Exploring and Designing Wireless City Applications by Way of Archetype User Research within a Living Lab

Jo Pierson, An Jacobs, Katrien Dreessen, IBBT Research Group SMIT - Vrije Universiteit Brussel (VUB), Belgium

Lieven De Marez, IBBT Research Group MICT - Universiteit Gent (UGent), Belgium

Abstract

In the paper we demonstrate the process and the outcome of 'archetype user research' for exploring and designing wireless broadband applications in a city environment. This type of research is based on ethnographic research of a number of persons that are each purposefully selected as being an 'archetype' user of a number of broadly defined application ideas. The archetypical character here refers to potentially interesting socio-economic background features and city-related practices. This leads to the identification of dimensions that define the practice of a city visit. In the project being discussed in the paper (ROMAS) these qualitative data are integrated with a quantitative scanning of potential application ideas among different stakeholders. In this way two approaches of ICT user research, diffusion and domestication, are combined. The outcome of this bottom-up investigation is then coupled back to the applications ideas, leading to design suggestions based on what potential users say, do and experience in everyday life situations in the city. This fits in the current evolution to increasingly involving the user in service innovation, especially in the 'fuzzy front end' of the new product development process.

Introduction

An increasing number of services and applications are being developed and marketed within the emerging mobile and wireless environment. Former experiences with unsuccessful mobile and wireless technologies - like WAP and MMS - have already demonstrated that user-oriented approaches to technology design are required. We experience increasingly a reversal order of the value chain, where we need to investigate people's needs and context before or in parallel with the development of new applications. One way of doing so is making use of ethnographic research in the early stages of new product development. A number of ICT companies have already adopted this kind of approach in their innovation processes.[i]

In the academic research on product and system development we are witnessing an evolution towards a more interdisciplinary study of ICT use. Traditionally the latter can be situated in three different domains: Human-Computer Interaction research, social shaping approach and the adoption/ diffusion tradition (Frissen & Pierson, 2004). These three perspectives are beginning to share common approaches and methods. For example the typical HCI perspective of cognitive psychology has broadened its approach with theories from the social arena, like sociology, anthropology and other social sciences (Rogers, 2004; Clemmensen, 2004). Within the social shaping and ethnographic approach different methods of cultural and technological probing are being introduced to gather richer insights (Pierson et al., 2006).

In this paper we report on the experiences of the enrichment of the social shaping perspective, more in particular the domestication school, with the adoption/ diffusion perspective. In this way we interpret the design of technological innovations as a continuous and interdependent process of influence between 'technology push' and user initiatives (De Marez, 2006: 259), as "*two sides of the same innovation coin*" (Boczkowski, 2004: 255).

Secondly, the results gathered from within a diffusionist framework complement the results collected from within a domestication framework, using a particular procedure: archetype user research. Using this procedure we try to make explicit our expectations on the user characteristics in relation to 'taming' the technology to be developed. This delivers a framework to question those assumptions. The latter is done by investigating the everyday life of the people participating in the study based on these criteria. In the end, by using an ethnographic research approach, we find a new - more interpretative grounded - categorisation of the previewed habitualisation of these technologies to be developed.

To illustrate both aspects we first introduce the project ROMAS on which these insights are build. Secondly, we explain our archetype user approach and demonstrate the value of the domestication framework. Next, we illustrate the approach and enrichment from the diffusion framework as applied in the ROMAS project. In this way we want to show how they are indeed two sides of the same coin, taking care of data with their own procedures.

1. Research set-up

The methodological and empirical findings are based on the two-year ROMAS project (Research On Mobile Applications and Services) within the research centre IBBT (Interdisciplinary institute for BroadBand Technology). The paper is based on research in the first phase of the project (September 2006 until February 2007). The overall project objective is to conduct, in the conceptual phase of the development, a user-oriented assessment of (future) wireless applications and services within a large-scale living lab environment from an interdisciplinary approach. The living lab is an 'experimental field' within a socio-technological scope with specific goals and a specific structure, but simultaneously dealing with the uncontrollable dynamics of everyday life. In ROMAS this refers to the i-City living lab in the city of Hasselt (Flanders - Belgium) for studying the users in real life. This environment consists of 600 users, equipped with a mobile device (PDA) and running a city services software platform, which enables a range of dedicated mobile applications. In the ROMAS project versions of the wireless applications are being put to the test of social value, market relevance, legal preconditions, usability and interface requirements as well as quality of experience performances within the i-City living lab.

2. Archetype user research within a domestication framework

The overall goal of the first stage in the ROMAS project was to generate a prospectus of relevant and user-oriented wireless city applications to generate ideas. In order to achieve this from a domestication perspective we worked in an explorative way, based on ethnographic research helping us to anticipate the paths of domestication of these applications, grounding them in the actual everyday city life experiences and practices of inhabitants. The main goal is to identify the situational dimensions that are related to the city life of people - more in particular the practice of a 'city visit' - and the mobile city applications under development. This outcome is taken into account for the creation of personas and scenarios, as an essential input for the subsequent phases of the development process (Jacobs et al, 2007). We focus on people's practices and explore the implications on future practices of potential mobile city applications.

2.1. The domestication framework

The domestication framework is a central perspective of looking at the meaning and experiences of technologies in the everyday life of users (Haddon, 2007; Silverstone & Haddon, 1996). The concept, originating from anthropology, consumption studies and media studies, starts from the context in which ICTs are experienced.

Domesticating refers to the integration of technology in the daily patterns, structures and values of users. It also refers to the activity of domesticating or taming wild animals in order to make it a pet, a metaphor for absorbing a strange technology into the context of the everyday life. This kind of research is essentially based on qualitative research methods since the aim is gaining insights in the contextualised behaviour and needs of users, as well as in the interest for and the meaning of new devices and applications to people (Haddon, 2007; Van den Broeck et al, 2006). Within this approach ICT innovation is considered as a social process, because it helps to understand how social structures and power relations are being reflected in individuals and households' ICT use.

This process of incorporating the technology in the normal structures of everyday life is not a one-way stream. The innovation is tailored by the user to fit in his or her daily life, but the user and his environment change as well (Punie, 2000; Frissen, 2004). Therefore, the domestication perspective is not only about how users or potential users behave in relation to the technology and vice versa, but also about how people deal with ICT, which can also be an articulation of existing practices, conflicts and meanings within the user community (Pierson, 2005). Central is the 'mutual shaping' or mutual dependency between technology and social change, whereby technology influences the everyday life and everyday use transforms the technology. Or to put it differently: the domestication is anticipated in design; while at the same time the design is completed in domestication (Silverstone & Haddon, 1996).

Within this domestication approach we focus on an ethnographic research approach, where ethnography refers to a set of methods that aims at perceiving the world from a perspective of the people one is seeking to understand (*'verstehen'*). More in particular we aim at doing design ethnography in very early stages of the new product development process (Crabtree, 2002; Haddon, 2001).

2.2. Archetype user research: selection of archetypes

For doing this kind of an explorative exercise we have set up an 'archetype user research' process. Central in this procedure is making the pre-categorisations from the literature and former studies explicit and recognisable as selection criteria in real people (sampling). Those pre-categorisations are questioned during the exploration of the practices of the people selected by these criteria, giving room for new categorisations. By using an interpretative approach with ethnographic methods, the categories are then grounded in the everyday experiences of people.

The two main steps for conducting this kind of research are the selection of archetypes based on a threefold purposeful sampling technique (maximum, phenomenal and theoretical variation) and the compilation of the archetype panel. These different steps will be illustrated.

For the ROMAS project we first identified eight archetype users for wireless city applications. The number and identification of these archetypes is based on a specific purposeful sampling technique (Sandelowski, 1995). To organise the purposeful sampling, we first look at a 'maximum variation' using typical central social characteristics for explaining social change with regard to communication and media use in everyday life (age, gender, employment, life stages,...). In addition we ensure 'phenomenal variation', which refers to the characteristics that are significant for the application setting to be investigated.

An input for the phenomenal variation could have been clusters of all applications that are of interest for potential users (infra, diffusion approach). However due to the structure of the project we had to choose for a comparison a posteriori of our insights. In complement, we look to what extent daily practices, experiences and routines of people selected on other phenomenal dimensions can be involved and we try to match these insights with the overview of all (high) potential applications, identified by diffusion research approach.

To determine our phenomenal variation within the project constraints, we start from the supply side choice of applications within the project: a mobile local news application and a mobile city guide application, both with a photo sharing functionality. In order to direct our phenomenal variation in the selection of archetypes we translated the affordances [ii] of the first two applications into two more abstract characteristics. Those characteristics referred on the one hand to searching and finding news and information linked to the city and on the other hand to the different ways inhabitants (and not so much

tourists) move around in the city. By focussing on inhabitants and not on tourists we could expect a higher variation in the acquaintance with the city. Moreover the different gradations of being acquainted with the city determine the need for more or less information during the inner-city movement. Although the scope of this research is explorative, in this way a certain amount of attention was given to the applications under development while selecting.

Based on the phenomenal variation, eight archetypes profiles are identified and withheld, which all have strong connections with the mid-sized Belgian city of Hasselt: retired inhabitant, pupil, city guide, home nurse, shopper, student living in a student house in the city, working man, working woman with children. They are interested in different sorts and in a different degree of city news and information, and they all move around in diverse ways throughout the city. The selected archetypes were distributed over the different quadrants in a matrix (Figure 1). The research process was subdivided in three iterative phases in order to strive for 'theoretical variation'. This entails that the final selection of the (last) archetype users is based on (in between) findings. In this way preliminary findings feed and steer the research, which means fine-tuning the selection of archetypes for enabling theoretical variation as well as adjusting the research methods. After the second iteration there was a need for an adjustment in the selection of archetypes: the archetype of 'pupil' was replaced by an archetype of a working man who, because of his job, needs to keep informed about city news (for example a practitioner of a political post i.e. a 'politician'). This adjustment in the selection was directly related to an application under development in the project: mobile news. To explore the integration of this application in everyday life it was necessary to incorporate an archetype that frequently and actively seeks for rich city information.
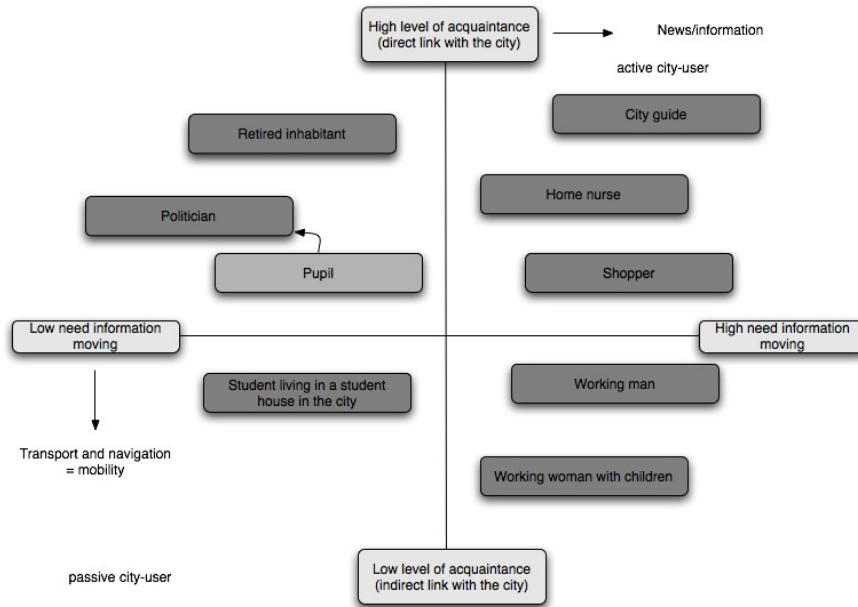
Fig. 1. Matrix of archetypes

After the selection, a representative of each archetype was recruited. He or she was the subject of a field study, based on in-depth interviews and complementary ethnographic methods (observation, diary method, cultural probes and photo elicitation) in order to collect as much contextual information as possible. The goal was to identify the applications and functions within the digital city environment, which fit the most in the context of the archetype's everyday life environment. The latter can - dependent on the kind of application - refer to daily activities like listening to music, contacting local government, contacting friends in their online community, looking for the latest local news items etc. This analysis of the social context of the archetype users will however focus on his or her mobile behaviour, in order to identify instances when wireless applications are meaningful.

2.3. Archetype user research: practices of inhabitants

The research generated a 'thick' description of how the practice of a 'city visit' takes form, among the different archetype users. In the results we first identified the kinds of activities that typically take place in relation to the common visit to Hasselt by the archetype users. Next we took a closer look at the ways the city is visited during these activities by inhabitants and the dimensions that configure the different experiences. Finally we find out the reasons for doing different activities in the city. In this first part of the

ROMAS project, the archetype users are not part of the test panel that the i-City living lab has set up, because the focus is here on their ordinary behaviour and experiences, without any specific technological issues at stake. Nevertheless it is important we involve inhabitants that live in the space where the envisioned wireless living lab applications are available for testing. In the second phase of the ROMAS project, we will explicitly involve test panel users that have some experience with the wireless applications being offered.

We found that a city visit can be the subject of a broad variety of activities, yet experienced in a diverse ways. The city is experienced as an *in-between phase*, since a great amount of activities occur when a person is moving or on the go (Paulus, Anderson & Townsend, 2004). Throughout the analysis it became clear that a city is being used for relaxing purposes[iii] as well as utilitarian activities.[iv] However a fixed classification cannot be made since activities are often hybrid: a utilitarian activity can be at the same time relaxing or vice versa.[v] Based on the research findings it became clear that utilitarian activities frequently occur while being on the move, since one wants to finish those activities as quickly as possible. Nevertheless the city is also a place where people go to perform an activity on a fixed location. Those kinds of activities are referred as nomadic ones.

The findings also show that the experience of activities during the city visit also greatly varies: the rhythm of a city visitor is strongly dependent on several dimensions, which determine the actual experience. The two most prominent dimensions in the results are time and place. The place refers to the familiarity with a specific locality, to what is perceived as the entry and the borders of the city and on what places, buildings or monuments are seen as major symbolic reference points. In this view our archetype user Myriam refers to a specific monument in the city of Hasselt that is seen as an important reference point.

"It's been standing there for several years. When only the rocks were placed there, I found it more beautiful. Afterwards they've put the horses on top. No, not especially beautiful. But it's indeed recognizable. We're always saying to people: there where the horses are standing on the rocks. And then it's like: oh yes there" (Myriam, Home nurse) [vi]

Concerning the borders of the city, they are also differently perceived by the archetypes. The figure below illustrates how our archetype user Rita, the shopper, sees the city as the small city centre. Her entrance to the city is located on the side of the city where she lives. Contrary, the retired inhabitant Theo perceives the city much bigger; his borders are not limited to the city centre. His entrance tot the city is located at a different side, since he is living in that area and his habitual route starts there.
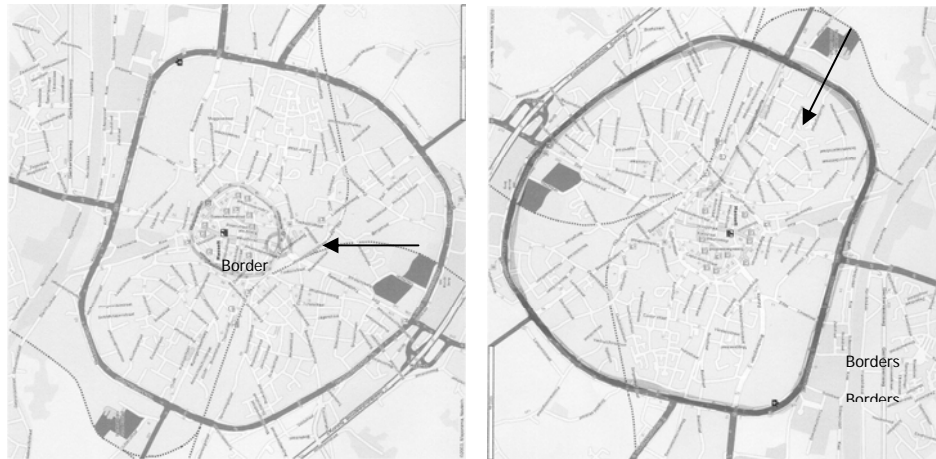
Fig 2. Entrance and borders of the city according to Rita (shopper) and Theo (retired inhabitant)

Yet also the time dimension heavily influences the practice of the city visit. Having plenty of time gives of course a chance to be more involved with different activities. If time is more restricted, the archetype users keep a closer time management and try to choose more rationally their means of (public) transport. Another dimension is preparing or doing a city visit in a structured or a non-structured way. When, how and with what kind of sources the preparation for a city visit is done, also has an important influence. The latter is linked to official sources of information versus more informal sources like social contacts. In addition whether or not people are alone or together with family, friends or other people frames the way the city is visited. Finally routines in place or time determine heavily the way inhabitants interact with the city. The quote below by David describes how certain routines take control during a city visit. He always visits the same restaurant when coming to the city: he associates eating out with a specific location.

"No when I'm coming to the city for eating out, than it's usually the same restaurant." (David, Working man)

The way an activity is experienced is often difficult to categorise given the interdependency between several dimensions. Each dimension is linked to each other and influences the actual experience. The different dimensions can change throughout the visit and thus transform the city visit, which means that city visits are divers and complex situations wherein constant variation and transformation takes place. One needs also to take into account the changing character of people: they act differently in various situations. A city visit can therefore be described as a flow or a series of activities. People move throughout the city with certain rhythms, which can change from day to day as well as from activity to activity. The city forms a space where al those activities and the way they are experience continuously change, based on different

dimensions. This means that the archetypes are not stereotypes or fixed market segments that constantly behave in the same way.

Based on these findings a dynamic typology of city visitors has been compiled. It is dynamic because it is not a fixed classification since people can take different roles during a city visit, based on the aforementioned dimensions. The different roles are positioned on two axes: one refers to kind of information source (official versus informal) and to what extent the city visit is structured in time and place. This leads to the following figure.
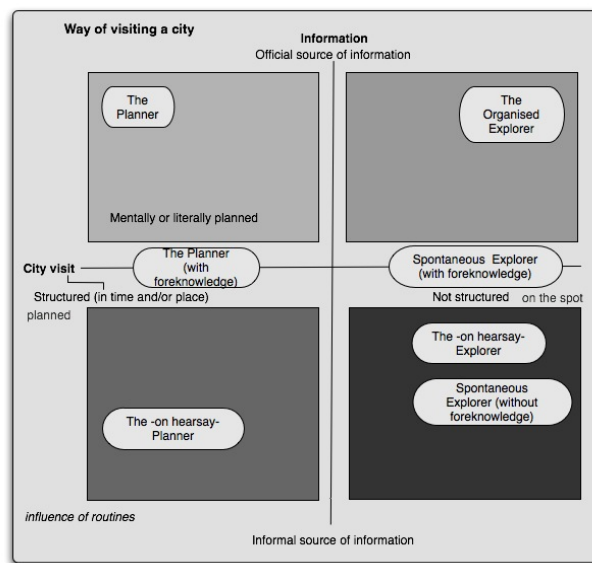

Fig. 3.Typology of roles in the practice of a city visit

2.4. Archetype user research: recommendations for technology design

Finally in our analyses we also identified the needs and reasons for doing different activities and taking different roles linked to various dimensions. This mainly refers to need for (utilitarian) information, for fun and relaxation, for sociality and for efficiency and convenience. These results, together with the former findings, were integrated in a number of general technology design recommendations.

It became clear that people are often on the go for utilitarian activities they want to end as quickly as possible. This is an area wherein mobile services and applications can offer a contribution. Clearly it is important to take into account the type of activity and situation since some utilitarian activities are better suited for the use of a desktop computer, like for instance online banking. The reason that an application can be used mobile is dependent of several of those dimensions.

A city is also a place where people spend a lot of time. However the literature states that there is often little space for meaningful social contacts, the so-called *Third places* (Oldenburg & Brisset, 1982). This was also noticeable during the research and therefore a stimulation of social contacts can become an important and social function of mobile devices. The perception of a city is often closely connected with busyness, whereby encountering trusted people is perceived difficult or seen as a threshold for making appointments. Mobile applications and services that simplify this process can find a positive approval by certain users. This is not necessary valid for everyone: it depends if the situation asks for an online or real life social experience. Since the dimension of place has an important function in a city it seems recommendable to develop mobile services as a means for real life encounters in specific kinds of situations.

A city is also an important relaxation area which offers room for several relaxing activities or is on its own a way of leisure. The potential of mobile applications lies in the fact that they can inform people and thus help in making the activity as relaxing as possible, for instance concerning navigation and transport. Information is an important element in the experience of a city. Keeping people posted of relevant information, for instance contextualised information, can also contribute to a better experience of the city or a more efficient organisation of everyday life.

Although every person has different needs, mobile city applications can especially offer an added value in the field of utilitarian activities and the practical organisation of everyday life; for instance a parking application, bus navigation application, friend finder, best deal finder, city information application (possibly with integration of user generated content), event application (mobile programme guide).

3. Two sides of the same coin: enrichment from a diffusionist perspective

To date diffusion and domestication perspectives are too much considered as opposite and competing perspectives (Boczkowski, 2004: 255). With diffusionism as the more quantitative research tradition with the focus on acceptance and adoption decisions, and the domestication as the more qualitative research tradition with the focus on the use and appropriation of technologies, both traditions are clearly complementary (Punie, 2000). After explaining the archetype user research in the previous section, we now look at the enrichment from an explorative study within the adoption and diffusion tradition as applied within the ROMAS project. We first give a brief introductory overview of this theoretical perspective.

3.1 Diffusion perspective

According to this framework the diffusion of innovations in a social system always follows a bell-shaped normal distribution, in which there can be successively distinguished between innovators (2,5%), early

adopters (13,5%), early majority (34%), late majority (34%) and laggards (Rogers, 2003: 298). These segments are distinguished on dimensions of time-based innovativeness, reflecting the timing of adoption decisions of the members of a social system (Rogers, 2003: 297; Trujilo, 2003: 2).

A person's innovativeness or its 'degree to which an (s)he is relatively earlier in adopting an innovation than other members of the social system' (Rogers, 1983: 22) is assumed to be determined by the perception of the following set of innovation characteristics: (1) **Relative Advantage** or the degree to which an innovation is perceived as better than the successors or alternatives (e.g. Rogers, 1983: 3); (2) **Complexity** or the degree to which an innovation is perceived as relatively difficult to understand and use' (e.g. Rogers, 2003: 266); (3) **Compatibility** or the degree up to which the innovation is perceived to be compatible with a person's lifestyle and technologies (e.g. Lin, 2003: 354) ;(4) **Trialability** or the degree to which an innovation may be experimented with on a limited basis' (e.g. Rogers, 2003: 266); (5) **Observability** or the degree to which the results of an innovation are visible to others (e.g. Rogers, 2003: 266).

During the past decades, the theory and its assumptions served as a valuable basis for user-centric research purposes in multiple studies. In some cases the typical innovator and early adopter profiles are used to select to the so-called 'lead users', in other cases the assumptions on adopter profiles, segment sizes and determining perceptions of product characteristics are used to detect the different adopter segments in order to investigate their needs and wants (e.g. innovativeness scales by Goldsmith & Hofacker, 1991; Parasuraman & Colby, 2001 or Moore & Benbasat, 1991).

3.2. Enriched by the diffusion perspective: broadening the set of potential mobile city applications

From the outset of this i-City Living Lab environment, several mobile city application(s) (ideas) were already developed and implemented (e.g. mobile news portal, mobile city guide,...). Each of these applications is integrated in our study, but to ensure the user-centric focus of our research this 'supply-side driven pallet of applications' could not be the solely starting point. Since engineering and development departments are often susceptible to 'field of dreams thinking' (Baldwin, Stevens McVoy, Steinfield, 1996: 190) or the 'if we build it, they will come'-virus (Dholakia, Mundorf, Dholakia, 1996: 3; Lennstrand, 1998a: 3) it would have been naïve to assume that each of the developed applications is a priori a 'high potential' application, and that there would not be any potential left for other (overlooked) mobile city applications.

Hence, we started with a user-based scan or listing of possible mobile city application(s) (ideas) by means of qualitative focus group research and supply side interviews with (potential) application developers.

With diffusion theory and the assumptions on perceived product characteristics as a framework, 18 consumers were recruited for focus group research on mobile city applications. A first focus group consisted of 8 consumers (non i-City panel) familiar with mobile technology and applications. The second focus group consisted of 10 respondents from the i-City test panel (already familiar with the PDA's and testing the applications on the mobile city network). This selection aimed to overcome the problem of lack of familiarity with future technologies. Due to this lack and the lack of imaginative capacity of consumers, it is often very difficult to do user research on the identification of opportunities for future technologies. Referring to diffusionism's 'perceived innovation characteristics' this familiarity also overcomes the problem of a high-perceived complexity or low trialability. Which made the focus groups an ideal starting point for a reliable detection of a relative advantage (e.g. added value of mobile news consumption compared to the way one is consuming news today) or compatibility (e.g. compatible applications to their current news consumption, usage of navigation technology or lifestyle patterns and interests) for certain applications. As 'teasers' or probes for this application detection, and to avoid remaining stuck around specific types of applications, we constructed three fictional users for a hypothetical framework of 'time spending dimensions[vii]' in a mobile city context was developed. The first fictional user is Dimitri, a 27-year old manufacturer, playing volleyball, single, game-addict, ... The second one was Patricia, a 40 year-old mother of two young children, working full-time, commuting between Hasselt and Brussels, and with a passion for classical music and cooking. The third fictional user, Gerard, 57 year old active senior, diabetic, often taking his wife for a long walk, and with a passion for wine, painting and musea.

Starting from the time spending patterns of these three invented persons, the respondents were asked to think about their own context and to suggest (wild) ideas of possible mobile city applications that would have a relative advantage to them and the way they do certain things to date. The resulting demand-side based list of application ideas was then presented to potential suppliers (supply-side) of such applications (e.g. the idea of mobile video surveillance was discussed with a security company (G4Securicor), just as school related applications were discussed with Hasselt's High School PHL) in order to check for feasibility, and the degree up to which these ideas were already existing or 'in development'. In the end, the combination of these focus groups and interviews resulted in a long list of 80 possible mobile broadband city applications.

3.3 Enriched by the diffusion perspective: Clustering applications on potential for test-users mobile city platform

However, an overview of possible applications can evidently only be a first step [viii]. The sole purpose of it was to avoid limiting our scope to a strictly supply-side driven view on 'mobile city applications'. A next step should help to tell something about the potential of these applications or mobile city applications in general. Again, a reliable investigation or forecast of such potential is not evident due to the lack of familiarity, trialability and the limited imaginative capacities of the average user. In the context of the ROMAS project however this problem is overcome, since the 600 test users are already working and experimenting with the PDA's and mobile city applications in the i-City Living Lab setting (cf. supra). In order to investigate the potential of the detected application ideas, these 'test users' were presented an online survey in which they were questioned about their interest in the applications and the perceived relative advantage to their current way of life (5 point scales + open question in which respondents were asked to describe their current way of doing things and the situation in which the mobile application could have an added value). 312 respondents completed the questionnaire. For 64 of the 80 applications the correlations in interest and perceived relative advantage were strong enough to summarize or group them into 13 factors or 'application clusters' (Principal Component Analysis, 28 iterations, R^2 67,5% + cronbach alpha > 0.65 and item-total correlations > 0.40 for all factors). In the table 1 we see these 13 application clusters and 16 remaining single applications ranked by their average interest scores (average score on 5 pt scale 1: not interesting at all – 5: very interesting) [ix].

Clearly, not all applications are equally appealing. The average interest ranking learned that the most important are not the most innovative applications, but ones enabling time saving and ensuring and improving life quality. Of the 13 application clusters the most important 'main lines' are the clusters 'Payment & money affairs' and 'Help with serious health issues'. Of the separate applications the 'indication of parking spaces and availability', 'public transport schedules' or 'practical and administrative information for students' seemed to be perceived as most interesting mobile city applications. But these are still conclusions on a more general sample level.

Since is it is likely that not all applications are equally appealing to every single respondent of this sample, we thought it would be interesting to investigate up to which degree the correlations in interest and perceived relative advantage allowed to distinguish between a number of internal homogeneous and external heterogeneous user clusters. Despite the skewed nature of our sample (test panel, more than average interested in technology and mobile applications), K-Means clustering allowed us to detect six user clusters. [x]

Application (cluster)	Average Interest*	User clusters					
		1	2	3	4	5	6
Very appealing							
Indication of parking spaces & availability	4.23 / 5	++	++	+++	+++	+	+++
Practical & administrative information for students	4.20 / 5	+	+++	+++	+++	+	+++
Public transport schedules	4.11 / 5	+	++	+++	+++	+	+++
Payment & money affairs (mobile payment, mobile banking, parking ticket on mobile, e-ticket, automated tolling)	4.01 / 5	-	++	-	++	+++	+++
Traffic jam alerts	4.01 /5	+	++	-	+	+	+++
Help with serious health issues (blind aid, crib death alarm)	3.99 / 5	-	++	--	+	+	+++
'Independent living support'	3.93 / 5	-	++	++	+	-	+++
Free mobile surfing	3.92 / 5	--	+	+++	++	+	+++
Find shops	3.92 / 5	-	++	-	++	-	+++
Tourist information (museum tour, tourist portal, event information, i-map, reader)	3.87 / 5	--	+	+++	++	+	+++
Moderately appealing							
Mobile search	3.78 / 5	-	+	++	+	-	+++
Doing 'usual, daily tasks' more effective by mobile (mobile domotica, smart domotica, smalrt machines on mobile, restaurant order & payment, e-meal, business card exchange, shared agenda, mail/agenda on mobile)	3.73 / 5	--	+	-	+	-	+++
Consultation of available places in cinema	3.72 / 5	-	+	-	+	-	+++
More effective health care (prescriptions, medication prescriptions & schedules, health monitoring, e-care)	3.68 / 5	--	++	--	-	-	+++
Doing 'unusual tasks' more effective by mobile (accident reporting, manual download, school agenda & report, monitoring organisation aid, identity & medical info on mobile)	3.68 / 5	-	+	--	-	-	+++
Download presentations or other information	3.65 / 5	-	+	--	+	-	++
Administration (heartbeat info, mobile admin., dentist appointment, CV on mobile)	3.63 / 5	--	+	--	-	-	+++
Multimedia (note taking, mobile video calling, photo service)	3.57 / 5	-	+	+	+	-	++
Movie choice	3.54 / 5	-	-	--	+	--	++
Mobile help for studies (& work) (mobile learning, study mentor, study choice guide, mobile academy, mobile terminal)	3.43 / 5	--	+	-	-	--	++
Mobile 'high tech' (video surveillance, webcam, i-nanny, finding lost elderly, mobile auction, scanning information)	3.43 / 5	--	+	--	-	--	++
Keeping up hiking & cycling routes	3.42 / 5	--	+	--	+	-	++
Not appealing							
Food & Shop Help (eQuick recipes, meal help, receipt download, making appetizers, shopper, shop alert, restaurant finder)	3.23 / 5	--	-	--	-	--	++
Mobile news & information (mobile news, mobile feed reader, mobile information services, mobile blog)	3.11 / 5	--	-	++	-	--	+
Spare time suggestions	3.10 / 5	--	-	--	-	+	+
Mobile social contacts & Friends (mobile chat, finding people with same interest, mobile flirt, mobile dating, smart mobile messenger, MapQuest find me)	2.94 / 5	--	--	--	+	--	+
Carpooling system	2.93 / 5	--	-	--	-	--	+
Location based advertising	2.78 / 5	--	-	--	-	--	+
Sport events on mobile	2.74 / 5	--	--	--	-	--	-

Table 1 Clustering applications by using Principal Component analysis

*Legend: 1: Not interesting at all – 5: Very Interesting

3. Conclusion: coming together

Although the two different approaches (diffusion versus domestication) guided the research and two different sets of methods were used, similar findings related with mobile city applications were encountered. In the domestication approach we found that utilitarian activities frequently occur while being on the move, and that people want finish them as quickly as possible. This is in parallel with the finding of the diffusion approach that time saving applications are very wanted. These kinds of parallels illustrate the potential complementarities between the two different approaches. Combining both in one project, offers a more complete picture of usage patterns of mobile city applications.

Because of these complementarities, it would be useful to apply them sequential. In that way the diffusion approach could explore the most likely application ideas. The latter could then serve as the basis for the phenomenal variation in selecting between the adequate archetype users.

We found that archetype user research gives the opportunity to 'tune in' to a practice-oriented categorisation to start the ethnographic research on from within a domestication perspective. In the same sense that the Jungian archetypes are innate and primitive prototypes for ideas, our archetypes start of as primal categories of people. The purposeful selection of the latter categories is based on a priori assumptions by the researcher about relevant socio-demographic characteristics (maximum variation) and about the attributes that seem to have relevance in relation to the applications being developed (phenomenal variation). Also during the iterative cycle of data collection and interpretation, adjustments can be made in the selection of archetypes (theoretical variation). After selecting the (primitive) archetypes, the archetypical possibilities are refined with additional dimensions based on related literature. Making explicit the researcher's underlying assumptions is one of the main elements of added value of the archetype user approach. Subsequently, it is necessary to involve representatives of the identified archetypes in a multi-methodological research plan, e.g. ethnographic research, to reach a higher degree of sophistication. The data collection of real life behaviour and practices enable grounding in the field and by this a re-adjustment of the initial primitive categorisation.

By using archetype user research we were able to get grip on the conceptual phase of the development of wireless city applications. With this we could give essential input for the following phases of testing, experimenting and evaluating applications within the development process, based on social requirements and user experiences.

Also diffusion theory can be again a valuable framework again for some of these phases. One of them is the evaluation of applications in terms of forecasting adoption potential or the size of its potential innovator, early adopter, majority and laggard segments.

In conclusion, we may refer to Bockzkowski (2004) again. By means of the conducted research in the context of the IBBT-ROMAS case, we hope to have contributed in the search and illustration of how social shaping/domestication and diffusion can indeed be two intimately tied sides of the same innovation coin.

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[i] Well-known examples of companies are Philips, Microsoft, Intel, Google, Motorola or Nokia. One of the meetings where anthropologists and social scientists involved in this kind of innovation strategic research and development gather is the yearly Ethnographic Practices in Industry Conference (EPIC).

[ii] Affordances are defined as the combination of 'perceived and actual properties of the thing - primarily those fundamental properties that determine just how that thing could possibly be used.' (Norman, 1988: 95). A term borrowed from Gibson's ecological theory of perception (1977).

[iii] E.g. Window shopping, going out, dining in a restaurant,...

[iv] E.g. Shopping for food, doing payments at the bank, bringing in laundry,...

[v] E.g. Shopping at the market, bringing books back to the library and reading a magazine there,...

[vi] The quotes are from the original Dutch transcriptions translated to English.

[vii] Around 8 main domains (social participation, household, study, work, transport, spare time, health, sleep) and several sub domains

[viii] It may be valuable starting point for further diffusion-based research, but also for domestication based research it may be of a certain value: e.g. as an input for the phenomenal variation in the archetype research.

[ix] The factors are marked by the label 'Factor' between brackets and an enumeration of the application numbers (cf. table supra) of the applications being member of that factor.

[x] 1 - The out of (mobile) potentials: This segment contains 19 respondents (6,6% of the sample) for which hardly any of the 80 applications has potential. This group is characterised by a dual profile. On the one hand we find a group of students with a high school degree, younger than 25 years old, not married and still living with their parents. On the other hand, this cluster consists of a group of (female) users between 45 and 54 years old, who are married and having children. We can consider both groups as laggards when it comes to the adoption of mobile city concepts. The only application they have a 'special interest' in is 'indication of parking spaces and availability'.

2 - Global interest I: Organisation & Health: As a first of two 'global interest' clusters, this segment has a special interest in applications which can be useful in an organisational and working context or in a health context. It represents 28% (81 respondents) of the sample. Compared to the other clusters, its members are between 35 and 54 years with a family life (married with children). Because both parents have a job and a rather busy lifestyle they are interested in applications that can help them organise their life by finding shops, more effective health care, making appetizers... In this type of applications they perceive a lot of potential added value.

3 - Specific interest I: Information junkies: This clusters contains only 3 members with a very interesting profile. These people have an outspoken interest in information and news related applications. Due to the small size of the cluster, no generalisable analysis was conducted for this cluster.

4 - Global interest II: Leisure: The members of the second 'global interest' cluster are most interested in applications that can be used during leisure time. The cluster has a young profile since there is an overrepresentation of (male) respondents younger than 25, students, not married and still living with their parents. This cluster contains 20,1% of the sample or 58 respondents. Some of the most interesting applications for this cluster are free mobile surfing, movie choice, keeping up hiking & cycling routes... They also perceive some added value in applications as mobile dating, note taking, find shops, tourist portals, finding people with the same interests...

5 - Specific interest II: Payments: The 35 members (12,1%) of this cluster are mainly interested in 'payment' related applications. More than the rest of the sample they are married, higher educated, between 35 and 44, and living in a busy household with children. This cluster is mostly interested in applications concerning money and payment affairs but also perceives some added value in rather practical applications like public transport schedules, smart machines on mobile...

6 - Mobile innovators: This cluster contains 93 respondents or 32,2% of the sample. This is a cluster of people to which practically all mobile application ideas are very appealing. Most of the cluster members are younger than 34 years old and have a fulltime job, but do not have a family of their own yet.