Co-Creation of Value for IT-Enabled Services: A Case of Geocaching

Tero Vartiainen
University of Oulu
tero.vartiainen@oulu.fi

Tuure Tuunanen
University of Jyväskylä
tuure@tuunanen.fi

Abstract

This study explores how value is co-created in one particular IT-enabled service, geocaching. Consumer Information Systems (CIS) framework is used as a sensitizing framework to study experienced geocachers' (n=14) perceptions of what they value in geocaching. The following core values emerged that motivate people to co-create value in geocaching: challenging oneself and others, joy of success, learning, and social relations. The results reveal that geocaching is distinctively hedonic in nature, as people pursue happiness and utility via geocaching. Even support for the geocaching community was motivated by such values. In addition, the results reveal that the environment of geocaching and searching for and finding geocaches are the most important motivators for geocachers. Future research directions are offered and the study is evaluated.

1. Introduction

Recent radical changes in the mobile telecom industry demonstrate the importance of understanding customers' requirements. Apple's fantastic successes with the iPhone/iPod/iPad devices have transformed the industry. Correspondingly, Nokia's smart phone market share has plummeted. We see that one of the principal reasons for this is that Nokia did not understand the importance of service experience [1] for its customers. Instead, Nokia relied on development of hardware-based products and marveling on technical details of their devices vs. users' service experiences. Apple, in turn, understood that modern smart phones provide a platform, or an ecosystem, enabling services that are the core of the value proposition for the user.

We are facing an exciting period of change, where information systems (IS) are not designed for organizations and the utilitarian efficiency needs of their associated users anymore [2]. We are now experiencing the advent of systems that target a new kind of IS users. These users do not reside within organizations anymore; instead, they are consumers of information technology (IT)-enabled services. As such, they are accustomed to seeking entertainment or even pleasure through different kinds of IT-enabled services, such as television programming via broadcasting or cable networks. Tuunanen et al. [3] defines these as: "*… systems that enable consumer value co-creation through the development and implementation of information technology enabled processes that integrate system value propositions with customer value drivers*."

Amazing business and technology successes, such as Apple's iPhone and App Store, are currently motivating more and more researchers to shift the focus of service design and development research toward understanding the development and design of such services. This emerging area of IT-enabled services brings up interesting problems that have not yet been fully studied. For example, traditional IS development approaches most often focus on improving the efficiency and effectiveness of organizational processes, whereas the design of digital services for consumers may require more of an emphasis on the socio-psychological aspects of service use, such as hedonic utility [4] derived from the user experience.

In this study, we focus on understanding value co-creation for one particular IT-enabled service: geocaching. Geocaching is an outdoor treasure hunting game [5] that combines physical activity and technology [6]. Participants use Global Position System (GPS)-enabled devices and they navigate to specific GPS coordinates and attempt to find the geocache (container) that is hidden at that location. Upholding social relations seem to be important for geocachers, as many of them search geocaches in groups, such as families and friends [7]. Geocaching may also have educational benefits (see Jewett [8] on multiple literacies of geocaching, for example). These findings suggest that we might find complex socio-psychological structures beneath the experiences and perception of geocaching. We argue that this information would benefit other studies on IT-enabled services and developing them in practice.

1530-1605/12 $26.00 © 2012 IEEE
DOI 10.1109/HICSS.2013.134

Our objective is to study how geocaching participants conceive how the value is co-created from this activity, which is undertaken partly online and partly in different geographic locations. Our research question is how geocachers perceive value co-creation. We use the framework of value co-creation for consumer information systems (CISs) [3] as our research lenses. For our interpretive study reported here, we interviewed 14 geocachers in Finland. Next, we elaborate on geocaching as an IT-enabled service activity. Then, we review the literature that provides the basis of the framework we will use for our data analysis. Finally, we present our results, discuss the implications of the study, and conclude.

2. Geocaching

Geocaching has become more and more popular as a hobby; in 2012, there are over five million geocachers worldwide. 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 such an infrastructure for geocaching that without it, geocaching would not be possible to the extent that it is practiced today: all the information and coordinates on geocaches around the world are stored in the www.geocaching.com website (Figure 1).

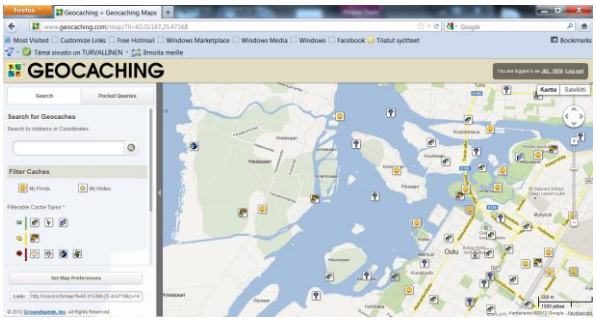

Figure 1. Geocaching web site showing caches in the center of a town

When the geocacher aims for the "hunting" trip, he or she first searches the web site for the available geocaches in his or her neighborhood (or in more distant places if he or she is able to travel). For each geocache, there is a web page that 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 may be a decrypted hint that the geocacher may encrypt to hasten the seeking process. 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 (Figure 2). At the location, it may be easy to find the cache if it is a plastic container (e.g., Tupperware or similar) hidden beneath a stone, for example. Harder ones may be camouflaged as rocks or tree branches. Only the imagination is the limit in hiding geocaches. After the hunt, the geocacher visits the web site and writes "Found it" logs to the caches that were found. In addition to seeking caches, it is also possible to create them. Creation of caches is open to everyone registered on the web site. This means that it is possible for geocachers not just to seek the caches, but also to collectively create the common experience.

Figure 2. A geocache container and a GPS device (picture by Jari Toiminen, Finland)

3. Co-Creation of Value for IT-Enabled Services

The problem of recognizing the needs of information systems has been a topic of constant debate in the literature. The traditional approach has been to determine the needs of the organizational end-user and then to analyze user requirements in order to develop requirement specifications [9-11]. This has led to the development of requirement elicitation and analysis techniques to assist the analyst to understand the users. IT-enabled service development naturally shares many similar features with traditional IS development. However, some aspects are different, if we take the viewpoint of co-creation of value for IT-enabled service use. We have summarized these in Table 1.

Tuunanen et al. [3] have presented a framework for CISs that argues that value co-creation is an interplay of at least two issues. First, the system makes value propositions to the users, and second, the users have value or goals that drive their behavior. According to

Table 1. Factors for co-creation of value for IT-enabled services, adapted from [3]

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

Lamb and Kling [12-14], the term "actor" should be used instead of "users." Individuals do not work in isolation, but rather, they work in teams. Lamb and Kling [12] also claim that actors can potentially have an identity [15, 16] attached to the IT artifacts they use. Lamb and Kling argue that actors use these IT artifacts to form and construct identities for themselves. For instance, Japanese teenagers accessorize their mobile phones with different gizmos and costume jewelry, making mobile phones part of their identity. Other researchers have suggested that the context of system use [17-20] is also an important issue. These authors argue that context of use is very likely to affect the service experience of users. Other researchers have argued that cultural context is likely to influence user requirements [21] and system use [22, 23]. These are depicted as value propositions in Table 1.

Furthermore, Tuunanen et al. [3] suggest that there are three key value drivers. First of all, they mention "service process experience." Holbrook et al. [24] have proposed the notion of "playful consumption," where play becomes part of the consumption experience. They studied the effects of emotions, performance, and personality on value creation in games. Kahneman et al. [4] also have suggested that consumers derive not only utility from consumption, but also benefits of a hedonic nature. Similarly, it has been suggested [25-27] that an experience of flow in service or system use is important to users, as are emotions elicited during use.

Second, according to service-dominant logic, we are seeing a change from firms providing services of pre-determined value to a new landscape where firms only make value propositions; value is co-created and the total value of the offering is determined by the customer in use [1, 28]. This phenomenon has been especially evident with computer gaming [29]. Moreover, consumers now expect more personalized experiences. IS researchers have long promoted participation of users in development [see, e.g., 17, 30, 31]. 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 to involve users [32-37]. Most studies have focused on users in organizational settings. However, some studies have explicitly taken a consumer focus. For example, Von Hippel et al. [38-40] suggested engaging potential lead-users of a product or service via toolkits that could be implemented with virtual communities.

Finally, we have the question of how IT-enabled service users' values and goals contribute towards 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 [41] investigated how to use quality function deployment to match computer and console gamers to games. Their research showed differences between gamer segments and consumers' game feature desires, but it does not provide linkages between, for example, hedonic utility derived from gaming and game features in order to enable its measurement. In the IS research literature, on the other hand, there has been a strong tradition of using perceived usefulness of information systems as a success metric [42]. In marketing, the conjoint approach has been used to measure consumer trade-offs and utility associated with product or service features [43, 44].

In summary, these are the six factors that Tuunanen et al. [3] argue influence value co-creation for IT-enabled services. They develop the argument through a literature review and the findings from their research from the past ten years. The studies they mention have incrementally developed the idea. These studies include three different case studies: *Mobile Financial Service* [45], *Mobile Presence Services* [21], and *Interactive Television Services* [46].

4. Research Methodology

The interpretive research approach was selected to understand how value is co-created in the geocaching community. We chose the interpretive approach instead of the qualitative approach because with interpretive approach, it is possible to understand how reality and experiences are socially constructed; see, e.g., [47]. In the case of geocaching, there is a community of geocachers developing the whole experience, i.e., creating and seeking the geocaches. By gathering data by interviewing with open-ended questions, it is possible to gain an in-depth understanding of geocachers' perceptions.

We gathered prospective interviewees at two geocaching-related Facebook groups and at the Finnish geocaching web site (www.geocaching.fi). Table 2

summarizes the demographic data of the interviewees. "Discovered geocaches" means the quantity of caches that the subject has found, and "created geocaches" means caches that he or she has created. "Exp" means experience geocaching, in years.

Table 2. Subjects and their demographic data[1]

Id	Sex	Age	Exp	Discovered Geocaches	Created Geocaches
1	2	25	3	500	0
2	2	38	3	1080	3
3	2	43	4	1730	10
4	1	30	4	350	6
5	1	33	3	526	10
6	1	51	10	4562	13
7	2	41	5	1700	30
8	1	44	2	2300	10
9	2	30	1	440	34
10	1	28	2	116	0
11	2	48	1	516	4
12	1	59	4	912	15
13	2	53	6	1460	15
14	2	36	2	1023	58

Regarding gender, there were six female and eight male subjects. The age group breakdown was as follows: four subjects aged ≤30 years of age, three 31–40, four 41–50, and three ≥51.

The data collection was accomplished with the laddering interview technique to elicit tacit values and goals that motivate people to geocache. Laddering was developed by Reynolds and Gutman [48] to study the means–end structures consumers have about a product. In laddering, interview participants are typically given a choice or decision task within a product category, then asked to describe what particular product attributes were the basis of their decision. Then, participants are probed to uncover the relevant product consequence(s) that they derive from the attribute. Probing questioning continues until they describe the final personal values that are satisfied through product consumption.

For our dataset, the laddering interviews were conducted as follows. The interviews started with a presentation of the stimuli list (see Appendix 1). These stimuli were intended to suggest ideas regarding what in geocaching is important to the interviewee. We then asked the participants to select two important themes. Then, one at a time, for the two highest ranked stimuli, the interviewer asked each participant to describe how that theme was significant to him or her. 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 for the chain. The data was recorded in the notes as chains of *feature—consequence—values*, as described by Peffers et al. [49].

During the interviews, the interviewer entered, on a spreadsheet, the features, consequences, and value attributes, i.e., the chains, that he recognized during the interview. With respect to the underlying goal or value, the interviewer asked the interviewee if the interpretation was right. After the interview, he listened to each interview recording again to sharpen the interpretations and correct any deficiencies in chain descriptions. In this phase, we had a preliminary version of the chains ending up with an underlying value or goal. Figure 3 demonstrates a chain that starts with "C different types of people" and "C a hobby that different people and people from different ages go in for." The chain ends with values or goals (V), the first of them being "V Diversity produce experiences."

As the values and goals were written in free form in the spreadsheet, this version was again gone through to identify similar or neighboring values or goals. They were merged to form a coherent collection of values and goals. The following section presents these results.

5. Results

Here, we present our results from the analysis. First, we look at how the participants emphasized different themes based on number values. Then, we look more closely at each of the theme areas and their value distributions. The themes are listed in Table 3. Table 3 also depicts the connection between stimuli items (full details in Appendix 1) and the CIS framework elements.

Table 3. Stimuli items and theme identifiers (ID)

ID	CIS Element	Stimulus item
1	Construction of identities	Me as a geocacher
2	Social nature of use	Social intercourse and socializing
3	Context of use	Environment where the geocaching occurs
4	Participation in service production	Creation of the prerequisites and basis of geocaching
5	Service process experience	Searching for geocaches and finding them
6	Customer goals and outcomes	Goals, values, and wishes in geocaching

5.1. Value distributions at the interview theme level

We coded a total of 207 values for the ladder chains resulting from the interviews. The distribution of the

[1] Gender coding: 1 = female and 2 = male

values among the interview themes is presented in Table 4. From the results, we can observe that two

Table 4. Distribution of values per theme

Value / Theme ID	1	2	3	4	5	6	Σ
Challenging oneself & others, breaking routine	1		1	6	10	5	23
Childhood & playfulness					4		4
Comfort			1				1
Competitiveness			1	1	2	2	6
Creativity					1		1
Development (self/others)			4	1			5
Diversity, equality, liberalism, understanding others	2	7	2		3		14
Excitement, experimentation, adventure			1	1	3	2	7
Familiarity of local places, local history			8		1		9
Feedback on own geocaches			1	2			3
Freedom			1		2		3
Geocaching as a part of identity, enabler						2	2
Goal setting/ orientation						3	3
Holiness of forests, religion			1	1		1	3
Joy of success	3	1	1	1	12	3	21
Learning	1	1	11	2	6	1	22
Nature, scenic values, art & beauty			4		2		6
Parenting					2		2
Personal reputation	1			2			3
Physical/ mental welfare		4	2		2	6	14
Quality of life					1		1
Reciprocal voluntary work / helping others/ mentoring	3	2	1	7	4		17
Relaxation, passing time		1	3		2	1	7
Self-awareness			2		2		4
Social relationships	2	13	1	1	5	4	26
Total (n)	13	29	46	25	64	30	207

themes were more emphasized than the others. More specifically, these were contextual issues of geocaching (ID 3, n=46) and participation in geocaching (ID 5, n=64). Three of the interview themes were similarly emphasized: social use (ID 2, n=29), geocaching experience (ID 4, n=25), and goals and values in geocaching (ID 6, n=30). Remarkably, geocaching was not found to be very influential for construction of identities (ID 1, n=13).

If we observe the value distribution over all interview themes, we also can learn interesting insights. There seems to be a group of values that drives geocaching behavior. First of all, challenging oneself and breaking one's daily routines seems important (n=23). Similarly, excitement-seeking behavior and experimentation with new things are important (n=7), as well as the joy of finding geocaches (n=21). These constitute 24.63% of all values. Another overarching theme is a great interest in learning (n=22), which seems to be linked with gaining further understanding of the local sites and the history behind them (n=9). Furthermore, the geocachers have a strong feeling of community, which is reflected by the emphasis in understanding others, diversity, and equality values (n=14), as well as reciprocal voluntary work, helping, and mentoring other geocachers (n=17). The two previous value groupings add up to 14.98% of all values. Finally, social relationships were considered to be very important as a value (n=26; 12.56% of all values).

5.2. Value distributions within the interview themes

The first interview theme focused on the geocacher's identity and its development through use of the IT tools enabling geocaching. This could mean actions that develop the person as a geocacher or the image of the person as a geocacher. This can also mean the development of one's Internet profile or its contents. The participants described that reciprocal voluntary work and generally helping others is important (n=3); similarly important were diversity (n=2) and social relationships (n=2). Finally, the joy of success also seemed important (n=3). This extract from spreadsheet memos exemplified this theme:

> Subject 14: "*You start to respect great mysteries; mentor status; you get known by others [when you have created great mysteries]*"

The second interview theme handled social intercourse and the socializing aspects of geocaching, such as the actions that involve contacting other geocachers and taking part in discussions in the online forums or in meetings. Not surprisingly, social relationships were most represented in this interview theme (n=13). However, what is intriguing is that this was closely followed by diversity, equality, liberalism, and understanding others (n=7). In addition, reciprocal voluntary work was mentioned (n=2). Finally, physical and mental welfare was linked to this (n=4). The next extract exemplifies this theme:

Subject 6: "*You want to widen your circle of friends outside your family and work community; there is life in other places also; you develop your support network; life is boring alone; you want to share experiences*"

The third interview theme centered on the context where the geocaching occurs. This can mean searching for geocaches at home via Internet services or geocaching-finding activities themselves. The majority of the values related to this theme were learning-driven (n=11), particularly about local places and history (n=8). Self-development and assisting other people's development was also mentioned (n=4). Other values seem to link to being outdoors and spending time with diverse sets of people. An example follows:

Subject 2: "*To learn and see places that deviate from conventional; Places that you do not typically go*"

The fourth interview theme concentrated on the creation of the prerequisites and basics of geocaching. This means all kinds of actions that make it possible for others to geocache. This might mean development of a new geocache and its maintenance, as well as sending travel-bugs and coins on the move. Here, challenging oneself and others was important (n=6), but with the emphasis of helping and mentoring other geocachers (n=7). Personal reputation and feedback on the developed geocaches was also visible in the interviews. Others included an interesting mention of the holiness of the forest, which seems to refer to experiencing the silence of the forest and the majestic tall pine trees in Finnish natural forests. An example follows:

Subject 11: "*Creation of geocaches is interesting; it is interesting to learn to create caches; what kind of feedback I get from my caches; challenging others; getting positive feedback*"

The fifth interview theme concentrated on searching and finding geocaches, including all the experiences that are felt while searching for them, such as browsing geocaches in the Internet service, transit to the location, searching for the geocache, solving mystery caches, and transferring travel-bugs and coins from one cache to another. This was the most popular theme among the participants, and it emphasized challenging oneself and others (n=10), as well as the joy of success for finding the geocaches and solving the riddles and puzzles of mystery caches. Similarly, social relationships (n=5), learning (n=6), and voluntary work (n=4) were regarded as important. One distinctive feature of this theme was the importance of feeling like a child again and the ability and opportunity to play. The next extract exemplifies this theme:

Subject 1: "*Joy of finding the cache; if it is hard, one it is joyful to find it; you break your own limits; you climb into a tree; fun as it was when I was a child; breaking everyday routines*"

The final interview theme focused on the participants' goals, values, and wishes pertaining to geocaching. Physical and mental welfare (n=6) and challenging oneself (n=5) were the two most numerous values in this theme. Social relationships (n=4), the joy of success (n=3), goal setting (n=3), and competitiveness (n=2) were similarly mentioned as goals or values. What is particularly interesting with this interview theme is that participants mentioned here that geocaching is enabling them to develop an identity for themselves within the community. An example follows:

Subject 8: "*Physically hard geocaches; clear need to lose weight; geocaching has an important part in keeping oneself fit*"

6. Discussion

Geocaching, as a whole, is an example of a CIS that makes its users or actors co-create values that they perceive as meaningful. Our findings suggest that the core values that motivate people in geocaching are as follows: challenging oneself and others, joy of success, learning, and social relations. Challenging oneself and learning relate closely to each other, and they represent a desire for mental (and in some cases physical) development. Joy of success in finding the geocache (and the location, in some cases) is the mental state that geocachers aim for. Social relations are a basic human need that many geocachers perceived important in this activity. We might summarize these by stating that geocachers want to challenge themselves and learn new things to attain joy of success when finding a geocache, either by themselves or in the company of others.

In addition, there are other significant values, such as upholding diversity, equality and liberalism, familiarity of local places and local history, physical and mental welfare, and reciprocal voluntary work and helping others.

Many of these values, such as joy of success, challenging oneself, and social relations, are hedonic in nature (cf. Kahneman et al. [4]), meaning that people pursue happiness and utility via geocaching. There are also other-directed aims, such as developing and challenging other people via creating geocaches for others. On the one hand, geocaching would not be possible without actors that serve each other. On the other hand, during the interviews, the participants described that the underlying reason for providing others with geocaches was that such a voluntary work is reciprocal; i.e., if you give, you also get. Therefore, geocaching is inherently a hedonic activity.

In the CIS framework [3], there are two sides: system value propositions and customer value drivers. The system value propositions are features that enable value co-creation, whereas customer value drivers are driving the customer, or user, to co-create value. From the results, we can argue that searching and finding geocaches is a very important value driver for geocachers. Similarly, we can argue that for geocaching, contextual support where the geocaching occurs, i.e., the environment, is vital for the participants. These two add up to 53.1% of all value items derived from the laddering interviews. Interestingly, the construction of identity by the geocachers was less visible in the results than expected. It seems that the construction of identity items is more tacit for the participants. We can observe such items in the dataset, such as personal reputation and feedback for the created geocaches; however, it seems that we need to analyze further the data in order to investigate the tacit relationships between the values. This would require us also to analyze the data as chains of *feature—consequence—values,* as suggested by Peffers et al. [49].

What is interesting is that we also found that we see distinct value patterns within this dataset compared to other previous studies using similar data gathering and analyses. In the mobile financial services study [45], the values from the participants were more utilitarian, which is reasonable, given that the service in question focused on personal finances and handling daily financial actions and mobile payments. In a later study, where Tuunanen et al. [21] studied how consumers would like to use a mobile service for informing friends and relatives of their current presence status, the results indicated that hedonic and utilitarian values were balanced; i.e., there were clear hedonic values driving use, such as enjoying life, but there were also very distinct utilitarian values visible, like economic gains. The interactive television services study [46] focused on the development of an online IPTV learning system for university students. The values in that study show that the participating students were quite goal-oriented and wanted the system to support their learning activities. The described values were more focused on the utilitarian values than hedonic.

Finally, during the data gathering, it also became evident that this hobby (like any other hobby) is a part of the whole life experience, and these issues affect each other. In the interviews, the subjects directly or indirectly described how geocaching, as a whole, has supported them after or during certain life incidents or situations, such as loneliness, sickness, dating, and parenting. This observation suggests that it would be interesting to study how integrating theories of human development, such as life span theories [50], benefit a better understanding of how to construct IT-enabled services, such as games and hobbies, that support them as they pursue values that are meaningful to them in those life situations.

In the case of geocaching, the elements of CIS were differently weighted. First, the contexts of use (the environment where geocaching occurs) and service process experience (searching and finding geocaches) were most weighted. Second, the social nature of use, participation in service production and customer goals and outcomes were moderately weighted. Lastly, construction of identities were least weighted. To summarize, this means that geocaching offers a major value proposition, context of use, that intrigues the actors, geocachers. What drives them most is service process experience, finding the geocaches. We summarize geocaching as it offers interesting environments where geocachers experience the searching and finding the caches and all these activities are motivated by hedonic values, i.e., happiness and utility. Our findings, therefore, suggest that both system propositions and value drivers that enable value co-creation can differ significantly between different IT-enabled services. Furthermore, it is likely that the role of IT in the service, i.e. whether it is more dominating or less visible, will affect how customer experiences the service and more importantly how to design IT-enabled services in a such a way that they support and engage people in value co-creation.

7. Conclusions

This study investigated how geocaching can be conceptualized in terms of system value propositions provided by the supporting information systems, such as geocaching web sites and GPS, and the value drivers that drive the activity itself. We interviewed 14 Finnish geocachers with the use of the laddering interviewing technique. The laddering interviews enabled us to understand what features of geocaching are important to the participants, what the reasoning is behind these, and more importantly, what values or goals are behind

the reasoning. We analyzed the dataset using the CIS framework and its six factors, which have been argued to influence the value co-creation for IT-enabled services [3].

Our study revealed the underlying values of a single IT-enabled service, a game and a hobby, geocaching. Most dominant values were related to challenging oneself and others, joy of success, learning, and social relations. Furthermore, we found that geocaching can be characterized as a hedonic activity where different information systems enable this behavior. This supports the original argument by Tuunanen et al. [3] that we should investigate the values behind the system propositions and customer drivers as a continuum of hedonic and utilitarian values. We also present that this study opens an interesting new avenue for research. Given that more and more information systems are offered and used by non-organizational users, we should take into account theories that further explain the behavior of these users. Functionality and usability of IT devices likely affects the geocaching experience, for example. We see great interest, such as in human development and life-span theories, and how these might explain what values drive IS use in certain life situations or ages. The underlying reasons why an individual does geocaching may change while one grows up, this is to say that IT services may be experienced differently in different life phases.

With respect to the theoretical saturation, it is noteworthy that the subjects represent both genders evenly, and the age groups are evenly represented. The limitation of our sample is that there are no newcomers in our sample, as the subject with the least found geocaches already had 116 finds. However, this can be perceived as a strength, as our subjects are experienced and active, and some of them invest their time in supporting the geocaching community by creating caches and arranging meetings. In addition, the first author is an active geocacher (1012 found caches, 1 hidden cache, 6th September 2012), and he was able to understand the subjects' special expressions on geocaching. To summarize, the immersion of our subjects and the first author in this phenomenon increase the trustworthiness of our results.

With future research, we plan to extend the current study to gain more insights into the value structures of geocachers and to analyze the complete laddering *feature—consequence—values* chains [49] in order to understand whether there are distinctive patterns in the reasoning behind the values with geocaching vs. the other reported studies where value structures have been more utilitarian in their focus. Furthermore, we look forward to extending the focus of the study to include other hedonic IT-enabled services. This is most likely to reveal more about the characteristic features of such information systems.

Appendix – Stimuli List for Interviews

Read the following seven themes. Select two themes that you found the most interesting. Which of them interests you more? You may also raise new themes (selection 7).

1. **Me as a geocacher:** This means actions that develop you as a geocacher or the image of you as a geocacher. This might mean the development of your profile or its contents (also the selection of your nickname), for example. In addition, this might mean writings through which you bring up your own actions and identity visible for others, like logging the found cache, for example.
2. **Social intercourse and socializing:** This means actions that involve contact with other geocachers. This might mean taking part in discussions in forums or taking part in meetings, or geocaching in groups, as well as random interactions with other geocachers while geocaching.
3. **Environment where the geocaching occurs:** This means all those environments where acts relating to geocaching occur. This might mean searching for geocaches at home via WWW service or geocaching in population centers, in nature, beside attractions (e.g., nature or culture attraction), or in otherwise important locations.
4. **Creation of the prerequisites and basis of geocaching:** This means all kinds of actions that make it possible for others to geocache. This might mean creation of a new geocache and its maintenance and sending the travel-bugs and coins on the move. In addition, this might mean production of different kinds of texts that help others in geocaching.
5. **Searching for geocaches and finding them:** This means all those experiences that are felt while searching for geocaches. This might mean browsing geocaches in WWW service, transportation to the location (e.g., by foot, by car), searching for the geocache at the zero point, solving mystery caches, and transferring travel-bugs and coins from one cache to another.
6. **Goals, values, and wishes in geocaching:** This means all those goals or objectives that you set for yourself when geocaching. In geocaching, you may pursue as many found caches as possible, for example. The objectives might relate to other issues, like making friends or exercising.
7. **The other theme:** What else interests you in geocaching. Describe.

References

[1] S. L. Vargo and R. F. Lusch, "Evolving to a New Dominant Logic for Marketing," *Journal of Marketing,* vol. 68, pp. 1-17, 2004.

[2] H. Simon, "A Behavioral Model of Rational Choice," *Quarterly Journal of Economics,* vol. 69, pp. 99-118, February 1955.

[3] T. Tuunanen, M. Myers, and H. Cassab, "A Conceptual Framework for Consumer Information Systems Development," *Pacific Asia Journal of the Association for Information Systems,* vol. 2, p. 5, 2010.

[4] D. Kahneman, E. Diener, and N. Schwarz, Eds., *Well-Being: The Foundations of Hedonic Psychology*. New York, NY: Russell Sage Foundations, 2003.

[5] geocaching.com. (2012, June 1st). Available: http://www.geocaching.com

[6] B. E. Schlatter and A. R. Hurd, "Geocaching: 21st-Century Hide-and-Seek," *Journal of Physical Education, Recreation & Dance (JOPERD),* vol. 76, pp. 28-32, 2005.

[7] D. J. Gentry, "Mapping Where We Live and Play with GPS Technology," *Journal of Family and Consumer Sciences,* vol. 98, pp. 41-43, 2006.

[8] P. Jewett, "Multiple Literacies Gone Wild," *The Reading Teacher,* vol. 64, pp. 341–344, 2011.

[9] T. A. Byrd, K. L. Cossick, and R. W. Zmud, "A Synthesis of Research on Requirements Analysis and Knowledge Acquisition Techniques," *MIS Quarterly,* vol. 16, pp. 117-138, March 1992.

[10] G. J. Browne and M. B. Rogich, "An empirical investigation of user requirements elicitation: Comparing the effectiveness of prompting techniques," *Journal of Management Information Systems,* vol. 17, pp. 223-249, Spr 2001.

[11] L. Mathiassen, T. Saarinen, T. Tuunanen, and M. Rossi, "A Contingency Model for Requirements Development," *Journal of Association of Information Systems,* vol. 8, pp. 569-597, November 2007.

[12] R. Lamb and R. Kling, "Reconceptualizing Users as Social Actors in Information Systems Research," *MIS Quarterly,* vol. 27, pp. 197-235, June 2003.

[13] R. Lamb, "Modeling the Social Actor," in *the 12th European Conference on Information Technology Evaluation*, Turku, Finland, 2005, p. 7.

[14] R. Lamb, "Alternative Paths Toward a Social Actor Concept," in *the Twelfth Americas Conference on Information Systems*, Acapulco, 2006, p. 11.

[15] W. E. D. Creed, M. A. Scully, and J. R. Austin, "Clothes Make the Person? The Tailoring of Legitimating Accounts and the Social Construction of Identity," *Organization Science,* vol. 13, pp. 475-496, October 2002.

[16] B. Simon, K. Boudreau, and M. Silverman, "Two Players: Biography and 'Played Sociality' in EverQuest," *Game Studies - The International Journal of Computer Game Research,* vol. 9, April 2009.

[17] D. L. Goodhue, "Understanding User Evaluations of Informations Systems," *Management Science,* vol. 41, pp. 1827-1844, December 1995.

[18] B. Schilit, N. Adams, and R. Want, "Context-Aware Computing Applications," in *First Workshop on Mobile Computing Systems and Applications*, Santa Cruz, CA, 1994, pp. 85-90.

[19] A. K. Dey and G. D. Abowd, "Towards a better understanding of context and context-awareness," 2000, pp. 304-307.

[20] W. J. Orlikowski, J. A. Yates, K. Okamura, and M. Fujimoto, "Shaping electronic communication: the metastructuring of technology in the context of use," *Organization Science,* vol. 6, pp. 423-444, 1995.

[21] T. Tuunanen, K. Peffers, C. Gengler, W. Hui, and V. Virtanen, "Developing Feature Sets for Geographically Diverse External End Users: A Call for Value-based Preference Modeling," *JITTA : Journal of Information Technology Theory & Application,* vol. 8, pp. 41-55, 2006.

[22] M. Myers, "Investigating information systems with ethnographic research," *Communications of the AIS,* vol. 2, 1999.

[23] M. D. Myers and F. B. Tan, "Beyond models of national culture in information systems research," *Advanced topics in global information management,* vol. 2, 2003.

[24] M. B. Holbrook, R. W. Chestnut, T. A. Oliva, and E. A. Greenleaf, "Play as a Consumption Experience: The Roles of Emotions, Performance, and Personality in the Enjoyment of Games," *Journal of Consumer Research,* vol. 11, pp. 728-739, September 1984.

[25] A. V. Hill, D. A. Collier, C. M. Froehle, J. C. Goodale, R. D. Metters, and R. Verma, "Research opportunities in service process design," *Journal of Operations Management,* vol. 20, pp. 189-202, April 2002.

[26] R. Agarwal and E. Karahanna, "Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage," *MIS Quarterly,* vol. 24, pp. 665-694, December 2000.

[27] M. Csikszentmihalyi, *Flow: The Psychology of Optimal Experience*. New York, USA: Harper Collins, 1991.

[28] C. K. Prahalad and V. Ramaswamy, "Co-Creation Experiences: The Practice in Value Creation," *Journal of Interactive Marketing,* vol. 18, pp. 5-14, Summer 2004.

[29] F. Karlsen, "Quests in Context: A Comparative Analysis of Discworld and World of Warcraft," *Game Studies - The international journal of computer game research,* vol. 8, September 2008.

[30] G. Davis, "Strategies for information requirements determination," *IBM Systems Journal,* vol. 21, pp. 4-31, 1982.

[31] G. Herzwurm, S. Schockert, and C. Weinberger, "Customer Oriented Evaluation of QFD-Tools," in *Proceedings of the Third International Symposium on Quality Function Deployment*, Linköping, Sweden, 1997, pp. 309-323.

[32] S. Kujala, "User involvement: a review of the benefits and challenges," *Behaviour & Information Technology,* vol. 22, pp. 1-16, Jan-Feb 2003.

[33] S. Kujala, M. Kauppinen, and S. Rekola, "Bridging the Gap between User Needs and User Requirements," in *Advances in Human-Computer-Interaction I (Proceedings of the Panhellenic Conference with International Participation in Human-Computer Interaction PC-HCI 2001*, 2001, pp. 45-50.

[34] P. Tait and I. Vessey, "The effect of user involvement on system success: a contingency approach," *MIS Quarterly,* vol. 12, pp. 91-108, 1988.

[35] J. Hartwick and H. Barki, "Explaining the role of user participation in information system use," *Management Science,* vol. 40, pp. 440-465, 1994.

[36] J. D. McKeen and T. Guimaraes, "Successful strategies for user participation in systems development," *Journal of Management Information Systems,* vol. 14, p. 150, 1997.

[37] A. L. M. Cavaye, "User participation in system development revisited," *Information & Management,* vol. 28, pp. 311-323, 1995.

[38] E. von Hippel, "Lead Users: A Source of Novel Product Concepts," *Management Science,* vol. 32, pp. 791-805, July 1986.

[39] E. von Hippel, "Innovation by user communities: Learning from open-source software," *Sloan Management Review,* vol. 42, pp. 82-86, Sum 2001.

[40] E. von Hippel and R. Katz, "Shifting innovation to users via toolkits," *Management Science,* vol. 48, pp. 821-833, Jul 2002.

[41] G. Jacobs and B. Ip, "Matching games to gamers with quality function deployment " *Total Quality Management & Business Excellence,* vol. 14, pp. 959 – 967, November 2003.

[42] V. Venkatesh, M. G. Morris, G. Davis, and F. Davis, "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly,* vol. 27, pp. 425-278, 2003.

[43] P. E. Green and V. Srinivasan, "Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice," *Journal of Marketing,* vol. 54, pp. 3-19, October 1990.

[44] A. L. Ostrom and D. Iacobucci, "Consumer Trade-Offs and the Evaluation of Services," *Journal of Marketing,* vol. 59, pp. 17-28, January 1995.

[45] K. Peffers and T. Tuunanen, "Planning for IS applications: a practical, information theoretical method and case study in mobile financial services," *Information & Management,* vol. 42, pp. 483-501, Mar 2005.

[46] T. Tuunanen and H. Govindji, "Utilization of Flow Concept for Digital Service Requirements Prioritization," in *Proceedings of SIGSVC Workshop . Sprouts: Working Papers on Information Systems*, Shanghai, 2011, p. 18.

[47] G. Walsham, "Interpretive case studies in IS research: nature and method," *European Journal of Information Systems,* vol. 4, pp. 74-81, 1995.

[48] T. J. Reynolds and J. Gutman, "Laddering theory, method, analysis, and interpretation," *Journal of Advertising Research,* vol. 28, pp. 11-31, 1988.

[49] K. Peffers, C. Gengler, and T. Tuunanen, "Extending Critical Success Factors Methodology to Facilitate Broadly Participative Information Systems Planning," *Journal of Management Information Systems,* vol. 20, pp. 51-85, 2003.

[50] D. J. Levinson, *The Seasons of Man's Life*. New York: Alfred A. Knopf Inc., 1979.