschung*, Westdeutscher Verlag, Opladen, 1991.
- [MR06] Mainemelis, C. & Ronson, S.: Ideas are Born in Fields of Play: Towards a Theory of Play and Creativity in Organizational Settings. *Research in Organizational Behavior*, 27 (6), 2006; pp. 81-131.
- [MW00] Mallon, B.; Webb, B.: Structure, Causality, Visibility, and Interaction: Propositions for evaluating Engagement in Narrative Multimedia. *International Journal of Human-Computer Studies*, 53 (2), 2000; pp. 269-287.
- [Pe06] Perry-Smith, J.: Social Yet Creative: The Role of Social Relationships in Facilitating Individual Creativity. *Academy of Management Journal*, 49 (1), 2006; pp. 85-101.
- [PW06] Piller, F. T.; Walcher, D.: Toolkits for Idea Competitions: A Novel Method to Integrate Users in New Product Development. *R&D Management*, 36 (3), 2006; pp. 307-318.
- [RI04] Reiter-Palmon, R.; Illies, J.: Leadership and Creativity: Understanding Leadership from a Creative Problem solving Perspective. *Leadership Quarterly*, 15 (1), 2004; pp. 55-77.
- [Sh95] Shalley, C. E.: Effects of Coaction, Expected Evaluation and Goal Setting on Creativity and Productivity. *Academy of Management Journal*, 38 (2), 1995; pp. 483-503.
- [SGB00] Shalley, C. E.; Gilson, L. L.; Blum, T. C.: Matching Creativity Requirements and the Work Environment: Effects on Satisfaction and Intent to Turnover. *Academy of Management Journal*, 43 (2), 2000, pp. 215-224.
- [SM01] Slywotzky, A. J.; Morrison, D.: The Rise of the Active Customer. *Marketing Management*, 10 (2), 2001; pp. 22-26.
- [To06] Toubia, O.: Idea Generation, Creativity, and Incentives. *Marketing Science*, 25 (5), 2006; pp. 411-425.
- [vH01] von Hippel E.: Perspective: User Toolkits for Innovation. *Journal of Product Innovation Management*, 18 (4), 2001; pp. 247-257.
- [vdH04] van der Heijden, H.: User acceptance of Hedonic Information Systems. *MIS Quarterly* 2004, 28 (4); pp. 695-704.
- [ZB10] Zhang, X.; Bartol, K.: Linking Empowering Leadership and Employee Creativity: The Influence of Psychological Empowerment, Intrinsic Motivation, and Creative Process Engagement. *Academy of Management Journal*, 53 (1), 2010; pp.107-128.