Contradictions in Value Co-Creation in IT-Enabled Services:

A Case of Geocaching

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Abstract

Negative consequences of value co-creation in consumer information systems are rarely assessed in information systems (IS) research. In this empirical case study, we focus on contradictions and structural tensions in information technology (IT)-enabled value co-creation in the case of geocaching. Geocaching is a treasure-hunting, recreational activity that uses Global Positioning System (GPS) technology. Based on our analysis, we identified four contradictions: i) an open secret society exists; ii) hedonism-seeking undermines hedonistic experiences; iii) one can experience nature while consuming it; and iv) building community occurs with competition. Paradoxically, these results show that geocachers undermine geocaching by their own acts. Based on the results, we offer recommendations for research on value co-creation and the practice of geocaching.

Keywords

Value co-creation, IT-enabled service, contradiction, geocaching, case study

INTRODUCTION

The emergence of new logic to govern marketing theory based on intangible resources, the co-creation of value, and relationships between the supplier and the customer (Vargo & Lusch, 2004) create opportunities to take a fresh look at the involvement of the customer in the design and use of information technology (IT)-enabled services (Bardhan, Demirkan, Kannan, Kauffman, & Sougstad, 2010). Firms can gain profound insights into what creates value for the customer by engaging the customer in the design (Flint & Mentzer, 2006) of new services for delivery to users (Payne, Storbacka, & Frow, 2008). Value co-creation goes beyond listening to the voice of the customer (e.g., customer surveys) and extends to a process in which both the firm and the customer learn about the needs and preferences of one another. Together, they are involved in understanding, prioritizing, and making decisions about the design of the co-produced services (Jaworski & Kohli, 2008).

Geocaching is a recreational activity and an example of IT-enabled value co-creation (Schlatter & Hurd, 2005; Gentry, 2006). There are over five million geocachers worldwide who hide and seek the caches; in other words, they create value for each other by hiding caches to be found by other geocachers. One reason for the popularity of geocaching is its ease of use, which pertains to the flexibility provided by IT. Indeed, geocaching is IT-enabled play, as IT provides an infrastructure for geocaching, and without it, geocaching would not be possible to the extent that it is practiced today. Geocaching has received positive attention as a healthy and creative activity, but the emergence of etiquette for geocaching (Schlatter & Hurd, 2005) suggests that the positive news about geocaching is not the whole story. To better understand geocaching, we use the concept of contradiction. Robinson and Wilson (2002) stated that to understand the totality of the studied phenomenon, the contradictions should be known; contradictions refer to structural tensions of an activity that become visible in the form of disturbances, conflicts, and eruptions (Engeström, 1987). Smith and Tushman (2005) argued that identifying and embracing structural tensions, contradictions, and support lead to success. As any human organization includes contrasting, inconsistent, and even paradoxical tensions, their identification and consideration are the first steps in managing them. With respect to the concept of contradiction, there are other similar concepts, such as paradox and dilemma (Poole & van de Ven, 1989; Metcalfe, 2006; Engeström & Sannino, 2011). To the best of our knowledge, neither value co-creation nor geocaching has received attention in the literature from the viewpoint of contradictions (or paradoxes).

In this study, we reveal the contradictions of value co-creation for one particular IT-enabled service: geocaching. Based on analysis of interviews, discussion forum texts, and personal experience, we reveal four contradictions: i) an open secret society exists; ii) hedonism-seeking undermines hedonistic experiences; iii) one can experience nature while consuming it; and iv) building community occurs with competition.

Below, we present the framework of value co-creation for IT-enabled services, with geocaching as one such service, the concept of contradiction, and our synthesis of these frameworks. In the research design section, we show how we collected and analyzed the data to identify the contradictions that are presented in the results section. The discussion considers the importance of the results, offers recommendations for practice and research, and evaluates the study.

THEORETICAL FRAMEWORK

Tuunanen et al. (2010) presented a framework (Table 1) that argues that value co-creation for IT-enabled services includes the interplay of at least two issues. First, the system offers value propositions to the users; second, the users possess values or goals that drive their behavior. According to Lamb and Kling (2003), the term "actor" should be employed instead of "user." Individuals do not work in isolation; rather, they work in teams. Lamb and Kling (2003) also claimed that actors can potentially have an identity (Creed, Scully, & Austin, 2002) attached to the ICT artifacts that they use. Lamb and Kling further argued that actors use these artifacts to form and construct identities. For instance, Japanese teenagers accessorize their mobile phones with different objects and costume jewelry. As a result, they use their mobile phones to construct a part of their identities. Other researchers have suggested that the context of system use (Orlikowski, Yates, Okamura, & Fujimoto, 1995) is also an important issue. These authors argued that the context of use is likely to affect the service experience of users. Other researchers have argued that the cultural context is likely to influence user requirements and system use (Myers, 1999). These components are depicted as value propositions in Table 1.

Table 1: Factors for Value Co-creation for IT-enabled Services (see, Tuunanen et al., 2010)

Value Propositions	Value Drivers
Social nature of use	Service process experience
Construction of identities	Participation in service production
Context of use	Customer goals and outcomes

Furthermore, Tuunanen et al. (2010) suggested that there are three key value drivers, including the "service process experience." Holbrook et al. (1984) proposed the notion of "playful consumption," in which play becomes a part of the consumption experience. They studied the effects of emotions, performance, and personality on value creation in games. Kahneman et al. (2003) suggested that consumers derive not only utility from consumption, but also benefits of a hedonic nature. Similarly, it has been suggested that an experience of flow in service or system use is important to users, as are emotions that are elicited during use (Agarwal & Karahanna, 2000; Csikszentmihaly, 1991).

Second, according to service-dominant logic, we are seeing a change from firms that provide services of a predetermined value to a new landscape in which they only make value propositions; value is co-created and the total value of the offering is determined by the customer in use (Prahalad & Ramaswamy, 2004; Vargo & Lusch, 2004). This phenomenon has been especially evident within the computer gaming segment (Karlsen, 2008). Moreover, consumers now expect more personalized experiences. IS researchers have long promoted the participation of users in development (see, e.g., Davis, 1982). Although researchers agree that user participation is beneficial, especially in the requirements elicitation and analysis phases of the project, there is still some uncertainty about the best ways in which to involve users (Hartwick & Barki, 1994; McKeen & Guimaraes, 1997; Tait & Vessey, 1988). Most studies have focused on users in organizational settings. However, some studies have explicitly taken a consumer focus. For example, von Hippel and Karz (2002) suggested the engagement of potential lead-users of a product or service via toolkits that could be implemented within virtual communities.

Finally, we have the question of how cyber-physical systems and service users' values and goals contribute to the co-creation of value. Quality function deployment techniques have been used to ensure that product or service features are linked to customer needs. Jacobs and Ip (2003) investigated potential ways to use quality function deployment to match computer and console gamers to games. Their research revealed differences between gamer segments and consumers' desired game features, but it does not provide linkages between, for

example, the hedonic utility that is derived from gaming and game features in order to enable its measurement. In IS research literature, on the other hand, there has been a strong tradition of using the perceived usefulness of information systems as a success metric (Venkatesh, Morris, Davis, & Davis, 2003). In marketing, the conjoined approach has been used to measure the consumer trade-offs and utility that are associated with product or service features (Green & Srinivasan, 1990; Ostrom & Iacobucci, 1995).

Geocaching

Geocaching is an outdoor treasure-hunting game that combines physical activity and technology (Schlatter & Hurd, 2005). Participants use Global Positioning System (GPS)-enabled devices, and they navigate to specific GPS coordinates and attempt to find the geocache (container) that is hidden at that location. When the geocacher begins the hunting trip, he or she first searches the website for available geocaches in his or her neighborhood (or in more distant places if he or she is able to travel). For each geocache, a web page contains the name of the geocache, describing text, and the attributes of the geocache (e.g., if the cache is available for wheelchairs or if it is available during winter). There are also other geocachers' log entries for interest, as they may prepare the geocacher to confront special conditions of the location or other challenges he or she will face. The coordinates of the geocache are visible on the page, and they can be automatically transferred to a GPS receiver. After fetching one or more geocache coordinates, the geocacher sets himself or herself in motion toward the location with the help of a GPS receiver that shows an arrow and exact distance in meters to the geocache. At the location, it may be easy to find the cache if it is in a plastic container (e.g., Tupperware) hidden beneath a stone, for example. More difficult to find are those camouflaged as rocks or tree branches. Non-geocachers are called "mugglers," and to keep the cache safely hidden, it is important that the exact location of the cache is not revealed to mugglers. After the hunt, the geocacher visits the website and writes "found it" regarding caches that were found. In addition to seeking caches, it is also possible to create them. This means that it is possible for geocachers not only to seek caches, but also to collectively create a common experience.

Contradictions

Contradiction refers to the struggling relationship of two opposites or poles that are both important for the joint outcome (e.g., Benson, 1977; Engeström, 1987; Carlo et al., 2012). The opposites or the poles of contradiction polarize each other as these differences pull each other apart and bring them back together (Carlo et al., 2012). An example from relational dialectics makes polarizing clear (Baxter, 1988); in any human relationship, there is a contradiction between autonomy and connectedness as there is a desire to be connected and a desire to exist as a unique individual. As these poles coexist in relationships, there are conflicts and eruptions that are born of this contradiction.

The concept of contradiction and its neighboring concept, paradox, have been used in IS research and have been shown to be meaningful in developing understanding. Dubé and Robey (2008) studied paradoxes of virtual teamwork. One of the paradoxes they found was that virtual teams require physical presence. They also identified strategies to cope with the paradoxes. Another example is the study by Carlo et al. (2012). They studied the collective mindfulness of high-risk projects when practitioners aim to increase organizational reliability to mitigate adverse events. They found that software was used in contradictory ways, both mindlessly and mindfully, during construction of a building. See also experiences from IS in Robinson and Wilson (2002) and project management research in Thyssen and Gessler (2012) and Hodgson et al. (2011).

Synthesis of geocaching and contradiction

Geocachers co-create value with the help of IT technologies. As geocaching is a mixture of direct or indirect social relations and uses of IT technologies, these aspects affect each other. For example, the geocaching website offer constantly updated information on new geocaches, and when geocachers go for a "hunt" they may meet each other at the geocache locations ("mini-meets") and discuss their experiences. However, the emergence of etiquette for geocaching and the promotion of rules for geocaching suggests that there are tensions or disturbances in geocaching. Therefore, it is likely that there are contradictions and structural tensions in geocaching that explain the emergence of tensions or disturbances. Our goal is to first understand what contradictions there are in geocaching. This information is vital to a better understanding of geocaching in order to provide recommendations for developing it. In addition, we aim to understand how the contradictions of geocaching relate to value propositions and value drivers of geocaching as an IT-service. This information is likewise key to a better understanding of geocaching as an IT-enabled service. In the next section the research design used to study these issues is presented.

RESEARCH DESIGN

The interpretive research approach was selected to reveal contradictions in value co-creation in geocaching. With the interpretive approach, it is possible to understand how reality and experience are socially constructed (Walsham, 1995). The idea of activity theory (Engeström, 1987)—that contradictions become visible in the form of disturbances, real-life conflicts, or eruptions from the prescribed script of the activity (the ideal proceeding of the activity)—inspired the identification process of contradictions. Additionally, the underlying values of geocaching were revealed in order to aid in the understanding of the essentials of geocaching. There are two approaches to collecting interpretations in this study. The first author of this study is an active geocacher, and his experiences are used in the analysis. Interviews were also conducted to understand what drives people to geocaching. These interviews were also analyzed to identify conflicts. The data gathering and analysis phases are presented below.

Phase 1: Interviews (understanding driving values and disturbances)

We gathered prospective interviewees at two geocaching-related Facebook groups and at the Finnish geocaching website (www.geocache.fi). The appendix summarizes the demographic data of the interviewees. One interviewee was under 20 years of age, seven were between 21 and 30, ten were between 31 and 40, four were between 41 and 50, and four were 51 or older. Eleven interviewees were female and 15 were male. The interviews lasted from 30 to 60 minutes.

Interviews were accomplished with the laddering technique to elicit values and goals that motivate people to geocache. Laddering was developed by Reynolds and Gutman (1988) to study the means–end structures consumers have about a product. We asked interviewees to describe significant issues in geocaching. The interviewing process continued with a series of "Why would that be important?" questions to elicit what the subject perceived as an end result of what is important in geocaching, i.e., as values or objectives. As the end-result of this phase, we identified the following underlying values driving geocachers to their hobby (see for a more detailed report, Vartiainen & Tuunanen, 2013): challenging oneself and breaking one's daily routines, excitement-seeking behavior and experimentation with new things, the joy of finding geocaches, and learning the local sites and the history behind them. The results also showed that geocachers have a strong feeling of community, which is reflected in the emphasis in understanding others, diversity, and equality values, as well as reciprocal voluntary work, helping, and mentoring other geocachers. Geocaching can be perceived as hedonic in nature as people pursue happiness and utility via geocaching. Additionally, the environment of geocaching and the process of searching for and finding geocaches are important motivators. After identifying the underlying values, these interviews were re-analyzed to identify disturbances, conflicts, or eruptions that became visible. Disturbances relate to the deviation from the prescribed script of the geocaching activity, and we can find the description of the script in the rules of caching (http://www.geocaching.com/guide/). When identifying the disturbances, the described deviations or concerns for deviations from the prescribed script were taken into account. To summarize, there are rules on how to hide the cache (e.g., permission of landowner) and how to search for caches to guarantee that geocaching occurs in accordance with laws and good manners.

Phase 2: Discussion forums and the first author's experience (iterative contradiction formulation)

In this phase, 100 discussion threads in the discussion forum of the Finnish geocachers' website (URL: www.geocache.fi) and two Facebook discussion forums were assessed to understand disturbances in geocaching. Additionally, as the first author of this study is an active geocacher (since 2007, he has found over 2,100 caches and has hidden three caches), he reflected on the gathered data together with his own experiences of disturbances to identify contradictions. The first author's geocaching experience was a key requirement in identification of contradictory poles in this analysis process. He understands the essentials of geocaching (cf. poles of contradictions) and was able to link them through the identification of disturbances. This also meant that the analysis process was iterative in nature, i.e., he reflected disturbances found in the data with his own experiences and going back to the data was typical in this process.

RESULTS: CONTRADICTIONS

Contradiction 1: An open secret society

The core idea in geocaching is that caches are hidden from the public view, and finding caches should occur in disguise from the sight of outsiders, or mugglers. This means that there is a clear secret society nature in geocaching as there is a clear distinction in who belongs and who does not. However, the nature of a secret society contradicts the extrovert twist found in geocachers. Geocaching is actively introduced to friends, relatives, and work colleagues, for example. In addition, there are newspaper articles and television programs on

geocaching. Therefore, geocaching is not really a hidden activity; outsiders are actively informed about it (Table 2). Next, we will show examples from the data of how the contradiction has become visible.

In the following excerpt, the interviewee describes that finding the cache should be done without mugglers recognizing what is being done; the caches should be hidden so that mugglers do not recognize them as caches:

> Interviewee 5: We protect the cache in the way that they [mugglers] do not realize that you have found the cache.

The relationship between geocachers and mugglers becomes critical when searching for caches in public places where mugglers are present or where they may unexpectedly appear. If a disguised activity, such as tying shoelaces, does not convince mugglers, and they insist on knowing what is happening, many geocachers openly disclose that they are searching for a geocache. The following excerpt shows that geocaching is not a seriously hidden activity as mugglers may become geocachers:

> Interviewee 2: I guess I want to share my experiences on what has happened. When you discuss with mugglers, when you engage yourself with a good discussion with them, then they are not mugglers anymore as they have already started [this hobby]. But it is also fun to discuss with someone who do[es] not know anything about this…. However, there is [a specific] language and…culture among geocachers.

On a Finnish geocaching site, there is a special discussion on "police and geocaching in Finland," in which geocachers describe their experiences with police. Police have observed geocachers and suspected them of suspicious activity; they then intervened. In such situations, geocachers have typically disclosed their acts to police, resulting mostly in a neutral or positive reaction.

Contradiction 2: Hedonism-seeking undermines hedonistic experiences

Geocaching is a hedonistic activity—the underlying values of geocaching, challenging oneself and breaking one's daily routines, excitement-seeking behavior and experimenting with new things, and the joy of finding geocaches—make geocaching an addictive hobby, as some of our interviewees explained. Geocaching also connects different activities and people, e.g., it connects other outdoor activities such as bicycling, boating, climbing, and raising dogs with finding geocaches. Second, geocaching connects a variety of people. For some interviewees, a great value of geocaching is that in this hobby, they are able to meet people of all ages and backgrounds. The connecting nature of geocaching means that it is actively introduced to friends, relatives, and work colleagues. In the next excerpt, the interviewee describes how geocaching expands:

> Interviewee 15: We are so enthusiastic about [geocaching] that we have talked about it and [on] Facebook we announce it and also our friends ask about it. We have inspired our friends about this hobby.

The connecting nature of geocaching means that people can increasingly pursue hedonistic values when they connect different activities and people via geocaching. These positive experiences are introduced to others, and as a consequence, geocaching as a hobby expands and there are more and more hedonistic-seeking individuals participating in geocaching.

Hedonistic values are threatened, however, when geocachers forget to abide by the rules of geocaching that protect the hedonistic experience. The more geocachers, the more the need to educate novice cachers; the variety of motivations for geocaching also increases. In practice, this has meant a decrease in the quality of the processes of geocaching and has resulted in disputes regarding the rules of caching. For example, some caches are placed in inappropriate locations, finding caches is not done in disguise, containers do not withstand weather conditions, and containers are returned to their hiding places carelessly. To simplify this contradiction, the more geocachers there are, the more geocaching as a hobby is threatened.

The following examples in the discussion forum on the Finnish geocaching site show that the rules of geocaching are sometimes forgotten or that gray areas exist. "In our garden area there is a geocache and I do not like it!" shows that although a geocache may be hidden in a public place, it may be so near a private property that it causes harm when many geocachers enter the place. "New caches hidden by newcomer cachers" discussion showed that the experienced cachers do not always like the attitude of newcomers who tend to forget the rules of caching. The following excerpts from this discussion show what may happen (a "pot" refers to a cache): "I really do not like that when a newcomer in his or her first ecstasy creates ten pots and then forgets them." The comment, "Is it possible to go for geocaching in some other way than the wrong way?" likewise reflects the tensions between following the rules of geocaching and taking a relaxed attitude toward the rules.

Table 2: Contradictions, their descriptions, poles of contradictions, and context

Contradiction	Description	Poles of contradiction
#1: An open secret society exists	While geocaching has a quality of a secret society, geocachers actively introduce it to outsiders.	Secret society vs. openness of geocaching
#2: Hedonism-seeking undermines hedonistic experiences	As geocachers pursue hedonistic values and people increasingly begin geocaching, geocachers forget the rules of geocaching—which undermines geocaching.	Pursuing hedonistic values vs. rules of geocaching that protect hedonistic values
#3: One can experience nature while consuming it	Geocaching values nature-related experiences, but the technologies that are used in geocaching use natural resources and therefore undermine the value of nature.	Technology that consumes natural resources vs. nature-based experiences
#4: Building community occurs with competition	Geocaching exposes geocachers to competing with each other while they promote a strong sense of community.	Competing with others vs. a voluntary and relaxing hobby and socializing with other geocachers

Contradiction 3: Experiencing nature while consuming it

Geocaching is dependent upon different kinds of technologies that require the use of natural resources. First, geocaching in its current form requires IT applications such as the Internet, the World Wide Web, GPS, and mobile phone devices. The production and use of these technologies requires natural resources. Second, in geocaching there is a tendency that once the nearby caches have been found, the hunting continues by enlarging the hunting circles. For this purpose, different traffic systems such as cars are used. These types of technologies require the use of natural resources, which is in contradiction with a goal of geocaching: to experience nature. Appreciation of nature and the earth is visible through the hiding of caches in nature and in the establishment of a nature-related cache type, "Cache In Trash Out" (CITO). This cache type means that geocachers earn a found cache by taking part in cleaning the environment. Earth caches create lessons about the earth as a planet. Earth caches may be located in natural parks or geological monuments, for example. Below, a geocacher describes the conflict of using a car for geocaching (via Facebook text):

> What a possibility to find caches now when I have a car! Even the rainy weather does not slow [me down]. On the one hand the underlying ideology about outdoor activities and sustainable development while caching…decreases. When you bicycle, walk or use public transportation you are more at the core of these things. Using [a] car while caching is not ideologically [the] right way. But tolerance is suitable in this matter also. But to each his own. (Facebook text 16.6.2014, Male)

Contradiction 4: Building community while competing with each other

Geocaching makes it possible to compete with others in several ways and develop one's status as a geocacher. A typical way—at least among Finnish geocachers—to compete with each other is in the sum of found caches. More specialized ways to compete or develop one's status through the public profile relate to the number of First-to-Find (FTF) logs and finding caches with high terrain or difficulty values. Many interviewees recognized that they themselves or other cachers had adopted the attitude of competition. However, geocaching is considered a voluntary, non-work-related hobby that should not be taken so seriously. Our findings show that there is a strong sense of community among geocachers, and some interviewees described that the strong sense of community surprised them after integrating themselves in geocaching. There is an emphasis on understanding others, diversity, and equality values together with reciprocal voluntary work and helping each other. These values are in direct opposition to the idea of competition. However, the nature of geocaching makes the exposure of people to competition as well as a strong sense of community and helping each other essential to the activity. An interviewee summarized geocaching as "competition without competition." In the following excerpts, the interviewees recognize that there is at least latent competition among geocachers:

> Interviewee 13: Perhaps in the background there is competition and some are more competitive than others. We can see the rivalry when we talk about statistics. One good example is the type of challenge cache. For example, the challenge of one hundred crosses. Find one hundred church caches in Finland; after you have found them you may log this cache. It creates geocaching merit among other geocachers. "Oh, he has completed that cache!"

> Interviewee 21: One may want to belong to those cachers, to that certain class [of cachers] that have been able to accomplish something that is not possible for everyone. Perhaps belonging to the elite [laughing].

Table 2 above summarizes the contradictions and their poles. The poles of contradiction describe the essentials of geocaching, which also oppose each other.

DISCUSSION AND CONCLUSIONS

This study showed that IT-enabled value co-creation in the case of geocaching includes four contradictions. First, both Contradiction 1, "an open secret society" and Contradiction 2, "hedonism-seeking undermines hedonistic experiences" relate to norms of geocaching and how the norms aim to protect the values that geocachers pursue. However, the values of geocaching are threatened when geocachers do not abide by the norms. The norms that were threatened relate to "service process experience" as geocachers are expected to make an effort to find caches without outsiders knowing, but fail to do that, and "participation in service production" as some geocachers do not produce geocaches with adequate quality standards. There is also a paradox in that geocaching is marketed to outsiders quite actively, but maintains the idea that geocaching should be a hidden activity. To summarize, this means that by not abiding to norms of geocaching, geocachers themselves undermine the whole activity. Undermining geocaching is also visible in Contradiction 3, "experiencing nature while consuming it," which links "context of use" with "service process experience." Geocachers appreciate and enjoy the environments where geocaching occurs, especially nature, but when they pursue these experiences they use technologies that have detrimental effects on our environment. This means that geocaching as an activity undermines what geocachers are looking for from geocaching. Lastly, Contradiction 4, "building community while competing with each other" links "social nature of use" and "customer goals and outcomes." A geocacher may have acquired a goal to directly or latently compete with other geocachers, in terms of the number of found caches, for example, but at the same time, he or she aims to enjoy the company of others (e.g., in arranged meetings or when meeting other geocachers while caching). This means that there is a possibility that geocachers in their own acts undermine what they are looking for, i.e., upholding social relations.

Identified contradictions (and paradoxes) can be used to manage underlying tensions in organizations (Smith & Tushman, 2005). Smith and Tushman (2005) proposed the use of two processes, differentiation and integration, to consider contradictions. In contradiction, there are two poles that are important both for the activities of differentiation and integration, and each pole has to be understood separately to create meaningful links between them. Through these two processes, these poles reinforce each other (Smith & Tushman, 2005). With respect to geocaching, we have now made known four contradictions that consist of opposing poles that nevertheless need each other. Earlier literature often follows the original thoughts of Vargo and Lusch (2004) and describes value co-creation as the processes and relationships between the supplier and the customer. The actual description of value co-creation remains fuzzy. The debate often remains at the level of promoting firms to create value for the customer by engaging the customers in design (Flint & Mentzer, 2006) and service delivery (Payne, Storbacka, & Frow, 2008). Tuunanen et al. (2010) have approached this from the development aspect and have argued for the importance of understanding the possible value propositions of service on the one hand, and on the other hand, the value drivers of customers. Tuunanen et al. (2010) infer that the interactions of these propositions and drivers are essential for value co-creation, at least in the area of IT-enabled services, but likely in other services as well.

Our study shows that the six value co-creation factors set forth by Tuunanen et al. (2010) are helpful in analyzing how value is co-created in geocaching. However, our study also shows that many of the six factors seem to be interlinked, and without further analysis, it is difficult to distinguish how the interactions of system value propositions and customer value drivers interact. Furthermore, the use of contradictions as an analysis tool to study the interactions of system value propositions and customer value drivers is interesting. Our analysis reveals that although value co-creation is evident among the geocaching community, there are also visible signs that some actions also create negative value. In fact, contradictions show that geocachers engage in activities that undermine the whole experience of geocaching and the whole IT-enabled service. Thus, we propose that value co-creation can have both positive and negative impacts on the interactions of the service provider, the service, and the customer or user of the service. The anecdotal evidence from this study also indicates that the value co-creation activities change when geocachers are more mature and have more experience. From the interviews, we have learned that with more mature geocachers there are less recognizable contradictions. Thus, we see that the next step in the geocaching community is to apply processes of differentiation and integration to better understand how poles of contradiction could flourish without causing major disturbances to the activity of geocaching.

Klein and Myers (1999) defined seven principles for evaluating field studies in IS research. The principles of abstraction and generalization are the most relevant with respect to this study. Data was gathered in one country, Finland, and the Finnish geocaching site offered detailed statistics. Therefore, the emergence of the contradiction on competition may be explained by the existence of this particular service. We do not know if in other countries there are similar services available. In addition, the data analysis was strongly dependent on the experiences of the first author, so the interpretation may be biased. However, this may also be considered a strength as the experience and its reflection support the interviewees' stories.

To conclude, we argue that the contradictions found by this study can be considered essential (or poles) to geocaching and that these are in constant tension. People pursue hedonistic values while geocaching, but during the process, they confront disturbances such as the sudden approach of outsiders asking what they are doing, wrongly placed caches, feelings of guilt over using cars for geocaching, or discomfort with unnecessary competition with other geocachers. These disturbances are born of the essentials (or poles) of geocaching that oppose each other. We see these findings as an interesting avenue for future research.

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APPENDIX: SUBJECTS AND THEIR DEMOGRAPHIC DATA

Code	Gender (1=female; 2=male)	Age	Work Experience	Geocaching Years	Found Geocaches	Hidden Geocaches
1	2	25	0	3	500	0
2	2	38	12	3	1080	3
3	2	43	20	4	1730	10
4	1	30	7	4	350	6
5	1	33	7	3	526	10
6	1	51	28	10	4562	13
7	2	41	20	5	1700	30
8	1	44	15	2	2300	10
9	2	30	4	1	440	34
10	1	28	7	2	116	0
11	2	48	22	1	516	4
12	1	59	45	4	912	15
13	2	53	20	6	1460	15
14	2	36	16	2	1023	58
15	2	33	12	3	800	11
16	1	35	14	1	246	0
17	2	36	13	2	415	4
18	2	31	6	1	26	0
19	2	31	6	3	69	0
20	2	19	0	5	62	6
21	1	40	15	6	1450	12
22	1	28	3	1	1800	1
23	2	29	10	1	1800	1
24	2	25	3	1	349	3
25	1	51	25	1	30	0
26	1	36	10	1	6	0

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