Innotin game supporting collective creativity in innovation activities

Parjanen Satu, Hyypiä Mirva

INNOTIN GAME SUPPORTING COLLECTIVE CREATIVITY IN INNOVATION ACTIVITIES

Abstract

To support collective creativity in innovation interdisciplinary methods are required. This study introduces the Innotin game to support collective creativity. This multiple case study includes three co-design workshops, where the Innotin game was played. The primary research question is how can gamification support collective creativity in multi-actor innovation activities? The first objective is to study the experiences of the players of the Innotin game and examine how the game supports creativity according to them and what they consider is essential in the game. The second objective is to define the results of the co-design workshops. What kinds of ideas were generated with the help of the game and what did the players learn during the game? The results of this study indicate that low-tech (board) games can be developed into a method that enhances creativity between collaborators in innovation activities.

1. Introduction

Organizations are trying to respond to increasing uncertainty and complexity in various ways. The development of open innovation and networking have already been well documented; these are based on the notion that tackling challenges in contemporary business environments demands recognition of a shift in competitive factors from the company and industry level towards the constellations of companies and other stakeholders linked together through knowledge flows and shared value creation processes in advancing joint value to their customers (Bakhshi, Freeman, & Potts, 2011; Bogers, Chesbrough, & Moedas, 2018; Bogers et al., 2017; West & Bogers, 2017; Hyypiä, 2013). By integrating different actors into the innovation process, creativity and know-how are brought into the organization. Creativity, which is closely linked to knowledge (Leonard & Sensiper, 1998), is considered as an important organizational capability (Amabile, 1998), a possible source of organizational performance (Woodman, Sawyer, & Griffin, 1993; Cirella, 2016) and a source of competitive advantage (Leonard & Straus, 1997). Furthermore, creativity allied to innovation plays a critical role in the innovation process.

Due to the increased pressure to innovate, organizations have become more interested in exploring new, collective ways to gain access to creative ideas. Creative achievements, such as innovations, are created ever increasingly in an interaction between different actors. The complexity of today's problems transcends the individual human mind, requiring not only individual but also collective creativity. In collective creativity, it is impossible to trace the source of new ideas to an individual. Instead, creative activity emerges from the collaboration and contribution of many individuals, thereby blurring the contribution of specific individuals in creating ideas (Hargadon & Beckhy, 2006; Nisula & Kianto, 2018; Leopoldino, González, & Júnior, 2016; Parjanen, 2012.)

Gamification may be used as one possible way to support collective creativity since it increases amusement, engagement, and immersion in activities (Skaržauskienė & Kalinauskas, 2014; Chou, 2015; Vesa, Hamari, Harviainen, & Warmelink, 2017). This study is interested in the Innotin game and its use in co-design workshops as an arena for creativity. The game board and the rules of the Innotin game were borrowed and developed from the well-known board game - Monopoly[1]. The basic idea of the Monopoly board game is a fast-dealing property trading. The origin of the Monopoly game board can be traced back to 1903, when Elizabeth Magie created a game called Landlord's Game. The purpose of the Landlord's Game was to represent an educational tool for illustrating the negative aspects of concentrating on land in private monopolies (Pilon, 2015). Over the years, different versions of the Monopoly game board have been developed; junior versions for young children, online versions or various Monopoly game based tools for learning and discussion purposes, for instance with financial accounting (Shankling & Ehlen, 2007) or poverty and inequality (Ansoms & Geenen, 2012).

The premise for designing the Innotin game to be used as a means for encouraging innovation activity was that the Monopoly game board provides rather well-known and adjustable arena for playing. The primary research question is how the gamification supports collective creativity in various innovation processes. The first objective of this study is to examine the experiences of the players of the Innotin game: how the game supports creativity according to the players and what they consider essential in the game. The second objective is to examine the results of the co-design workshops and look at what kinds of ideas were generated with the help of the game and what the players learned during the game. This study uses a case study approach as a research strategy. This multiple case study includes three cases and their co-design workshops where the Innotin game was played. The cases were chosen because they represent different industries; wood processing, exercise and well-being and Small and

---

[1] *Monopoly is a board game where players roll two six-sided dice to move around the game board, buying and trading properties, and develop them with houses and hotels. Players collect rent from their opponents, with the goal being to drive them into bankruptcy. Money can also be gained or lost through Chance and Community Chest cards, and tax squares; players can end up in jail, which they cannot move from until they have met one of several conditions. The game has numerous house rules and hundreds of different editions exist, in addition to many spin-offs and related media; Monopoly has become a part of international popular culture, having been locally licensed in more than 103 countries and printed in more than 37 languages* (https://en.wikipedia.org/wiki/Monopoly_(game)).

Medium sized Enterprises (SMEs) operating in the field of logistics. This study focuses on the constellations of organizations and stakeholders who are intertwined through knowledge flows and shared value creation processes. The knowledge flows and value creation are linked to this study through co-design workshops and collective creativity.

2. Gamification as a tool for collective creativity

In this study, knowing and learning are considered a creative process at individual and collective levels. Learning is not a case of repeating what is known but creating something new. The problems that people are nowadays confronted with are usually complex and multi-faceted and require a wide variety of knowledge and expertise to be solved. The essential features of a problem are given when there is a goal, but there is lack of a clear or well-learned route to that goal. A problem-solving process is one whereby a situation that is not as it should be is transformed into one that is as it should be. In problem solving, it is possible to distinguish between routine problem solving and creative problem-solving. (Proctor, 2005; Steiner, 2009.) Creative problem-solving can occur when the task presented involves complex, ill-defined problems where performance requires the generation of novel useful solutions (Ford, 2000; Mumford & Gustafson, 1988). This implies that learning and creativity are closely intertwined and learning takes place through creative practices (Kangas, 2010).

The more complex the problem, the harder it will be for an individual to creatively develop solutions by her or himself. Therefore, the participation and contribution of different stakeholders with various backgrounds are required. Collective creativity takes place in those situations when only one individual does not hold all of the necessary knowledge to construct a creative solution, however, the potential for a creative solution requires the domain relevant skills of multiple participants. One person might have a potentially valuable idea but may not recognize its value, while another may have enough

knowledge of the problem in order to value the idea but he or she is not aware of it (Hargadon & Beckhy, 2006; Parjanen, 2012).

Collective creativity is associated with the diversity of perspectives (Bouncken, Brem, & Kraus, 2016; Fischer, Giaccardi, Eden, Sugimoto, & Ye, 2005; Kozinets, Hemetsberger, & Schau, 2008). The centres of creativity tend to be found at the intersections of different domains where beliefs, lifestyles, and knowledge could be mingled allowing people to see a new combination of ideas (Csikszentmihalyi, 1996, p. 9). Thus, people tend to be attracted to groups made up of members similar in some way to themselves, and relatively few people are capable of bonding different groups together. If group selection favours those who are similar, it reduces the diversity of the members. Homogenous groups often reach solutions more quickly and with less friction along the way. However, homogenous groups do little to enhance expertise and creative thinking. Everyone in the group comes in with a similar mindset and leaves with the same. (Amabile, 1998.) Based on this, diversity between innovating partners can be considered as a source of collective creativity (Fischer et al., 2005; Kozinets et al., 2008). The characteristics of collective creativity found in the literature are listed in Table 1.

Table 1. Characteristics of collective creativity (Parjanen, 2012).

Collective creativity	
• creativity that is shared by two or more people	Hargadon & Bechky, 2006; Sawyer, 2006; Sanders & Stappers, 2008
• outcome is more than a sum of individual efforts	Fischer et al., 2005; Hargadon & Bechky, 2006; Sawyer, 2006
• importance of collaboration	Chaharbaghi & Cripps, 2007; O'Donnel et al., 2006; Sanders & Stappers, 2008
• common interest or concern	Fischer et al., 2005; van Osch & Avital, 2009
• dialogue	Fischer et al., 2005; Sundholm, Artman, & Ramberg, 2004
• emphasis on past knowledge	Fischer et al., 2005; Hargadon & Beckhy, 2006; O'Donnel et al., 2006
• situated practice	Sundholm, Artman, & Ramberg, 2004; O'Donnel et al., 2006
• diversity as a source of collective creativity	Fischer et al., 2005; Kozinets, Hemetsberger, & Schau, 2008

However, the diversity between professional forms of knowledge can act as a barrier to collective creativity processes. For example, heterogonous teams are confronted with difficulties arising from different working- and communication styles (Bouncken et al., 2016). It is assumed that in the same cases the specialists of different domains have to intensively learn from each other in order to be able to jointly develop the new innovation. This implies that groups of specialists transfer their specific knowledge, which encompasses different concepts, theories, methods, and worldviews, among each other. It is argued that intensive cross-learning between specialists is a considerable expense in time and effort and therefore, inefficient (Schmickl & Kieser, 2008.) The notion of boundary objects (Bechky, 2003; Koskinen, 2005; Mäenpää, Suominen, & Breite, 2016) is cited as providing a possible channel through which distinct groups can communicate during the innovation process.

Boundary objects are objects that are flexible enough to adapt to local needs and the constraints of the stakeholders employing them, yet specific enough to maintain a common identity across different interpretations (Star & Griesemer, 1989). Boundary objects are the physical or virtual entities that allow groups to combine and form working relationships. Besides being concrete, boundary objects may also be metaphorical and intangible, such as the figures of speech or renaming a concrete phenomenon in an illustrating manner can play a significant role, especially in the sharing of tacit knowledge and understanding between people (Koskinen, 2005). Objects become boundary objects when they are used at the interface of different groups, social circles, stakeholders or organizations. If boundary objects are designed and used properly, they connect what were once separating different actors together. Boundary objects are the links in the communication processes where different perspectives are to be discussed into a co-created meaning (Brown & Duguid, 1991; Wenger, 2000; Mäenpää et al., 2016).

The notions of co-creation and co-design have been growing. Opinions about who should be involved in these collective acts of creativity, when, and in what role vary widely. Co-creation refers to any act

of collective creativity. The co-creation is a very broad term with applications ranging from the physical to the metaphysical and from the material to the spiritual. The co-design is a specific instance of co-creation. By co-design, authors refer to collective creativity as it is applied across the whole span of a development or innovation process. The co-design refers to the creativity of people also including those who are not trained in working together in the innovation process. (Sanders & Stappers, 2008; Nisula & Kianto, 2018.) Both co-design and co-creation can occur throughout the process, however, this paper focuses on instances of co-design in the fuzzy front end of the innovation processes. The key benefit of the co-design workshops is that they help to organize collective creativity (Sanders, 2002; Steen, Manschot, & De Koning, 2011). In the co-design workshops of this study, gamification is used as a tool to enhance individual and collective creativity.

The concept of gamification has recently gained popularity and the attention of researchers from various fields including education, management, and marketing (Alahuhta, Nordbäck, Sivunen, & Surakka, 2014; Domínguez et al., 2013; Kangas, 2010; Hyypiä & Parjanen, 2015; Huotari & Hamari, 2017; Vesa et al., 2017). Takeuchi and Nonaka discussed already in 1986 improving product design through a development game. Even back then, the idea was to challenge existing status quos and shift from a linear to an integrated approach, encouraging trials and accepting mistakes. Huotari and Hamari (2017), however, suggest that there is a second way of defining gamification: "as a process of providing affordances for gameful experiences which support the customers' overall value creation". Comparing with the game approach of Takeuchi and Nonaka, the nowadays gamification should involve all members of the organization and if possible customers as well, not merely research and development department of the company.

In this study, Innotin board game was used to enhance collective creativity in innovation activities as well as increase the engagement of participants and stakeholders during the innovation process (Chou, 2015). Many of the studies on gamification focus on web-based tools or platforms, such as the

study by Domínguez et al. (2013) about student motivation in e-learning platforms, the study by Fernandes et al. (2012) about web-based gamified environment design for supporting collaborative elicitation and the study by Alahuhta et al. (2014) about how gamification supports team creativity in virtual worlds. However, this study aims at shedding the light on how low-tech game boards could be used to support collective creativity.

Gamification per se does not guarantee the success of development or innovation processes. In such processes, participants decide on the degree of engagement in gameful experiences themselves, as well as the perceived value of the result (Huotari & Hamari, 2017). Gamification cannot be achieved solely by adding game mechanisms into innovation processes, and as a consequence, gamification does not automatically create new value or better engagement with customers, students or participants in development or learning processes (Hamari, 2013). In addition, a game-like environment should create opportunities for developing or modifying events during the game (Kurtz & Snowden, 2003). The actual idea of gamification is to add gamefulness to present organizational systems rather than constructing a completely new game (Hamari & Koivisto, 2013, p. 2). The authors found the definition of gamification provided by Huotari and Hamari (2017) suitable for this study. Hence, the aim of this study is to explore the gamification through innovation activities in real-life contexts. This study focuses on various organizations that are entwined through collective creativity and co-design processes.

3. Multiple case study

As a research strategy, a case study is used in many situations to contribute to our knowledge of an individual, group, organizational, social and related phenomena (Stake, 2005; Yin, 2009). However, the case study is only one strategy among several others of doing research. Other strategies include experiments, surveys and historical research. In this study, the type of research questions, the fact

that the investigators have little control over actual events, and the focus of the study as a contemporary phenomenon favoured the decision of using a case study research strategy. According to Yin (2009), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident. A case study strategy is also preferred when the researcher seeks answers to how and why questions.

This study is a multiple case study including three cases and their co-design workshops, where the Innotin game was played. The multiple case study enables the researchers to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases, or predict contrasting results based on a theory (Yin, 2009). The multiple case study approach was considered useful to this study as it allowed a broader view of gamification in the co-design workshops and richness of information, which may reveal a number of commonalities and diversity across cases.

A case study is also known as the triangulated research strategy, which means using different types of material, theories, methods, and investigators in the same study. The present study utilizes the triangulation of data and investigators in order to understand a complex phenomenon and to increase the quality of the study. The multiple case study is also suitable for this study because collective creativity as a concept and using games to support innovation activities have been meagre studied and the purpose of the study is to increase understanding about how can gamification support collective creativity.

In these cases, the researchers were not solely observers; they participated in the co-design workshops as a planner, participant or facilitator. They are aware that their internal position within

the study influences the way they interpret the data. However, the authors' roles among different cases varied. The authors analysed the data manually in co-operation and the case companies reviewed the results. The data inquiry was based on the content analysis; evaluating the appearance of mutual themes, adversarial feedback, experiences and suggestions for improvements. The manual analysis was chosen due to the rather small amount of data (Corbin & Strauss, 2008).

CASE A: Co-design with a company and its client organization

The first project concentrated on co-creating a value-adding network for open innovation processes between different companies. The project aimed at revealing the hidden and unspoken obstacles to collaboration through the different levels of an organization. The case company was a large international industrial company and researchers organized nine different sessions altogether for the employees of the company to bring together alternative outlooks, practices, and ideas. The researchers continued the project with the case company by extending the efforts to foster collaboration with their customers and members of their distribution channels. The trigger for enlarging the project was that the management was convinced of unused innovation potential in the network. The case concentrates on a co-design workshop, where an arena (the Innotin game) for knowledge co-creation between the case company and its client company is built. Altogether 34 people participated in the workshop from the case company (14) and the client company (20). For the game, all the participants from both companies were mixed in five different teams. Researchers formed the mixed teams beforehand. The co-design workshop was organized for the senior vice president, country managers, sale managers, marketing assistants, product designers, production and logistic workers. The planning process for the co-design workshop was done in collaboration with the case and client companies. The planning meetings included researchers, two managers and one marketing assistant from both companies. They invited the participants for the workshop.

CASE B: Co-design with potential users of virtual physical activity pharmacy platform

The case B builds on the MOTION! – project which aims to develop the exercise and well-being industry and create new collaboration models for co-operation between the private, public and third sectors. The key steps of the project included: creating a virtual physical activity pharmacy and piloting it together with the public, private and third sectors; ensuring the quality of services provided by the exercise industry in the health and exercise service chain; developing entrepreneurship in the well-being sector by using cluster operational models; developing new business models for the well-being industry through innovation; and strengthening collaboration between sectors through networks. The co-design workshop was organized for health experts in enhancing physical activity from public and third sectors. The project manager sent the invitation to the project members and other possible stakeholders. Nine people participated in the workshop.

CASE C: Co-design with representatives of SMEs at logistics

The case C is a university-facilitated innovation network that was established to ease the participation of SMEs in a long-term innovation process. Overall, 30 Finnish SMEs were brought together to discuss, collaborate and innovate. Traditionally enterprise networks are built the around defined fields of business or clusters. This network was built around three focal themes which were seen as crucial from the local business perspective. The focus was on SMEs working in the service business. The idea was to increase the innovation capability of not only individual organizations but also of the entire network and to lower the barriers to SMEs participating in innovation networks. The participants in the co-design workshop where the game was used represented different SMEs operating in logistics. Altogether 11 people participated in the workshop from eight different organizations. Beforehand they were asked about their interest to participate the project and this workshop was the second common workshop. The participants were invited to the workshop by the researchers responsible for the development project.

In terms of data collection, a case study requires the use of multiple sources of evidence. Multiple sources of data help address the issue of construct validity because multiple sources of evidence should provide multiple measures of the same construct (Yin, 2009). The multiple data sources were considered appropriate for this study because authors were interested in the (subjective) experiences of participants (Gummesson, 2000). The empirical data for this study consists of observation, feedback questionnaires, and documentary data. A summary of the data collection is presented in Table 2.

Table 2. Summary of the collected data.

The cases	Data collection
Case A	- Manuscript of the development day - One person focused only on observing the game as a method (written report) - Observing groups of participants (session and meetings where the results of the session were discussed) - Recorded data and photographs - Co-created session materials - Oral feedback from the players 25 written feedback from the players (questionnaire) - Report of the development day
Case B	- Manuscript of the development day - Participant-observation (session and meetings where the results of the session was discussed) - Oral feedback from the players - Report of the development day
Case C	- Manuscript of the development day - Recorded data and photographs 10 written feedback from the players and 2 written feedback from facilitators (questionnaire) - Report of the development session

4. **Co-creating the Innotin game intervention method**

In order to facilitate creativity, the co-design workshops, as a whole, were organized as a game. The starting point for designing the Innotin game as a means for encouraging innovation activities was that the Monopoly game board in itself provided a well-known arena for playing. In addition, the metaphorical aspects of competing and rules for playing were already known by most of the

participants. The Monopoly game board was enlarged to create a large mat of approximately 18 square meters in size upon which players were able to walk and it was named Innotin (Figure 1).

Figure 1. The visual design of the Innotin game. The design replicates the key elements of the Monopoly game board.

The Innotin game does not have a banker instead of an innovation-consultant, also a facilitator of the whole game. During the game, the currency used is innovation points and the teams were not able to buy houses or hotels rather, they were able to compete for innovation rewards. Innotin does not have streets but it has departments or sections. The main idea is to generate and share ideas and experiences related to the players' own fields, not just gain as many possessions as possible. Players are divided into mixed teams and they are challenged to compete against other teams throughout the workshop.

The theme of the Innotin game was modified for each workshop. As much as possible, the game needed to be team-oriented, and the teams were directed to perform different tasks rather than aim for properties or possessions. The dynamics of the game were considered from the aspects of the

relationships between players and the themes of the workshops. Other roles for the game also needed to be planned carefully in order to create a fun and constructive method for the co-design workshops.

The key roles in the Innotin game are defined as follows:

- An innovation consultant – Directing the playing

- Referee – Facilitating the overall workshop (optional role)

- Facilitator(s) – Supporting group work

- External participant(s) – Informal input on the topic (optional role)

- Team players – Competing and performing various tasks

The rules and mechanics of the game needed to be modified to work within a certain time frame and to meet the context of innovation and creativity. The graphic design of the game replicated the key elements of the Monopoly game board, and it was relatively rapidly decided that the game would be developed into a format larger than a board game, and this resulted in a large mat that the players could walk on. The winner team of the Innotin game is the team that have earned the most innovation points and rewards at the end of each workshop (Hyypiä & Parjanen, 2015; Hyypiä, 2013).

The tasks in the game enable a strong process for innovating and thus for being creative (Moritz, 2005). The topics for the various tasks appearing in the Innotin game required background information. This was gathered from the participants through surveys, interviews or earlier meetings before a co-design workshop. The tasks featured in the game and the facilitation of the game were revised and updated several times. Before the game was used with the case organizations in a real-life context, the Innotin game was tested with student volunteers. After spending some time playing the game, these students provided valuable feedback on the facilitation as well as the mechanics of the game itself.

The Innotin game utilizes various methods used in co-design processes but it essentially links together gamification and narrative approaches. Innotin enhances role play and group sketching etc. Through storytelling, experiences and viewpoints are shared via images, personas, posters, tomorrows' headlines and even a rap song chorus (Figure 2).

Figure 2. Example of Innotin game session from a co-design workshop. Innotin game is a large mat of approximately 18 square meters in size upon which players are able to walk.

5. Benefits of gamification in enhancing collective creativity

According to the results of this study, gamification is considered a suitable method for co-design workshops. Gamification was considered especially suitable for group work, as can be seen in Table 3 that presents the feedback from the cases A and C. The feedback was collected right after the co-design workshop. In the case A, 25 participants answered the questionnaire and in the case C, ten participants and two facilitators answered the questionnaire. The answering was voluntary. The scale in the feedback is from 4 (the lowest) to 10 (the highest). This scale is used to evaluate students throughout primary schools on a national level and it is familiar among the participants. When asked about what stuck in their minds about the game, the players answered as follows: "openness",

"innovativeness", "bravery", "open-mindedness", "good board game", and "good discussions and developable ideas". The feedback from cases was parallel as seen in Table 3. In the case A, the average score for the questionnaire item "The used methods were suitable" was 9.0 and in the case C, it was 8.7. Only one player in the whole data set considered playing not suitable for co-design workshops. However, according to him playing did facilitate good group work.

Table 3. Feedback from the cases A and C.

CASE A	Average	Max	Min
The feeling of the workshop	9.4	10	9
The theme of the workshop	9.2	10	8
The used methods were suitable for this kind of work	9.0	10	8
I think that this was useful	8.9	10	8
CASE C	Average	Max	Min
The feeling of the workshop	9.1	10	9
The theme of the workshop	8.8	10	8
The used methods were suitable for this kind of work	8.7	10	7
The used method facilitated group work during the workshop	9.1	10	8
I think that this was useful	8.9	10	8

Based on the comments of the observer and the players, the roles of the facilitator(s) were considered essential in playing. In the case A, the observer noted that the facilitator had an important role in commenting on what was happening in the game and making players feel relaxed. Reilly (2008) underlines that the facilitator is a guide whose predominant role is to focus on how things are made between people and in groups, not merely on what is done. Also, "well-prepared group works" were mentioned as being important to the success of the game playing. This implies that much of the work of the facilitators should have been done before playing and this is also highlighted by previous studies about facilitation (Konsti-Laakso & Rantala, 2018; McFadzean & Nelson, 1998; Parjanen, Harmaakorpi,

& Frantsi, 2010). In the case C, two facilitators answered the feedback questionnaire and they highlighted the importance of the order of the tasks, the role of the warming up exercises, ways to engage the players and the importance of a good spirit as critical elements of playing the game.

Creativity techniques are not only designed to stimulate the use of specific cognitive processes, but they also create a social environment that reinforces the generation of specific types of ideas (Garfield, Taylor, Dennis, & Satzinger, 2001; Nisula & Kianto, 2018). Gamification especially supported building a safe and creative environment. The observer in the case A noted that the game helped the players to relax and "there was already a buzz at the beginning of the game". She also noticed that after breaks "the teams restarted well". Most of the players saw the Innotin game as a means of facilitating and establishing an "inspiring atmosphere" where ideation is easier. The Innotin game succeeded in "facilitating creativity" and "inspiring work" during its playing. Especially in case B, the players deemed the game to help them generate ideas. The co-design workshop was organized on Monday morning and players described themselves as "sleepy and having the Monday blues". However, according to their comments after the workshop, they doubted if they would have been able to generate so many ideas with traditional methods. This implies that the players immersed themselves thoroughly in the playing. According to a study by Alahuhta et al. (2014) about team creativity in virtual worlds, immersion fosters persistence and interest towards a team's shared activities. Immersion also nourishes the utilization of the context of the problem in problem-solving situations. The perceived sense of immersion among team members can directly contribute towards creative abilities.

In addition, the players noted that the game made it easier to "become acquainted with new people". Collective creativity is based on diversity and people participating in collective creativity processes do not necessarily know each other, as was the situation in the cases A and C. The social distance between the participants may hinder the creative potential of the players. In a case study conducted by Parjanen, Harmaakorpi and Frantsi (2010) the social distance between the participants froze the start

of the session. When there is a close relationship, people are willing to support and encourage innovative ideas because the individuals involved are able to have the confidence needed to turn ideas into successful projects (Carmona-Lavado, Cuevas-Rodríguez, & Cabello-Medina, 2010).

However, playing or competing was not considered the main thing in the co-design workshops. Surprisingly, only one player pointed out the competitive nature of the game when he/she expressed that "competitiveness makes people become inspired". Furthermore, the observer of the case A pointed out that "the game was not the main part, it was the structure of the game that facilitated the generation of ideas". In addition, one player in the case C explained that "important issues were approached by game and playing". In this respect, the game could be also considered a boundary object. It supports communication across the boundaries of different knowledge bases, helping players from different backgrounds and perspectives to communicate and to build common ground. The Monopoly game board and it rules provided remarkable good tools and metaphor, as well as collectively accepted performing. According to the recorded data from case A, the excitement of the players was evident in their actions. While moving tokens the teams clapped their hands together and counted in unison. The teams were also very aware when it was their own turn to roll the dice and the teams invented different styles for moving their tokens on the platform, e.g. some individuals jumped and made funny noises. Moving tokens and rolling the dice made the players concentrate on playing. Also in other cases players smiled and laughed a lot. There was interaction within the groups but also between the groups. The players commented on the other group's work, asked questions and made jokes. According to Koskinen (2005), metaphoric boundary objects may play an important role as a coordinating mechanism in the knowledge sharing of innovation processes. The significance of metaphoric boundary objects resides in the fact that with them organizations can create the needed shared understanding behind the framing and resolution of the emerging problem in innovation activities.

The case A observer pointed out several times that the game succeeded in "generating dialogue between the case and client company". The idea of collective creativity comes very close to that of dialogue. The idea of the dialogue is that all participants make an important contribution and that the full range of their perspectives and ideas are necessary for developing an integrated, holistic view. The goal is to learn from each other, rather than to evaluate perspectives and determine who has the "best" viewpoint. As they interact and listen to one another, the players become aware of different opinions that have surfaced and they begin to examine them. Essentially, it is a dialogue between individuals, who partly share a mutual goal. (Sonnenburg, 2004; Sundholm, Artman, & Ramberg, 2004; Nisula & Kianto, 2018.)

During the dialogue, a novel sense of knowing is constructed by the participants themselves in a socio-cultural context through the interpretation of information and the construction of a common socio-cultural ground, rather than through simply managing information (Mahy, 2012; Pässilä, Oikarinen, & Harmaakorpi, 2015). For example, playing enabled the players in case A to learn new things about the theme of the co-design workshop (environmental awareness) in addition to the other company and their products. This way the game enabled the players to improve their expertise in the relevant domain that, according to Amabile (1997), influences individual creativity. Several players also highlighted that during playing they came to understand new things, such as "the significance of co-operation" and that "innovation requires co-operation and different perspectives". This implies that the players learned about the role of diversity and collective creativity in innovation activities.

According to the players, the game facilitated the generation of new ideas and these ideas were regarded as the products of collective processes. According to the data, it is impossible to point to an individual player who generated the ideas. Usually when there were references to generated ideas they were referred to in the passive, in terms such as "ideas were generated". It should be noticed that generated ideas were not strictly related to a particular process. Instead, ideas for different kinds

of innovations were generated. In the case A ideas for actual product innovations were achieved, while in the cases B and C the ideas were related more to different collaboration models. One the case A player was surprised that "in a short time, so many new ideas were generated". There were also comments mentioning that some people thought that some of the ideas were "wild" or "imaginative". The generation of these kinds of ideas may help in creating a relaxed and fun atmosphere in the co-design workshops. In this respect, the current study supports the findings of the study by Antikainen, Mäkipää, and Ahonen (2010) in that collective creativity is fun. Table 4 introduces the Innotin game as a structure for an innovation and learning environment.

Table 4. Innotin as a structure for an innovation and learning environment.

Innotin as a structure for an innovation and learning environment				
Atmosphere enhancing creativity	Getting to know new people	Idea generation	Learning new things	Understanding
"Fun!" "Cheerfulness" "Cohesiveness" "Boldness to try something new" "Relaxed people" "Facilitating creativity" "Enthusiasm to new things"	"becoming acquainted with new people" "a fun way to meet new people outside the own organization" "new people"	"inspired to develop new products" "ideas" "great ideas in a short time and also imaginative ideas"	"I learned new things about the other company" "Environmental awareness" (theme of the day) "Fibre-based package" (product of one of the companies) "Rigid cardboard" (product of one of the companies) "Innovation as a working method"	"There were more possibilities than I understood" "Lots of common interest" "The significance of co-operation in innovation" "A shared future"
Social elements of the co-design workshop		**Cognitive elements of the co-design workshops**		

Based on Table 4, it is possible to divide the effects of the playing on collective creativity into cognitive and social elements. Firstly, playing facilitated to generate multiple ideas for various kinds of possible innovations in co-design workshops. In addition, it enabled the players to exchange knowledge, learn and increase mutual understanding for future work together. Secondly, playing also succeeded in creating a trustful atmosphere where it was easier to become acquainted with new people. Because of the heterogeneity of the players, it is crucial to establish a trustworthy atmosphere, which helps

different actors to overcome their reluctance to take part in a creative process. If there is no trust, divergent perspectives and ideas will not be shared. Thus, the role of social elements is also supporting the cognitive elements to realize.

O'Donnell, Meyer, Spender, & Voelpel, (2006) describe collective creativity as a situated practice, which is embedded in a social context. Within the notion of creativity as a situated practice, knowledge is of value when it gives rise to and develops yet newer knowledge. Similarly, creativity as a collective practice is understood in a much broader sense to refer to the idea that thinking together not only consists of re-finding the bodies of knowledge, competence, skills or solutions which already exist but also of developing them. Therefore, by making a crucial link between creativity and the creation of new knowledge, an emphasis is placed on the emergence of innovation, unplanned outcomes and unexpected solutions, rather than simply on the reproduction of existing solutions (Grossen, 2008).

According to the written reports and feedback meetings, the innovation processes continued based on the results of the co-design workshops. In the case A, it was possible to achieve ideas for actual product innovations during the workshop. To develop these ideas further, the case company started to build a value-adding innovation network project involving their client company and wholesaler who also participated in the workshop. The ideas are on the verge of being implemented in the client company's product development processes, as was agreed in the closure meeting with the managers.

In the case B, the results of the workshop helped to focus on the target of the development more carefully. The generated ideas related to the content and structure of a virtual physical activity platform. In the workshop, it was brought forward that in the virtual physical activity platform there would be essential to be a place for professionals, where they can discuss, share knowledge, ask questions and innovate. However, the number of generated ideas was so great that it was understood that not all the ideas could be implemented during this particular project. When compared the ideas

generated in this workshop with the results of the development project there are similarities. However, the workshop was organized at the beginning of the development and many of the ideas were tentative and needed further development. The workshop gave impetus to organize cross-sectoral working groups and common steering committee between two projects (prime care organization and third sector organization). It also highlighted the need to develop knowledge sharing inside the organization, between the public and private organizations and to clients. The results of the project included the communication plan of physical activity in organizations, material for physical activity promotion (leaflets, magazine, poster, hand-outs) and various health communication pilots with new media (videos, Facebook, Twitter).

In the case C, the themes that emerged during the session related to forming a service providers' network with those who are planning and organizing the world championships in winter sports for 2017, building an ecological centre for expertise in logistics and a city card service concept for tourists and local people. The city card concept was further developed during the next co-design workshops. In addition, a mobile application for the access of the city card was planned to be created in order to visit different places via public transportation. However, the innovation process itself was not that successful. One of the critical setbacks could be indicated to the municipal level because major changes for the public transportation system was launched in the region right after. However, the unsuccessful idea implementation does not indicate that co-design workshop was not necessary or the Innotin game as a method was not supporting collective creativity in the innovation activities.

The managers and participants from the case C indicated that the most valuable aspect what they learnt from the workshops was related to networking among other SMEs in the same region. Participants highlighted the fact that getting to know each other, and having shared discussions and experiences, it is easier to contact and possibly develop new ideas together in the future. One example of this was the idea to organize a summer event (Lahti Ascot) at the local trotting-track. The executive

director of the trotting-track, who participated the co-design workshop, invited the other participants to develop the idea further. Now Lahti Ascot event has been organized six years a row since developing it in 2012. This event combines the regional expertise of the SMEs in logistics, communication, and event organizing including travel commerce.

The workshops did not differ significantly between the selected case industries. However, after the workshops, differences in the innovation processes and achieved innovations were recognized. The case A presented a large international company with experience of development and innovation activities. In this case A, the workshop started a product innovation process between two companies. This process could be described as analytical with a well-defined beginning and end (Lester & Piore, 2004). In the case B, representing a public sector, the results of the innovation processes were related to services and organizational processes and innovation process itself could be described as user-driven and interpretative. In addition, when comparing the cases A and C there are probably differences in companies' innovation capability. The lack of resources or skills in SMEs in networking and organizing workshops weakens the potential of co-creating innovations. The further development of some of the generated ideas in the co-design workshop would have required more network members and resources. In this particular case C, SMEs were able to share and access information rather easily since the responsibility of organizing and facilitating the workshop was with the researchers.

6. Conclusions

According to the results of this study, gamification creates opportunities for collective creativity between different actors participating in innovation activities. The obvious purpose of the co-design workshops was to create as many ideas as possible which could be implemented in the innovation processes of the organizations. In every workshop, plenty of ideas were generated. However, few of

them were able to be further develop. Some of the ideas were not in the focus of the current development or there were not needed resources available to implement them. Yet, the game succeeded in enhancing the creativity of its players at an individual and collective level. This study confirms the idea that individual and collective creativity are interconnected (Parjanen, 2012; Skaržauskienė & Kalinauskas, 2014).

In addition to idea generation, the Innotin game affected the social elements that were surprisingly much highlighted in the data. The Innotin game reduced the social distance by creating an inspiring atmosphere where ideation was easier. Playing helped to get to know new people and players learned and gained new understanding through playing. The game created exciting and innovative learning events. With the help of the Monopoly theme, the players encountered their own organizational situations in a metaphorical setting that allowed profound and meaningful learning. Creativity was encouraged and stimulated without threat, and this prepared the players for perspective shifts, patience and uncertainty (Kurtz & Snowden, 2003). This implies that games can be developed into a method, which enhances interaction among collaborators as well as improves innovation and learning.

The perceptual interaction usually results in a great number of new ideas and therefore it is of crucial importance to be able to prioritize relevant themes or issues for further development. Furthermore, not all the innovations and creative solutions can be immediately put into practice. It should be noted that game method enhances to recognize the obstacles as well as the opportunities in different development contexts. Occasionally, the co-design processes are perceived as time-consuming but the fact is that in the context of the complex innovation process, diverse methods have the opportunity to reduce costs and foster rapid responses in organizations (Snowden, 2005; Hyypiä, 2013).

Gamification does not automatically provide beneficial outcomes during idea generation interventions. When using games, or modifying familiar games for workshops, researchers need to keep in mind that the dynamics, mechanics and visual look of the game require a lot of attention before gamification can be added to existing processes (Huotari & Hamari, 2017; Hamari, 2013). It would be interesting for future research to look at how issues related to, for example, the visual look of a game motivate different people to play games. In this study, the essential role of the facilitator was highlighted and more research on the facilitation and the skills and expertise of the facilitator in game-like environments is needed. It would also be essential to study what kind of negative effects gamification may have on creativity and learning.

As this multiple case study about different industries focused on a single country, the issue of generalizability looms larger than perhaps in other qualitative studies. However, much can be learned from a particular study, and it is the reader, not the researcher, who determines what may or may not apply to his or her context. The authors believe that what they have learned has applicability in related situations worldwide. The combination of collective creativity, games, and innovation is still often overlooked or misunderstood. In the use of the gamification, it is vital to see the whole of development in a new way. The co-design processes need to develop organizational and individual skills in a comprehensive manner; in addition to single solutions and "technology hype", a multi-faceted and human-oriented vision and a very clear aim for using gamification are crucial. The results of this study indicate that low-tech (board) games can be developed into a method that enhances creativity among collaborators. This study provides a practical contribution on how a well-known board game can be developed into a beneficial method for supporting collective creativity in co-design workshops. Finally, the study sheds light on the significance of combining collective creativity, interdisciplinary methods and innovation theories in research.

REFERENCES

Alahuhta, P., Nordbäck, E., Sivunen, A., & Surakka, T. (2014). Fostering Team Creativity in Virtual Worlds. *J. Virtual Worlds Res.*, *7*, Lantern part 2/2, 1-22. doi.org/10.4101/jvwr.v7i3.7062

Amabile, T. M. (1997). Motivating creativity in organizations: On doing what you love and loving what you do. *Calif. Manag. Rev., 40*, 39–58.

Amabile, T. M. (1998). How to kill creativity. *Harv. Bus. Rev., 76*, 76–87.

Ansoms, A., & Geenen, S. (2012). DEVELOPMENT MONOPOLY A Simulation Game on Poverty and Inequality. *Simul. Gaming*, *43*, 853-862. https://doi.org/10.1177/1046878112451877

Antikainen, M., Mäkipää, M., & Ahonen, M. (2010). Motivating and supporting collaboration in open innovation. *Eur. J. Innov. Manag., 13*, 100 – 119. dx.doi.org/10.1108/14601061011013258

Bakhshi, H., Freeman, A., & Potts, J. (2011). *State of Uncertainty, Innovation policy through experimentation*. NESTA Provocation 14. London: NESTA.

Bechky, B. (2003). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organ. Sci., 14*, 312–330. dx.doi.org/10.1287/orsc.14.3.312.15162

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open Innovation: Research, Practices and Policies. *Calif. Manag Rev., 60*, 5-16. doi.org/10.1177/0008125617745086

Bogers, M., Zobel, A-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., Hagedoorn, J., Hilgers, D., Laursen, K., Magnusson, M., Majchrzak, A., McCarthy, I., Moeslein, K., Nambisan, S., Piller, F., Radziwon, A., Rossi-Lamastra, C., Sims, J., & Ter Wal, A. (2017). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Indust. Innov., 24*, 8-40. doi.org/10.1080/13662716.2016.1240068

Bouncken, R., Brem, A., & Kraus, S. (2016). Multi-Cultural Teams as Sources for Creativity and Innovation: The Role of Cultural Diversity on Team Performance. *Int. J. Innov. Manag., 20*, 1650012. DOI: 10.1142/S1363919616500122

Brown, J. S., & Duguid, P. (1991). Organizational learning and communities-of-practice: toward a unified view of working, learning, and innovation. *Organ. Sci.*, *2*, 40-57.

Carmona-Lavado, A., Cuevas-Rodriguez, G., & Cabello-Medina, C. (2010). Social and Organizational Capital: Building the Context Innovation. *J. Indust. Marketing Manag., 39*, 681-690. doi:10.1016/j.indmarman.2009.09.003

Chaharbaghi, K. & Cripps, S. (2007). Collective creativity: wisdom or oxymoron? *J. Eur. Indust.l Train., 31*, 626–638. dx.doi.org/10.1108/03090590710833679

Chou, Y-K. (2015). Octalysis – complete Gamification framework. http://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/#.VzF2u3q2UcM Accessed May 2016.

Cirella, S. (2016). Organizational Variables for Developing Collective Creativity in Business: A Case from an Italian Fashion Design Company. *Creativ. Innov. Manag., 25*, 331-343. doi.org/10.1111/caim.12189

Corbin, J., & Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory. Thousand Oaks: SAGE Publications.

Csikszentmihalyi, M. (1996). *Creativity. Flow and the psychology of discovery and invention*. New York: HarperCollins Publishers.

Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J-J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Comput. Education*, *63*, 380–392. dx.doi.org/10.1016/j.compedu.2012.12.020

Fernandes, J., Duarte, D., Ribeiro, C., Farinha, C., Madeiras Pereira, J., & Mira da Silva, M. (2012). iThink: A game-based approach towards improving collaboration and participation in requirement elicitation. *Procedia Comput. Sci., 15*, 66 – 77. doi: 10.1016/j.procs.2012.10.059

Fischer, G., Giaccardi, E., Eden, H., Sugimoto, M., & Ye, Y. (2005). Beyond binary choices: Integrating individual and social creativity. *Int. J. Human-Comput. Stud., 63*, 482-512.

Ford, C. M. (2000). Dialogue. Creative Developments in Creativity Theory. *Acad. Manag. Rev., 25*, 284-287. doi: 10.5465/AMR.2000.2607933

Garfiel, M., Taylor, N., Dennis, A., & Satzinger, J. (2001). Research Report: Modifying Pradigms – Individual Differences, Creativity Techniques, and Exposure to Ideas in Group Idea Generation. *Inform. Syst. Res., 12*, 322-333.

Grossen, M. (2008). Methods for studying collaborative creativity: an original and adventurous blend. *Think. Skills Creativ.*, *3*, 246-249. doi: 10.1016/j.tsc.2008.09.005

Gummesson, E. (2000). *Qualitative methods in management research.* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Hargadon A., & Bechky, B. (2006). When Collections of Creatives Become Creative Collectives: A field study of problem solving at work. *Organ. Sci., 17*, 484-500. dx.doi.org/10.1287/orsc.1060.0200

Hamari, J. (2013). Transforming Homo Economicus into Homo Ludens: A Field Experiment on Gamification in a Utilitarian Peer-To-Peer Trading Service. *Electron. Commerce Res. Appl., 12.* doi:10.1016/j.elerap.2013.01.004

Hamari, J., & Koivisto, J. (2013). Social motivation to use gamification: an empirical study of gamifying exercise. *Proceedings of the 21st European Conference on Information Systems*, Utrecht, Netherlands, June 5-8, 2013. http://aisel.aisnet.org/ecis2013/122

Huotari, K., & Hamari, J. (2017). A definition for gamification: anchoring gamification in the service marketing literature. *Electron Markets*, *27*, 21. https://doi.org/10.1007/s12525-015-0212-z

Hyypiä, M. (2013). *Roles of leadership in complex environments: Enhancing Knowledge Flows in Organisational Constellations through Practice-Based Innovation Processes.* Acta Universitatis Lappeenrantaensis 546. Dissertation. Lappeenranta University of Technology, Finland.

Hyypiä, M., & Parjanen, S. (2015). Gamification as an intervention method in Practice-based Innovation. *Int. J. Innov. Tech. Manag.*, *12*, 1-22. doi: 10.1142/S0219877015500182.

Kangas, M. (2010). Creative and playful learning: Learning through game co-creation and games in a playful learning environment. *Think. skills creativ., 5*, 1-15. doi: 10.1016/j.tsc.2009.11.001

Konsti-Laakso, S., & Rantala, T. (2018). Managing community engagement: A process model for urban planning. *Eur. J. Oper. Res.*, *268*, 1040-1049. https://doi.org/10.1016/j.ejor.2017.12.002

Koskinen, K. U. (2005). Metaphoric Boundary Objects as Co-ordinating Mechanisms in the Knowledge Sharing of Innovation Processes. *Eur. J. Innov. Manag., 8*, 323–335. http://dx.doi.org/10.1108/14601060510610180

Kozinets, R. V., Hemetsberger, A., & Schau, H. J. (2008). The Wisdom of Consumer Crowds: Collective Innovation in the Age of Networked Marketing. *J. Macromarketing, 28*, 339-354. doi: 10.1177/0276146708325382

Kurtz, C., & Snowden, D. (2003). The New Dynamics of Strategy: Sense-making in a Complex-Complicated World. *IBM Syst. J., 42*, 462-83.

Leonard, D., & Straus, S. (1997). Putting your company's whole brain to work. *Harv. Bus. Rev., 75*, 110-119.

Leonard, D., & Sensiper, S. (1998). The role of tacit knowledge in group innovation. *Calif. Manag. Rev., 40*, 112-132.

Leopoldino, K., González, M., & Júnior, J. (2016). Factors that contribute to collective creativity development in organizations. In Boks, C., J. Sigurjonsson, M. Steinert, C. Vis, & A. Wulvik (Eds.), *DS 85-1: Proceedings of NordDesign 2016*, Volume 1, Trondheim, Norway, 10th - 12th August 2016.

Lester, R. K., & Piore, M. J. (2004). *Innovation – the Missing Dimension*. Massachusettes: Harvard University Press.

Mahy, I. (2012). From the Artists to the Managers: Responsible Collective Innovation Practices, Inspiration Flowing Through Hosting and Harvesting Profound Change. In H. Melkas, & V. Harmaakorpi, V. (Eds.), *Practice-based innovation: Insights, applications and policy implications* (pp. 193-211)*.* Heidelberg: Springer.

McFadzean, E., & Nelson, T. (1998). Facilitating problem solving groups: a conceptual model. *Leader. Organ. Dev. J., 19*, 6-13. dx.doi.org/10.1108/01437739810368785

Moritz, S. (2005). *Service Design, Practical Access to an Evolving Field*. KISD, London. http://stefan-moritz.com/Book.html Accessed 15 October 2018.

Mumford, M., & Gustafson, S. (1988). Creativity syndrome: integration, application and Innovation. *Psychol. Bull., 103*, 27–43.

Mäenpää, S., Suominen, A. H., & Breite, R. (2016). Boundary Objects as Part of Knowledge Integration for Networked Innovation. *Tech. Innov. Manag. Rev., 6*, 25-35.

Nisula, A-M., & Kianto, A. (2018). Stimulating organisational creativity with theatrical improvisation. *J. Bus. Res., 85*, 484-493. doi.org/10.1016/j.jbusres.2017.10.027

O'Donnell, D., Meyer, J., Spender, J.C., & Voelpel, S. (2006). On collective creativity: an application of the theory of communicative action in situated practice. Presented in *Critical Management Studies (CMS) Research Workshop*, 11th-12th August, Atlanta.

Parjanen, S., Harmaakorpi, V., & Frantsi, T. (2010). Collective Creativity and Brokerage Functions in Heavily Cross-Disciplined Innovation Processes. *Interdiscipl. J. Inform. Knowl. Manag., 5*, 1-21. doi.org/10.28945/713

Parjanen, S. (2012). *Creating Possibilities for Collective Creativity. Brokerage Functions in Practice-based innovation*. Acta Universitatis Lappeenrantaensis 474. Dissertation. Lappeenranta University of Technology. Finland.

Pilon, M. (2015). Monopoly's Inventor: The Progressive Who Didn't Pass 'Go'. New York Times. https://www.nytimes.com/2015/02/15/business/behind-monopoly-an-inventor-who-didnt-pass-go.html Accessed May 28, 2018.

Proctor, T. (2005). *Creative Problem Solving for Managers. Developing skills for decision making and innovation*. (2nd ed.). Oxon: Routledge.

Pässilä, A., Oikarinen, T., & Harmaakorpi, V. (2015). Collective voicing as a reflexive practice. *Manag. Learn., 46*, 67-68. doi: 10.1177/1350507613488310

Reilly, R. C. (2008). Is expertise a necessary precondition for creativity? A case of four novice learning group facilitators. *Think. Skills Creativ., 3,* 59-76. dx.doi.org/doi:10.1016/j.tsc.2008.02.002

Sanders, E. B. N. (2002). From user-centred to participatory design approaches. In J. Frascara (Ed.), *Design and the social sciences: Making connections* (pp. 1-8). London: Taylor & Francis.

Sanders, E., & Stappers, P. (2008). Co-creation and the new landscapes of design. *CoDesign, 4*, 5-18. doi: 10.1080/15710880701875068

Sawyer, K. (2006). Educating for innovation. *Think. skills creativ., 1*, 41-48. doi:10.1016/j.tsc.2005.08.001

Schmickl, C., & Kieser, A. (2008). How much do specialists have to learn from each other when they jointly develop radical product innovations? *Res. Pol., 37,* 473-491.

Shanklin, S. B., & Ehlen, C. R. (2007). Using The Monopoly Board Game As An Efficient Tool In Introductory Financial Accounting Instruction. *J. Bus. Case Stud., 3*, 3. https://doi.org/10.19030/jbcs.v3i3.4852

Skaržauskienė, A., & Kalinauskas, M. (2014). Fostering collective creativity through gamification. *The proceedings of the ISPIM Americas Innovation Forum,* Montreal, Canada, 5-8 October 2014.

Snowden, D. (2005). Multi-ontology sense making: a new simplicity in decision making. *Informat. Prim. Care, 13*, 45-54.

Stake, R. (1995). *The Art of Case Study Research*. Thousand Oaks: SAGE Publications Ltd.

Star, S. L. & Griesemer, J .R. (1989). Institutional ecology, "translations" and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Soc. Stud. Sci.*, *19*, 387–420. doi: 10.1177/030631289019003001

Steiner, G. (2009). The Concept of Open Creativity: Collaborative Creative Problem Solving for Innovation Generation – a System Approach. *J. Bus. Manag., 15*, 5-33.

Sonnenburg, S. (2004). Creativity in Communication: A Theoretical Framework for Collaborative Product Creation. *Creativ. Innov. Manag.*, *13*, 254-262. doi.org/10.1111/j.0963-1690.2004.00314.x

Steen, M., Manschot, M., & De Koning, N. (2011). Benefits of co-design in service design projects. *Int. J. Des., 5*, 53-60.

Sundholm, H., Artman, H., & Ramberg, R. (2004). Backdoor Creativity: Collaborative Creativity in Technology Supported Teams. In F. Darses, R. Dieng, C. Simone, & Zacklad, M. (Eds.), *Cooperative systems design: Scenario-based design of collaborative systems* (pp. 99-114). Amsterdam: IOS press.

Takeuchi, H., & Nonaka, I. (1986). New Product Development Games. *Harv. Bus. Rev.,* January-February.

van Osch, W., & Avital, M. (2009). Collective Generative Capacity: The Seed of IT-Induced Collective Action and Mass Innovation. *Proceedings of the 8th Journal of Association for Information Systems. Theory Development Workshop,* Phoenix, Arizona.

Vesa, M., Hamari, J., Harviainen, T., & Warmelink, H. (2017). Computer Games and Organization Studies. *Organ. Stud., 38*, 273-284. doi.org/10.1177/0170840616663242

Wenger, E. (2000). Communities of Practice and Social Learning Systems. *Organization*, 7, 225-246. doi.org/10.1177/135050840072002

West, J. & Bogers, M. (2017). Open innovation: current status and research opportunities. *Innovation, 19*, 43-50. doi.org/10.1080/14479338.2016.1258995

Woodman, R. W., Sawyer, J. E. & Griffin, R. W. (1993). Toward a Theory of Organizational Creativity. *Acad. Manag. Rev., 18*, 293-321. doi: 10.5465/AMR.1993.3997517

Yin, R. K. (2009). *Case study research: Design and methods*. *Applied social research methods series.* Thousand Oaks: Sage Publications.