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MOBILE DATA SERVICES USAGE: AN IN DEPTH INVESTIGATION OF THE INFLUENCE OF THE "PERSONAL LAYER" OF PLACE

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Abstract

The new mobile networked environments ask for more investigation in order to explain users' behaviour and users' low demand for mobile data services. A field study, conducted in the territory of Greece, researched the use of a specific mobile data services platform, called here as Service A trying to identify how users experience place before deciding to use mobile data services. The findings of the research tend to suggest that participants did experience the different places in a similar way before deciding to use mobile data services. The study adopted the humanistic geographical perspective as represented by the four "layers of place" introduced by Yi-Fu Tuan's theory. The findings presented in this specific paper highlight the strongest patterns coming from the analysis of the "Personal layer" of place as represented by Tuan that are important influential elements in the decision of the users to start using mobile data services . The contribution of this paper is that it argues that the users' decision to start using mobile data services is influenced and triggered by their interaction with their surrounding environment and thus there is need to consider the role of this environment in the study of adoption and use of mobile data services.

Keywords: Mobile Data Services, Place, Personal Layer

1   INTRODUCTION

Mobile phone technology outperforms most of the communications technologies ever invented, since mobile phone users have already reached 3 billion world-wide[2]. Furthermore it is forecasted that in the coming decade, the mobile telephony industry will generate service revenue of US$ 800 billion, (Wang et al. 2007). However, this high mobile phone penetration rate did not lead to rapid mobile data services' diffusion (Carlsson et al. 2006) especially in Europe. Basic services such as SMS, ring tones, icons and logos are still the most popular services while the adoption of more advanced mobile data services such as mobile commerce and payments has been slower than expected (Ondrus et al. 2006 ; Dahlberg et al. 2007 ; Dahlberg et al. 2008 ; Hu et al. 2008).

The disappointing results of mobile data services adoption and use make scholars[3] question the understanding of the adoption and usage process within these new environments. More specifically Lee et al. (2003), Legris et al. (2003), Adams et al. (1992), Lucas and Spitler, (1999), Venkatesh et al. (2003), Sack (1997) and Agarwal and Prasad (1998) argue that the existing adoption and usage models have limitations which question their generalizability and explanatory power within different contexts. More recently Dickinger et al. (2006) showed that existing adoption models were not satisfying for highly interactive mobile communication technologies while Mallat et al. (2006) indicated that traditional adoption models should be augmented with the use situation and mobility constructs to better explain the use of mobile services.

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[2] www.3g.co.uk/PR/April2008/5961.htm

[3] www.emobility.eu.org/documents/SRA/SRA4_051123_Final.pdf

It can be argued that the behaviour intention of the user to communicate and to consume mobile data services depends on the context of the physical world the user is in. Thus there is a need for a new approach to study place. Following the above arguments, research has been conducted to investigate the role of the "*materials*" of place as defined by Tuan (1977) in the use of mobile data services. The richness of the data and the findings this research makes us focus in this paper only on the "*personal layer*" and highlight the strongest patterns that influence usage behaviour of mobile data services.

The motivation of this research is both theoretical and practice-based. On the one hand, results from this research contribute towards a better theoretical understanding of the relation and the impact of place in the usage process of mobile data services. On the other hand the findings of this research will assist companies to understand better the real needs of their customers and thus to produce more useful and desirable services.

In the following section, we present the theoretical underpinnings of this study. Section three discusses the research methodology adopted in the study, followed by a brief introduction to the case study in section four. Analysis of the findings is shown in section five, and section six discusses the conclusions of this research.

2   THEORETICAL FRAMEWORKS

The paper explores the role of the "personal layer" for the case of mobile data services usage process. Thus initially we review the literature of place to identify the characteristics of the "personal layer" and simplify its concept by analysing its factors and attributes using the Brahms modelling language.

2.1   Place

Scholars tried to analyse the constituent elements of the physical environment describing its nature through the concepts of space and place. Altman (1975), Harrison and Dourish (1996) as well as Kostakos (2004) consider space as the physical world and argue that there is a need to differentiate between space as physical location and place as social world. Places are spaces which have meanings, and as Harrison and Dourish (1996) argue, we are located in "*space*", but we act in "*place*", like when we are located in a "*house*" but we live in a "*home*". Based on Relph (1976) who introduced the 'raw materials' of place identity, Agre (2001) considers place as space filled with architecture, practices (routine actions people do in particular places) and institutions (social roles and rules that characterise these practices). Lainer and Wagner (1998) suggest that particular individual and social activities and behaviours can be trigged through the features of spatial design and Crabtree (2000) supports that a sociological perspective should be applied to understand the relationship between space, place and human behaviour.

Yi-Fu Tuan extended and refined the conceptual distinction between space and place and defined places as entities that describe our experience of being in the world, "*incarnate the experience and aspirations of people*" (Tuan, 1971, p.281), and invest a physical location or setting with meaning, memories and feelings (Tuan, 1977). In a more recent example Kostakos (2004) claimed that place is inextricably linked to people and how they perceive this location in terms of social connections and the presence of others, protocols of behaviour, values and cultural meanings attached to it.

We tried to explore the notions of space and place as these emerged within different perspectives. To proceed with this study we adopted a Humanistic geographical perspective on place influenced by Yi-Fu Tuan's theory, using the terms "*place*" when referring to the "*lived*", "*experienced*" qualities of an environment, and "*space*" when pointing out to its geometrical and physical extension. Adopting Yi-Fu Tuan's analysis of the "*materials or layers of place*", the paper defines place as a complex experiential notion that takes form by the physical, personal, social and cultural dimensions. These dimensions do not exist a priori, but exist in connection with the others leading to and emerging through people's actions and activities within a physical space. This means that in order to understand a place and its

inhabitants we have to take into account the physical attributes (time, location and weather conditions), the personal attributes (the memories, emotions and attitudes associated to the place), the social attributes (social roles and interaction, private and public social attributes) and the cultural attributes of the place (architectural design and the cultural identity of the place).

2.2   Model of Place

This paper focuses, explores and discusses the way the personal layer affects mobile data services usage, as it defines the drive to use them and the familiarity with them. We chose to model place and analyse the factors and attributes of the Tuan's personal layer using the Brahms modeling language. Brahms is a simulation tool to model business processes and to incorporate the social systems of work (Clancey et al. 1998, Sierhuis et al. 2002), and it is considered a suitable multi-agent modeling and simulation environment for designing complex interactions in human–machine systems Sierhuis et al. (2003). However, although Brahms model is suitable for studying kinds of social and work practice phenomena, Lisetti et al. (2005) believe that it can be used for modeling larger social phenomena. Brahms also takes into account the belief that we cannot ignore the influence of location upon people's decision to use technologies and thus model the activities of agents and groups in different locations and the physical environment consisting of objects and documents, including especially computer systems (Clancey et al. 1998). The Brahms modeling language compared to other tools, such as Swarm, allows for a more 'natural' representation of human behaviour at the level of activities, reasoning, communication, interaction with objects and movement in the world (Carley et al. 1994). For example, Swarm (Minar, Burkhart, & Langton, 1996), an often-used language for modeling and simulating social and economic behaviour of large agent societies (Luna & Perrone, 2002), is not based on any particular theory of human behaviour.

Our modeling approach is based on a model-based method that divides the system to be modeled into a number of more or less independent sub-models. These sub-models come from the Tuan theory and are the layers of Place. Following is a four layer pictorial representation of Tuan's layers of place:

Figure 1. Tuan's materials of place

The personal layer is characterized by its factors and each factor is analysed into its attributes. We simplified the personal' layer model into four main factors: the attributes of the user, the user's emotional state, user's familiarity with the place and user's activity within the specific place. A brief analysis of the factors follows.

The "user's attributes" factor: This factor concerns the attitude and the mindset of participants within specific places and is related to the demographic attributes of age, gender and socio-economic status as well as to the familiarity and expertise of the users with the usage of information technologies.

Place attachment: This factor represents the familiarity the users have with the areas they are located. This familiarity is represented in emotional as well as in functional terms. The place attachment factor depends on the number of the visits the users have made in this area such as frequent visits versus rare visits. According to Williams, et al. (1992) place not only provides opportunity to satisfy needs and achieve goals, but it creates strong emotional bonds between a person and particular places. This strong emotional relation can be described by the place attachment concept or the "*habit*" constructs which entail the meaning of the user's status regarding geographical movement (Castro and Gonzalez, 2008, Riley, 1992, Low, 1992). According to Williams and Stewart (1998 ,p.19), place attachment is "*the collection of meanings, beliefs, symbols, values, and feelings that individuals or groups associate with a particular locality*". Brown (1987) introduced the functional place attachment term, which is closely tied to the types of activities users pursue and the emotional place attachment term which refers to the emotional aspects of a person-place relationship.

User's emotional status: This factor relates to past and present emotional and physical conditions of the users as for example the mood, anxiety, fear, boredom, tiredness, happiness, anger, sadness, hunger and/or thirst as well as the expectations the users have for the places.

Activity factor : Activities are the collection of actions performed by an individual according to the Brahms model (Clancey, 2002). The activity factor consists of the type of activity, the interaction status which refers to either communicating or collaborating with other people and systems, the timeframe attribute which specifies when an activity is performed, the sub-activities which are micro units for viewing and describing human behavior and the mobility status of the user. This factor defines the types of the user's bodily movement status (sitting, laying, standing, exercising in a gym, waiting and walking or running to a specified location) or broader user's mobility status (traveling, wandering, and visiting). We adopted the concept of "*mobility*" that denotes the user's movement between locations and places. According to this concept users are in low mobility status whenever they are still (sitting, standing or waiting) and in high mobility status whenever they are moving (walking, running, driving, traveling and wandering).

3   RESEARCH METHODOLOGY

This research has adopted an interpretive approach where the reality is socially constructed by human agents (Walsham 1995). The units of analysis are end users and the data collected are presented in the form of multiple unit of analysis type case study (Yin 2002). The "*case study*" concerns a commercial mobile data services platform (Service A - a pseudonym).

A case study adopted for this study which was the launch of Service A in the Greek Market by a leading mobile service provider. Case study is a method that allows us to get a broader perspective of the mobile data services market as for example the characteristics of the heavy users' target group. The case study method gives better knowledge of the broader environment and market. For example special events and promotional campaigns that occur during specific periods could give false data making us relate these periods with high usage rates. According to Wang et al. (2007), who revealed that the diffusion of mobile Internet services in Taiwan is affected by mass media advertising, consumer behaviour changes all the time, and sometimes these changes may be the result from particular market incidents.

All the data were collected by the first author in Athens, while the other two researchers were involved in the rest of the phases. Qualitative research methods were used and the data collection for the research was carried out using interviews, focus groups and observation method where information collected related to the way users interact with the place in real usage situations. The type of interviews is positioned by Nandhakumar and Jones (1997) in the middle of the spectrum analyzing distance and engagement of data-gathering methods. Furthermore, elements of Contextual Inquiry method (Holtzblatt and Jones 1993) were used, in conjunction with more novel methods such as mobile Probes (Gaver et al. 1999, Hulkko et al. 2004).

A data collection technique was applied which augments the feedback method allowing the user and the researcher to be always in contact having synchronous textual communication (Papadopoulos, 2008b). Twenty seven individuals were recruited to participate in the focus group discussions. Demographics as well as behaviouristic characteristics had been considered in order to choose the sample. Furthermore, the participants were frequent users of the Service A platform with at least two usage occasions to the platform per week. Three focus groups (nine users per group) were conducted. From each focus group we chose three "*low entropy - heavy users*" of Service A, nine in total. According to Eagle and Pentland (2005), people who live low-entropy lives have a fairly predictable high-level behavior with very regular hours during a time period while people with high-level entropy lives tend to be more variable and harder to predict.

These nine participants were taking pictures of their surrounding places whenever they used Service A. After annotating these pictures they emailed them when available. Time to time when necessary MSN

chats with the users took place, as a "*synchronous feedback*" method, over their mobile phones. After the photos collection period passed, in-depth interviews were conducted with the nine participants where the mobile probes, along with the data from the chatting on MSN were used as inputs to trigger discussion.

Finally, three more individuals were recruited from the researcher's social network to participate in the observation phase of the study. These participants came from the researcher's social environment in order to be able to join them, observe or take photos or audio recording an informal, free-form interview more easily. Two days were spent with each individual and activity sequence graphs during that time were constructed based on these notes.

All conversations, interviews as well as the focus groups, were conducted in "*face-to-face*" meetings in Greek, taped and later transcribed. Taping interview content allowed a focus of attention on the conversation and extending the scope of interest where necessary.

Interview and focus group transcripts and field notes such as diaries and ethnographic data, were organised and structured by being grouped thematically, were coded by being divided into individual sentences or remarks and finally analysed. The coding process allowed us to interpret the data and identify what is relevant to the research project's goal. The model of place, that was used, provided us with a structuring mechanism or 'map of the territory' for the research effort, within which empirical data was collected and analysed (Fisher, 2004). This model allowed us to filter the relevant data in the analysis phase and provided what Miles and Huberman (1994) call "*the best defense against overload*". Thus since our study does not aim at constructing a theory from concepts emerging in the data we used the model as a filter to reduce the data.

Although our approach is closer to that of Miles and Huberman (1994), since we initially defined the structure of the model of place before the review of the data, we developed the structure of the coding system following a more integrated approach. Thus we employed both inductive developments of codes, using conceptual codes, as well as a deductive organizing framework for code types (model of place). The coding structure adopted for this research consisted of four distinct types:

- Profile (Socio-demographic) Coding.

- Classification Coding: Classification codes were used to analyse the data coming from the focus groups and the interviews, based on the proposed model of place as recommended by Miles and Huberman (1994) and Yin (2002).

- Conceptual coding: These codes are used to label discrete happenings, events, and other critical issues Strauss and Corbin (1998), as for instance the concepts "escape" or "alone".

- Pattern Coding: Pattern codes are labels for systematic sequential co-occurrences of other codes, signifying complex clusters of meaning. This approach aims to aggregate and summarize the previous codes, identifying themes and inferences across them all.

The analysis was guided by adopting Easterby-Smith et al. (1991) model of stages. The analysis enabled the seeing of repeated patterns within the collected data (phrases, sentences or passages) to reveal hidden motivations and behaviours allowing a better understanding of the conditions behind the use of mobile data services. Also the detailed analysis of the transcripts provided not only a comprehensive background understanding of mobile device users, but ensured that the demanding nature of mobile communication is fully documented, salient themes were identified where possible and the physical, social, technological and organisational constraints that a mobile application will function under were recorded.

4   CASE INTRODUCTION

Service A, has been chosen for this research because as a brand mobile services platform it has extent awareness within the Greek population, offers a pool of different success services and allowed the

establishment of samples across diverse groups of users. Service A has been considered by the press as an innovative service compared with the competition. Service A offers access to more than 82,000 Internet sites, and as of July 2004 it has attracted more than 41 million subscribers worldwide since its introduction in February 1999. Have to mention that no reference is provided to preserve anonymity.

Service A is a portal that allows users to have WAP services as well as to surf the Internet and have Mobile Banking, maps, On-line shopping, travel/booking, and other applications on their mobile phones. Service A is considered by the press as a world wide success story providing among other things successful applications such as e-mail and MSN over mobile phones. These applications were used as a data collection tool during the field study as a means of "*synchronous feedback*".

5   ANALYSIS AND DISCUSSION

The study revealed that the "personal layer" can impact the behaviour of users of mobile data services when they have to decide to use mobile data services. According to the findings, the background of the user (demographics and familiarity with technology) is an attribute that can influence the attitude of users to become heavy or light users of Service A.

More specifically usage and attitudes towards "Service A" applications are influenced by age in the sense that younger users (15 -19 years old), described in this study as youngsters or teenagers, are more prone to use Service A more frequently and to a greater extent. Within the total sample, teenagers were found to be more interested and emotionally attached to Service A which according to the findings appears to satisfy three core needs for this age group:

- Acceptance and participation in a peer group/relationship: this need defines teenage life and can be defined as wanting to participate in the communication codes the peer groups have, to remain always 'connected' and available to share news and thoughts with friends/partners. Maintaining constant 'touch' with friends/partners was found of supreme importance to teenagers as they fear that their unavailability can produce alienation by missing out what is taking place in their company of friends/partners, especially if they are from different schools. A 17 years old girl replied "*from time to time we call our friends' mobile phones and wait for reply. If this happens we know that everything is fine. We use to do it when we are out of money and we can spend more for prepaid cards. If we are within our budget and we have enough money to spend for prepaid cards we used to send MMS of emails using Service A as a way to communicate with friends. We do this everyday*". According to this girl there is a communication code with friends using mobile phones even when their friends are out of money. More specifically they prefer MMS which is the teenagers' favourite form of communication second to SMS which was described as the most cost-effective option and third to just calling when they are out of money. This communication code reveals an inherent need for 'constant contact'. Therefore a strong pattern emerged which is the 'securing constant contact' and concerns particularly the way youngsters appreciate Service A as a way for communication.

Also a pattern that would frequently emerge during the different phases of the analysis process was that Service A was often found to be the "*means to extract issues for discussion*". According to the interviews, Service A offers a pool of subjects of a light nature, that teenagers like to talk about with their friends, like astrology, chatting incidents, music news and gossip which they either access on their free/idle time or together with friends, browsing at sites during or after school. Even the capability the youngsters have in terms of using Service A becomes for these age groups the means to extract issues for discussion between peers. As the16 year's secondary education student reported "*I am the "champion" in writing texts in mobile phone. All the others are slower. How do I know that? We have tested our skills in this many times during breaks in the school. I am proud of that. *" As this teenager admitted he feels nice to be "*often*" the "*protagonist*" in discussions that concern his abilities.

- A proof of their individuality and emancipation; as mentioned before, teenagers look for ways to prove their emancipation mainly to their peer group and to safeguard their private life from parents.

As such, Service A offers the vehicle to communicate and exchange information between teenagers while at the same time it safeguards their privacy of communication.

- A medium to 'escape' of their everyday school related pressures, namely a vehicle to take a break within activities or an alternative to boredom, when being restricted at home. "*If I am not able to join my friends, I am ringing them waiting them to send me an MMS. This gives me a feeling that I am there with them.*" A 17 year old high school student reported.

Usage occasions of Service A mostly occur among teenagers, are depicted in the following diagram in relation to the typical Service A usage conducted by teenagers during each occasion. On occasions when they are outdoors a higher degree and frequency of Service A usage is observed as they relate to the key needs of teenagers for acceptance and participation in a peer group.
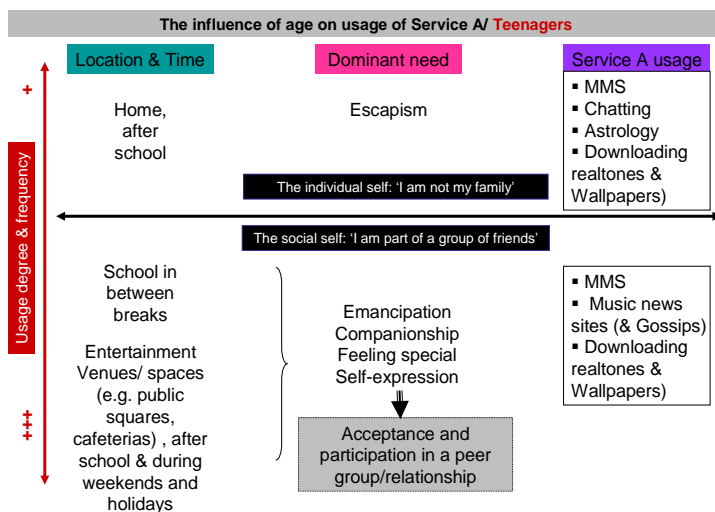
The influence of age on usage of Service A/ Teenagers

Location & Time	Dominant need	Service A usage
Home, after school	Escapism	▪ MMS ▪ Chatting ▪ Astrology ▪ Downloading realtones & Wallpapers)

The individual self: 'I am not my family'

The social self: 'I am part of a group of friends'

Location & Time	Dominant need	Service A usage
School in between breaks Entertainment Venues/ spaces (e.g. public squares, cafeterias) , after school & during weekends and holidays	Emancipation Companionship Feeling special Self-expression ⇓ Acceptance and participation in a peer group/relationship	▪ MMS ▪ Music news sites (& Gossips) ▪ Downloading realtones & Wallpapers

Usage degree & frequency

Figure 2 : Teenagers' usage behaviour of Service A

Also as the analysis revealed most relevant usage occasions for younger adults were found to take place mostly during socializing with friends. These usage occasions allow for relaxation and sharing information related mostly to recreational activities that a group of friends may share as for example checking out the weather before planning an excursion or the results of a sports game. It can be argued then that the 'social benefits of Service A' are of predominant value for this age group as they relate to a stronger set of needs such as needs for companionship, for sharing and others.
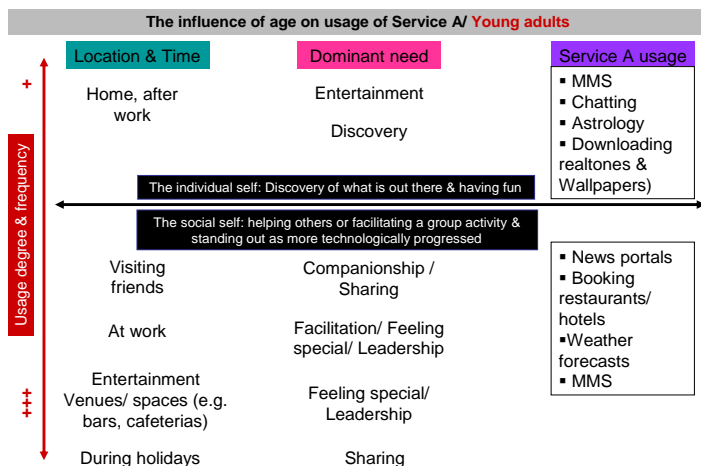
The influence of age on usage of Service A/ Young adults

Location & Time	Dominant need	Service A usage
Home, after work	Entertainment	▪ MMS
		▪ Chatting
	Discovery	▪ Astrology
		▪ Downloading realtones & Wallpapers)

The individual self: Discovery of what is out there & having fun

The social self: helping others or facilitating a group activity & standing out as more technologically progressed

Location & Time	Dominant need	Service A usage
Visiting friends	Companionship / Sharing	▪ News portals
		▪ Booking restaurants/ hotels
At work	Facilitation/ Feeling special/ Leadership	▪Weather forecasts
Entertainment Venues/ spaces (e.g. bars, cafeterias)	Feeling special/ Leadership	▪ MMS
During holidays	Sharing	

Usage degree & frequency

Figure 3 : Young adults' usage behaviour of Service A

Furthermore the older adults' age group seems to feel that "*work-life balance*" should not be disturbed by being overly consumed by technology gadgets and their merits, such as Service A. As they claimed, "*keeping up with the latest tools and services*" could be considered as a "*full time job*". A different behaviour suggesting usage of Service A was perceived by respondents to produce social withdrawal besides being the defining characteristic of a stressful overworked lifestyle.

In addition, the degree of expectations created by setting the internet as the comparison yardstick of Service A among older adults it will not work in favour of Service A. This age group recurrently made a point that Service A in its current form and extent does not seem to satisfy their expectations in terms of breadth, variety of content and speed. As the 35 year old female, HR manager, replied "*I expect more functions, more content, more applications and more fantasy from "Service A" in the near future. As it is now, it reminds me the launch of the windows operating system or the first version of Netscape browsing system...It looks kind of primitive*." According to her rational appreciation of Service A in combination with its perceived inability to perform tasks as good as the internet, results to her distancing from Service A, limiting herself to what is necessary and truly helpful.
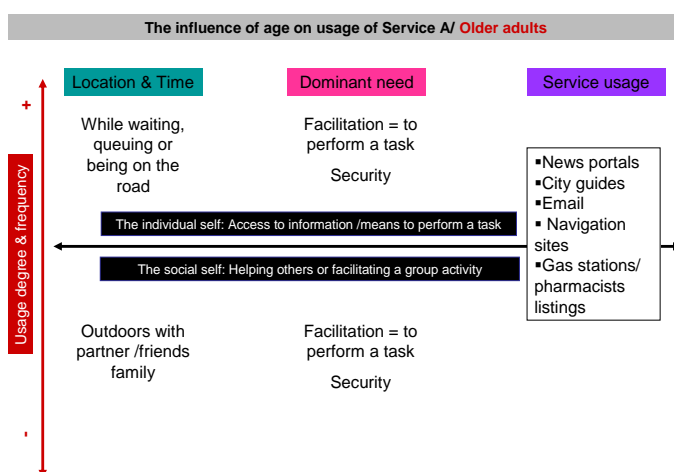

The influence of age on usage of Service A/ Older adults

Location & Time	Dominant need	Service usage
While waiting, queuing or being on the road	Facilitation = to perform a task	▪News portals
		▪City guides
	Security	▪Email
		▪ Navigation sites

The individual self: Access to information /means to perform a task

The social self: Helping others or facilitating a group activity

Location & Time	Dominant need	Service usage
Outdoors with partner /friends family	Facilitation = to perform a task	▪Gas stations/ pharmacists listings
	Security	

Usage degree & frequency

Figure 4 : Older adults' usage behaviour of Service A

Following the above findings we clustered the mobile data services between emotional and functional layers in terms of the users' age as shown in the following figure.
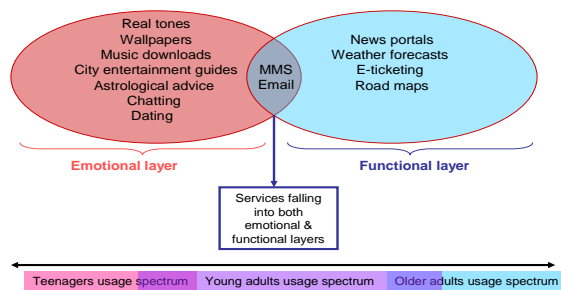
Figure 5 : Clustering emotional and functional layers of Service A per age groups

According to the above arguments older users are more likely to appreciate the functional offer of Service A, namely services that can provide information and a kind of facilitation that simplifies access to information they can use to perform a task. In contrast younger users perceive Service A more as an entertainment service and that is why they mainly use it to satisfy their emotional needs. Following these findings we could argue that the age is proportional to functionality concerning mobile data services.

Following the above discussion we conclude that the participants in this study appeared to appreciate Service A as part of their everyday life, delivering value either at a functional or at an emotional level. These participants were able to afford and to pay the price of using Service A as compared to lower socioeconomic classes which are expected to reject Service A on the basis of a poor value for money ratio and the absence of a clear and relevant functional benefit to legitimise the expenditure.

Beyond the demographic characteristics and background of the participants the factors related to place attachment, emotional status and the activities the users are involved in, play an important role in their decision to use Service A. According to the data the familiarity with a place has to do with the awareness of the objects and the metrics of this place. If this awareness exists then the users can create more easily their personal space within which they feel more protected and safe to access Service A.

To further explore the complex people-place relationship we adopted the concept of "*place attachment*" as described above. Today, some social theorists describe place attachment and mobility as two contradicting and mutually exclusive phenomena Giddens (1991) while others suggest that this is not necessarily the case (Gustafson, 2001). According to Williams and Stewart (1998 ,p.19), place attachment is "*the collection of meanings, beliefs, symbols, values, and feelings that individuals or groups associate with a particular locality*". Brown (1987) introduced the functional place attachment term, which is closely tied to the types of activities users pursue and the emotional place attachment term which refers to the emotional aspects of a person-place relationship. According to the analysis users prefer to access Service A when in places with specific attributes where they feel functionally attached with them. For example, users mentioned that when they have to wait for a few minutes time in their car they feel protected and they have the privacy and the stability they require to access mobile data services. In other words they are attached to their car. But the emotional place attachment would influence the usage of Service A only in cases that the place provides the functional requirements for that. The 27 years old member of a music band who stated that he was a keen football fun, during the focus group sessions respondent "*I like to go to the football ground and support my favourite team…..I have been doing that for more than a decade and I feel like being in my home while being there …but there is too much noise, tension and suspense to access Service A there*". People judge the functionality of a place based on their previous experiences and knowledge of alternative places (Warzecha & Lime, 2001). This can explain most of the replies form participants according to which they find themselves using Service A in familiar to them places where they visit often.

The activity concept could also be used to explain the findings related to the emotional status of the users that access Service A. Suchman, (1987), emphasizes the emergence of activities within situations. A 'situation' is the relation between acting people and the place within which they act. The analysis of the data revealed that Service A is used indoors as a routine activity during breaks within other activities such as between classes or while waiting. This means that although Suchman argues that actions are never planned and thus behaviour is not strictly serial from perception to action, there seems to exist a relation between Service A usage and situation. For example whenever the situation involves bored youngsters at home or waiting in places the possibility to use Service A is high, "*I use Service A when I am bored*" is what all the youngsters and almost all the younger adults replied when they asked to recall their emotions when they usually use Service A. Of course the activity of a human can be influenced by other modalities of conceptualization such as the sense of timing and by emotions. Emotions according to Frijda (1986), have an action tendency associated with them that can cause a set of possible actions. For instance bored users may consider only a subset of the activity alternatives that exist within their environment. And probably they will consider the low demanding activities as the usage of Service A. The 16 years old boy stated during the interview "*when I am home alone and I am bored I don't even think of using my PC console to play a game or I don't care about using wii[4]. I look for something less demanding to spend my time*". Engineers should take that into consideration and develop applications that are as simple and user friendly as possible.

The findings also support the argument according to which low mobility activities could positively influence usage behaviour. As we noticed, users in public indoor areas prefer to create their own space using their body language before starting to use Service A. They do that by turning their back on other people facing the table where they are sitting, avoiding eye contact, and looking at their mobile avoiding at all talking or talking at a low voice. In fact they personalise space in public settings by insulating themselves from the environment they are actually in, creating a kind of "*psychic cocoon*" around them Morley, (2003 ,p. 451) although this may lead them to cut themselves off from those around them losing thus sociability and generating strong negative emotional responses by non users (Haddon, 2000). This is not an easy task when they are out in the street while on the move.

Mobile technologies also bring into light spatial zones known as "*non-places*" such as trains, airports, large retail outlets, road vehicles, on motorways and other zones where people spend an ever-increasing part of their time (Augé, 1995). But users' micro-mobility status acts as a catalyst that facilitates the use of Service A within some of these spatial zones. For example all of the participants interviewed, admitted to using mobile phones outdoors even making and receiving calls while walking on the streets. Younger users argued that they are capable of sending text messages when they are outdoors, as the 16-year-old student reported "*if it's necessary, I can text while walking*". This was not the case for Service A, where places to sit or stand were more preferred, as a 30 year old female participant claimed "*I avoid accessing Service A while on the move*".

Following the above it can be argued that low mobility status positively influences the decision to use mobile data services. This is more evident whenever low mobility status is accompanied by low stimuli environments, perceptions of time-pressure and specific emotions such as boredom. The high mobility status of the user on the other hand such as moving fast, seems to be a constraint, decreasing the use of mobile data services. Figure 6 conceptualizes the above arguments relating the usage of mobile data services with mobility.

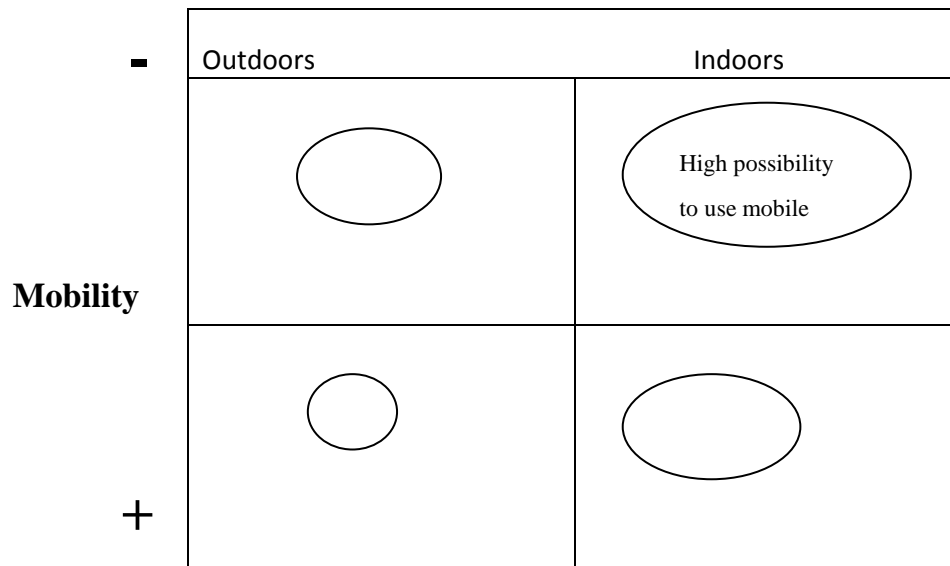---

[4] http://wii.com

Figure 6: Possibility to use mobile data services when indoors/outdoors.

Hence the findings showed that the users' low mobility status whenever surrounded by low stimuli environments, feelings of familiarity and comfort, and feeling bored, are patterns that can influence positively the decision to use mobile data services. Thus there exists an increased possibility to start using Service A when users are in a low mobility status and in a familiar environment of low level stimuli. There they feel less anxiety and have the perception that time somehow stretches out. It seems that the familiar place characteristics trigger emotions which may result in boredom which in turn may influence the decision to use mobile data services positively.

Based on the findings it can be argued that the possibility to use mobile data services increases in situations of low levels of arousal because people actively seek stimulation to avoid boredom. Furthermore, when users are bored their brain leads to low dopamine level, making them perceive that time is stretching. Thus within periods of boredom the necessary time period to use Service A is perceived by users as much lower than the necessary time that they could afford for such an activity which according to Papadopoulos (2008a), increases the possibility to use mobile data services. Thus bored people believe they have enough spare time and perceive usage of mobile data services as an activity that demands low effort compared with alternative activities.

The majority of the younger participants of this study complained that they often feel that "*they have nothing to do*" or that they have "*too much spare time during a day*". This easily causes them to feel bored. So since boredom is often associated with adolescence and usage of Service A is related to boredom I can safely conclude that youngsters are frequent users of service A. This conclusion is in accordance with the argument that youngsters are more prone to use Service A than older users.

According to the findings the "*expectations*" and "*voluntariness*" attributes played an important role for the decision to use Service A. According to Powers (1973; 1998), people expect to be satisfied by specific needs that are linked to specific places as for example someone goes to a cafeteria to have fun and communicate with other people. If these expectations of people that are related to their specific needs are not satisfied, then they will tend to occupy themselves otherwise as for example with mobile data services in order to satisfy these needs.

6   CONCLUSION

The purpose of this paper has been to examine and stress the strongest influential patterns of the "personal layer" of place in the decision to use mobile data services. The results from this analysis and discussion show how the focus on the "personal layer" of place throughout the research can give us important insights and patterns which could influence the attitude of users against usage of mobile data services. More specifically the discussion of the data collected during the research phase reflected on how users experienced their surroundings when decided to use Service A. It appears from the data that people did experience the different places in a similar way when they decided to initiate Service A. More specifically the participants' specific demographic characteristics, their memories and past experiences that this physical arrangement would not produce unexpected events together with their emotions and feelings such as boredom generated within the place made the participants to be more prone to use mobile data services. Furthermore the activities the users are involved in may trigger usage of Service A. More specifically, low mobility activities where the users are sitting or standing or laying are more possible to influence positively the usage of Service A. Also since the usage of Service A is a sub-activity between other primary activities is more probable for this service to be used when the user is involved in activities that permit other sub- activities to happen as for example when the user is involved in socializing activities with friends. Furthermore the longer each activity is lasting the more possible other sub-activities to be happening as for example the use of Service A.

The most compelling aspect of this research is that it recognises that the conceptualisation of place that we have proposed in this study, model of place produced through the combination of Tuans' theory and the Brahms language, is a significant factor in researching the usage process of mobile data services within real every day environments.

The upshots of these findings concern the researchers who have to consider place as a potential variable for future research as well as the front line professionals who have to consider the importance of the above place attributes in relation the design of mobile applications.

The present study offers several research avenues, but certainly the findings of our study should be interpreted in the light of certain limitations. Because our empirical results are based on a single-case study in one country only, we should not draw far reaching conclusions from the data. As we did not identify studies with a comparable approach, we have not compared our results to other countries. Our purpose was to explore and understand and not generalise. As such we feel we have provided some depth and insight into a new and poorly understood research area.

References

Adams, D. A., Nelson, R. R. and Todd, P. A., (1992) Perceived usefulness, ease of use, and usage of information technology - a replication. MIS Quarterly 16 (2), 1992, pp 227-247.

Agarwal, R. and Prasad, J. (1998) The antecedents and consequents of user perceptions in information technology adoption. Decision Support Systems 22 (1), 1998, pp 15-29.

Agre, P. E. (2001) Changing places: Contexts of awarning in computing. Human - Computer Interaction 16, 2001, pp. 177-192.

Altman, I.(1975) The environment and social behavior: Privacy, personal space, territoriality and crowding. Brooks/Cole, Monterey, California:. 1975.

Augé, M. (1995), Non-Places: Introduction to an Anthropology of Supermodernity, Verso, London.

Brown, B. B. (1987) In Handbook of environmental psychology (Eds, Stokols, D. and Altman, I.) John Wiley, New York, pp. 505-531.

Carley, K. M., & Prietula, M. J. (1994) ACTS Theory: Extending the Model of Bounded Rationality. In K. M. Carley & M. J. Prietula (Eds.), Computational Organization Theory. Hillsdale, NJ: Lawrence Erlbaum Associates. 1994.

Carlsson. C, Carlsson. J., Hyvönen K., Puhakainen J, Walden P.(2006), Adoption of Mobile Devices/Services – Searching for Answers with the UTAUT. Proceedings of the 39th Hawaii International Conference on System Sciences, 2006

Castro, L. A. and Gonzalez, V. M. (2008) Psychology Journal, 6, 61-82.

Clancey, W. J. (2002) Cognitive Systems Research, 3, 471-499.

Clancey, W. J., & Sachs. P, (1996) Brahms: Simulating practice for work systems design. Pacific Knowledge Acquisition Workshop, Sydney, Australia. 1996.

Clancey, W. J., Sachs, P., Sierhuis M. and van Hoof, R. (1998) "Brahms: Simulating practice for work systems design", International Journal on Human-Computer Studies, vol. 49, 1998, pp. 831-865.

Crabtree, A., (2000) Remarks on the social organization of space and place, Journal of Mundane Behaviour. Vol.1, No. 1. Available on line:www.mundanebehaviour.org/issues/v1n1/crabtree.htm

Dahlberg T., and Oorni A.(2007), Understanding Changes in Consumer Payment Habits - Do Mobile Payments and Electronic Invoices Attract Consumers?. Proceedings of the 40th Hawaii International Conference on System Sciences. 2007

Dahlberg T., Huurros M. and Ainamo A.(2008), Lost Opportunity – Why Has Dominant Design Failed to Emerge for the Mobile Payment Services Market in Finland?. Proceedings of the 41st Hawaii International Conference on System Sciences. 2008.

Dickinger A., Arami M., Meyer D.(2006), Reconsidering the Adoption Process: Enjoyment and Social Norms -Antecedents of Hedonic Mobile Technology Use. Proceedings of the 39th Hawaii International Conference on System Sciences. 2006.

Eagle N. and Pentland, A.(2005), "Reality Mining: Sensing Complex Social Systems"', J. of Personal and Ubiquitous Computing. To appear: June 2005.

Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991) Management Research An Introduction, SAGE Publications Limited, London.

Fisher, C. (Ed.) (2004) Researching and Writing a Dissertation, Prentice-Hall, Essex.

Frijda, N. H. (1986). *The emotions*. New York: Cambridge University Press.

Gaver, W., Dunne, T., & Pacenti, E. (1999) Cultural Probes. Interactions, 5(1). 1999, pp. 21-29.

Giddens, A. (1991). Modernity and self-identity: Self and society in the late modern age. Cambridge, UK: Polity.

Gustafson, P. (2001) Environment and behavior, 33, 667-686

Haddon, L. (2000) The social consequences of mobile telephony: Framing questions. In Seminar by Telenor: Sosiale Konsekvenser av Mobiltelefoni, Oslo. 2000b

Harrison, S. A. D., P. (1996) Re-place-ing space: The roles of place and space in collaborative systems. In CSCW, pp 67-76, ACM Press, Cambridge, MA, New York. 1996

Holtzblatt, K. & S. Jones. (1993) Contextual Inquiry. Principles and Practice. In D. Schuler & A. Namioka (Eds.), Participatory Design. Principles and Practice. Hillsdale: Lawrence Erlbaum. 1993

Hu X. , Li W. , Hu Q.(2008) Are Mobile Payment and Banking the Killer Apps for Mobile Commerce?. Proceedings of the 41st Hawaii International Conference on System Sciences. 2008.

Hulkko S, Tuuli M., Katja V., & Turkka K. .(2004) Mobile Probes. Paper presented at the NordiCHI '04, Tampere, Finland. 2004

Kostakos, V., Eamonn O.,(2004) Pervasive computing in emergency situations. In Proceedings of the Hawaii International Conference on System Sciences. 2004

Lainer, R., and Wagner, I., (1998) Connecting Qualities of Social Use with Spatial Qualities. In Proceedings of CoBuild98, Streitz, N., S. Konomi, and H. Burkhardt (eds). Heidelberg: Springer.

Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The Technology Acceptance Model: Past, Present, and Future. Communications of the Association for Information Systems, 12(50): 752-780.

Legris, P., Ingham, J. and Collerette, P. (2003) Why do people use information technology? A critical review of the technology acceptance model. Information & Management 40 (3), 2003, pp. 191-204.

Lisetti, Christine Laetitia;Cami, Aurel;Sierhuis, Maarten;Clancey, William J (2005) Towards simulating the multi-level process theory of human emotions in Brahms multi-agent modeling system. ADS'05, Agent-Directed Simulation Symposium, April 3-7, 2005, San Diego, USA. 2005

Low, S. M. (1992) In Place Attachment (Eds, Altman, I. and Low, S.) Plenum Press, New York, pp. 165-185.

Lucas, H. C. J. and Spitler, V. K. (1999) Technology use and performance: A field study of broker workstations. Decision Sciences, 1999, pp 291-311.

Luna, F., & Perrone, A. (2002) (Eds.). Agent-Based Methods in Economics and Finance: Simulations in Swarm. Norwell, MA: Kluwer Academic Publishers. 2002

Mallat N., Rossi M., Tuunainen V.K., Öörni A., (2006) The Impact of Use Situation and Mobility on the Acceptance of Mobile Ticketing Services. Proceedings of the 39th Hawaii International Conference on System Sciences 2006.

Miles, M. B. and Huberman, M. A. (1994) Qualitative Data Analysis: An Expanded Sourcebook, Sage Publications, Thousand Oaks, California.

Minar, M., Burkhart, R., & Langton, C. (1996). Swarm Development Group, [Web-site]. Available:http://www.swarm.org

Morley, D. (2003) What's "Home" Got to Do with It?: Contradictory Dynamics in the Domestication of Technology and the Dislocation of Domesticity. European Journal of Cultural Studies, 6(4): 2003, pp. 435-458.

Nandhakumar, J. & Jones, M. (1997) Too close for comfort? Distance and engagement in interpretive information systems research. In: Information Systems Journal, 1997, 7, pp 109-131.

Ondrus J., Pigneur Y., A (2006) Multi-stakeholder Multi-criteria Assessment Framework of Mobile Payments: An Illustration with the Swiss Public Transportation Industry. Proceedings of the 39th Hawaii International Conference on System Sciences. 2006.

Papadopoulos H.(2008a) Place as adoption moderating factor - usage implications for mobile data services. Paper will be presented at the Hawaii International Conference on System Sciences (HICSS-41'08), Hawaii. 2008a

Papadopoulos H.(2008b), Mobile Data Services Usage "A Methodological Research Approach",International Business Information Management Conference (10th IBIMA), Kuala Lumpur/Malaysia, Full paper, proceedings (ISBN: 0-975339397). 2008b.

Powers, W. T. (1973). Behavior: The control of perception. NY: Hawthorne.

Powers., W. T. (1998). Making Sense of Behavior (The Meaning of Control): Benchmark Publications.

Relph, E. (1976) Place and placelessness. London. 1976

Riley, R. B. (1992) In Place Attachment (Eds, Altman, I. and Low, S.) Plenum Press., New York, pp. 13-35

Sack, R. D. Homo geographicus. A framework for action, awarenessand moral concern. Baltimore. 1997

Sierhuis, M. and Clancey, W. J.(2002) Modeling and Simulating Work Practice: A human-centered method for work systems design, IEEE Intelligent Systems, vol. 17(5) (Special Issue on Human-Centered Computing). 2002.

Sierhuis, M., Clancey, W. J., Seah, C., Trimble, J. P., and Sims, M. H. (2003) Modeling and Simulation for Mission Operations Work System Design. Journal of Management Information Systems, Vol. 19(No. 4), 2003b, pp. 85-129.

Suchman, L. A. (1987). Plans and Situated Action: The Problem of Human Machine Communication. Cambridge, MA: Cambridge University Press.

Strauss, A. and Corbin, J. (1998) Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory, Sage Publications, Inc., Thousand Oaks.

Tuan, Y.-F.(1971) Geography, phenomenology and the study of human nature. The Canadian Geographer 15, 1971, pp. 181-192.

Tuan, Y.-F. (1977) Space and Place. The Perspective of Experience., University of Minnesota Press., Minneapolis.

Yin, R. K. (2002) Case Study Research, Design and Methods, Thousand Oaks: Sage Publications Inc

Venkatesh, V., M.G. Morris, F.D. Davis and Davis, G. B. (2003) User acceptance of information technology: Toward a unified view. MIS Quarterly 27, 2003, pp. 425-478.

Walsham, G. (1995) The Emergence of Interpretivism in IS Research, Information Systems Research , Vol 6, 1995

Wang H. C., Ku Y. C., Doong H. S., (2007) Case Study in Mobile Internet Innovation: Does Advertising or Acquaintances Communication Decide Taiwan's Mobile Internet Diffusion? Proceedings of the 40th Hawaii International Conference on System Sciences - 2007

Warzecha, C. A., & Lime, D. W. (2001) Place attachment in Canyonlands National Park: Visitors' assessment of setting attributes on the Colorado and Green Rivers. Journal of Park and Recreation Administration, 19(1), 2001, pp. 59-78.

Williams, D. R., Patterson, M. E., Roggenbuck, J. W. and Watson, A. E. (1992) Leisure Sciences, 14, 29-46.

Williams, D. R. and Stewart, S. I. (1998) Forest Science, 96, 18-23.