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An innovative mobility service to facilitate changes in travel behavior and mode choice

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Abstract

The aim of this paper is to present and discuss changes in users' travel behavior and mode choice during in the six-month Field Operational Test (FOT) of the UbiGo transport broker service in Gothenburg, Sweden. Four user groups are analyzed – car "shedders", car "keepers", already carsharing, and car "accessors" – based on data collected via questionnaires, interviews, and travel diaries. Findings suggest that although some groups sought or achieved change more than others, each group's mode choice shifted in a more sustainable direction, and these changes were perceived positively and with high satisfaction with the service. Despite the user groups' differing motivations, behaviors, and experiences, the FOT results illustrate that a holistic approach to mobility, in this case a personalized "transportation smorgasbord" package of integrated services, can offer "something to everyone" and promote broader change.

Keywords

UbiGo, field operational test, mobility as a service, mode choice, travel behavior, multimodal

Introduction

With the continued global trend of urbanization and increased demand for transportation with related issues of emissions, noise, congestion, etc., urban mobility is a major challenge for the future, e.g. (1). Many projects have attempted to bring about sustainable changes in individuals' mode choices and travel behaviors: information and education campaigns to raise commuters' awareness and change attitudes, mainly targeting a shift from private car to public transport and active modes (e.g. 2-5); competitions and handing out free public transport passes (e.g. 6-8); or increasing the attractiveness of public transport via new vehicle designs and improved traveler information (e.g. 9-12). But to bring about the radical changes required to meet the challenges ahead, new approaches are needed.

Urban mobility encounters additional barriers beyond the behavioral. The environment in which urban mobility management operates is, according to Arthur D. Little's report "The Future of Urban Mobility" (1), fragmented and there is a lack a holistic approach by which synergies could be achieved between different modes of transport. In addition, "… decisions are often mainly based on 'public actions' and do not sufficiently address interfaces with the private sector and what contribution it could make to the achievement of urban mobility goals" (1, p.26). As well as such political and organizational barriers, innovative urban mobility solutions must find sustainable business models, and as innovative as they may be, their users still require access to basic infrastructure such as public transport, bikesharing, and carsharing sites and parking (13).

The Go:Smart project (14) in Gothenburg, Sweden has been an attempt to create better conditions for sustainable urban travel, i.e. a reduced share of trips with fossil-fuelled vehicles, an increased share of travel by "collective transport" (including public transport), and reduced emissions (noise, CO_2), by demonstrating how new business models and partnerships can reduce the need for private car ownership in favor of "mobility services". An innovative transport broker service, named UbiGo, was developed and subsequently tested by more than 190 paying customers during a six-month Field Operational Test (FOT) from November 2013 to April 2014.

Three main assumptions shaped the project and the subsequent service:

- "Collective transport": The desired changes cannot be brought about by the development of a single transport mode or by focusing solely on a shift from fossil-fuelled, private cars to public transport, but by the integration of different transport services including both public and private solutions, i.e. "collective transport", cf. (1).
- Current societal trends: Current shifts in individuals' attitudes and values, cf. (15), in a more environmentally conscious direction, and the trends towards joint/shared ownership or no ownership at all – including car- and bikesharing (16-18) – open up new possibilities for new types of travel offers or services, such as Uber (19), lyft (20), moovel (21), Qixxit (22), etc.;
- Advances in and dissemination of mobile ICT: The technological developments in the field of Information and Communication Technology (ICT) as well as the dissemination of mobile ICT has made it increasingly possible to create and test new types of offers (23-24).

This paper explores how the use of the UbiGo transport broker service impacted the travel behavior and mode choice of the users. Questions posed are: Did the users represent different types of travel behaviors and, if so, which behaviors? How did the different behaviors influence expectations of and experiences during the FOT? How did UbiGo influence the travel behavior and mode choice of the various types of users? And, What can innovative, integrated mobility services such as UbiGo offer to different user groups?

The UbiGo transport broker service

The Go:Smart project involved the development and field operational test (FOT) of an innovative transport broker service, named UbiGo, for sustainable transport of people in urban environments. The service attempted to bridge the gap between private and public transport by taking on the role of a commercial actor, "a broker of everyday travel", offering customized transport services to fit the individual traveler's needs and requirements.

It did this by uniting already existing transport solutions and transport providers, including public transport, taxi, car- and bikesharing, and rental cars, and offering them in a package to customers through a single subscription service. The intended audience for the service was urban households, who were judged to have sufficient access to the existing transport solutions, in particular to carsharing and public transport, and large enough travel needs for the service to be financially competitive with their current solution.

For its users, the UbiGo service offered one-stop access to the range of travel services through a web-interface adapted to smartphones (subsequently referred to as the app). Customers, in the form of households (comprised of any number of individuals including both adults and children, i.e. typically a family), paid a monthly subscription adapted to their transport needs, which included a personalized combination of, and amounts of credit for, the different travel services. During the FOT, the minimum limit for prepaid credit was 1200 SEK/month, or approximately 135 EUR or 185 USD at the time, although the average subscription was approximately 150% of this value. Credit could be topped up or rolled over, and the subscription could be modified on a monthly basis. In order to encourage participation in the FOT, any unused credit was refunded to the participants at the end of the test. Also, the project could compensate participants for not using a private vehicle during the FOT, i.e. to offset insurance, parking, etc. up to a fixed limit.

To access their travel services, the UbiGo traveler logged into the app via a Google- or Facebook-login, where they could activate tickets/trips, make/check bookings, and access already activated tickets (e.g. for validation purposes). The app also allowed them to check their balance, bonus, and trip history, and get support (in terms of FAQ/customer service). Each participant received a smartcard, used for instance to check out a bicycle from the bikesharing service or unlock a booked car, but also charged with extra credit for the public transport system in case there was any problem using the UbiGo service.

To provide added value, UbiGo also included a customer service phone line open 24 hours per day; a bonus system for "eco-friendly" travel where earned points could be exchanged for goods and services provided by sponsors, and an "improved" travel guarantee, where UbiGo would cover the cost and deal with the paperwork to reclaim the extra expenditure from e.g. the public transport provider. Furthermore, the public transport offers unique to UbiGo included daily tickets and a more generous

zone system with easy up- and downgrades via the app. (See (25) for more on the added value of the service.)
The transport broker handled everything so as to create a "seamless" customer experience. The broker procured transport from different transport service providers (the public transport authority, one taxi company, one car rental company, one carsharing company, and one bikesharing company) by becoming a "business client". By representing a large number of customers, the broker could often negotiate lower prices for the individual trips. The back-office function also handled administration and billing, and kept track of credit that was added or rolled over, extra fees from rental cars and carsharing, subscription changes, rebates, etc.
In addition to the transport broker, transport service providers, and users, additional project stakeholders included service developers (ICT), research institutes, and society represented by the city and the region.

Method: data collection and analysis

This paper's primary information source is the "user" stakeholder group, i.e. the FOT participants, also referred to as the UbiGo customers. Data was collected via a mixed-methods approach including: "before" (BQ), "during" (DQ), and "after" (AQ) questionnaires (with 151 adults completing all three) covering expectations, perceptions, and experiences; individual and household interviews; focus groups; and "before" and "during" travel diaries. Although not the focus of this paper, data was also collected from non-participating households via questionnaires and in-depth interviews (see (26) for a comparison).
Based on ex-ante car ownership/access and the possibility to set aside one's car during the FOT, four groups have been identified for comparative analyses in this paper:

- Group 1 – car "shedders" – who owned one or more cars, but decided to set one aside during the FOT, i.e. "shedders" (cf. (27)) who wanted to test having access to a car without owning it (n = 19 answering all questionnaires). Of the 20 cars set aside, 17 were from single-vehicle households;
- Group 2 – car "keepers" – who owned one or more cars, but who kept their car(s) during the FOT (n = 52 answering all questionnaires);
- Group 3 – already carsharing – who did not own a car, but who were ex-ante carsharing members (n = 34 answering all questionnaires); and
- Group 4 – car "accessors" – who neither owned a car nor were ex-ante carsharing members, i.e. "accessors" (cf. (27)) who wanted to gain car access (n = 46 answering all questionnaires).

Statistical analyses of the questionnaire data have been performed with the software IBM SPSS (α = 5%). Due to the ordinal nature of the data (Likert Rating Scales of 1 to 7 with 7 being the most favorable), non-parametric tests are employed; and in the case of comparing multiple dependent or independent groups, post-hoc tests are conducted with a Bonferroni adjustment to minimize Type I error. The direct comparisons described in the text below are statistically significant.

Results and discussion

For an overview of the entire participant group's mode use, change, and levels of satisfaction during the UbiGo FOT, see Table 1. As the greatest changes were generally experienced in public transportation and car modes (private vehicle and carsharing), a breakdown of these modes' use and change by group is provided in Table 2. Table 3 gives a breakdown of the reported travel behavior changes by user group. Tables 4 and 5 present initial results from the travel diaries.

Socio-demographics

The original participant group in the FOT, which ran from November 1, 2013 to April 30, 2014, consisted of 83 customer subscriptions covering 195 persons: 173 adults and 22 children (under 18 years of age at the start of the FOT). Furthermore, a total of 20 private vehicles were deliberately set aside during the FOT; 17 from single-vehicle households.

From the "before" questionnaire (n = 164), the participant group had an average age of 38 years and consisted of approximately 50% women. Most lived in apartments (80%) and there was a mix of household types (mostly multiple adults with/without children) and income levels.
The majority was employed (80%) and had a driver's license (88%) although only 41% stated that they have daily personal access to a car. In terms of household car ownership, 36% were single-vehicle and 10% were multiple-vehicle households, i.e. a slight majority (54%) did not own a car, although of those households, 42% stated that they could borrow one or more vehicles. The majority was neither a carsharing member (69%) nor a bikesharing member (81%). However, the majority owned a bicycle (81%) and had a public transport card (88%).
A large majority of participants used the internet and apps on computers, tablets, and smartphones on a daily basis (88-91% in all cases). (Note that one needs a smartphone in order to run the UbiGo app.)
Although the project did not intend to target innovators (cf. (28)), this was likely the case as the major motive behind the participants' initial interest to join UbiGo was curiosity (63%) (see (26)). The "before" questionnaire included a series of questions related to interest in technology and change-seeking. Participants stated that they were interested in new technology and preferred to seek after and try new things rather than follow routines and habits. Furthermore, participant interviews revealed that the adults in the household were likely innovators, or a combination of an innovator, who may have been the primary driver behind joining the project, and an easily convinced early adopter.
Groups 1 to 4 differ socio-demographically in some respects ("before" questionnaire). Group 2 (owned and kept car) lived in a house to a significantly greater extent than did all other groups. Group 2 also had more adults and higher income than did Group 4, who neither owned a car nor was an ex-ante carsharing member. The aspect of car ownership (Groups 1 and 2) also meant that both these groups had significantly higher daily access to a car (90% and 64% respectively) compared to both Groups 3 and 4 (21% and 3% respectively). Ex-ante carsharing membership also differed, where Group 3 (with 100% membership) had significantly higher access than all other groups, and Group 2 (19%) also had significantly higher access than Group 4 (with no ex-ante membership). Car ownership is linked with Groups 1 and 2 both using car to a significantly greater extent than Groups 3 and 4 (see Table 2 for percentages of car use at least 1-2 times/week), although Group 3 (carsharing members) also had significantly greater car use than Group 4 (non-members). In terms of public transport, Group 4 used bus/tram significantly more than did Group 1 (see Table 2 for an example), and also utilized public transport information to a significantly greater extent.

Analysis of Group 1 – Car "Shedders"

Group 1, ex-ante car owners who decided to set aside a car during the FOT, was interested in testing car access without car ownership. Compared to Groups 3 and 4 (ex-ante non-car owners), Group 1 expected their travel to become significantly less time efficient during the FOT, although the "during" questionnaire revealed that Group 1's travel had not become as time inefficient as they'd expected. Not surprisingly, Group 1 also expected their environmental impact to decrease compared to Groups 3 and 4. They had a lower expectation of being able to make the same mode choices as before compared to Group 3 (non-car owners who were already carsharing members, i.e. who theoretically already had access to all the modes in the UbiGo service). Also, Group 1 felt it was significantly more important that the carsharing sites be accessible than did Group 4, who was not ex-ante carsharing members. This is likely due to Group 1's ex-ante car ownership and use, i.e. they wanted carsharing to be comparable as possible to their own private car.
During the FOT, Group 1 felt they had a decreased environmental impact compared to all other groups, and they also perceived that their travel patterns had changed significantly more than did Groups 3 and 4 (non-car owners). As Group 1 likely expected the greatest learning curve and behavioral changes due to giving up their car, this may also have translated into greater engagement in other aspects of the FOT, e.g. Group 1 contacted customer service more often and found the app easier to download than did Group 2 who did not set aside their car. Group 1 also felt the app was more fun to use than did Group 4 and that the app's instructions were easier to find than did Groups 3 and 4. These are the only differences between groups found in regards to the app or customer service.

At the end of the FOT, Group 1 rated their reduction of private vehicle use as significantly greater than did the other groups, and their perceptions of a decreased environmental impact held in relation to the other groups as well. Group 1 also discovered other modes and reported a significantly greater increase in bus/tram use compared to Groups 3 and 4 (non-car owners) and carsharing use compared to both Group 2 (who kept their car) and Group 3 (who were already carsharing members). The relatively greater experience of carsharing also lead to a greater appreciation of carsharing compared to Group 2, who kept their car, although Group 1 also felt their travel had become significantly more demanding physically than did Group 2. Additionally, Group 1 felt that their transportation costs had reduced to a significantly greater extent than did Group 3 (non-car owners who were already carsharing members).
From Group 1's self-reports (see Table 2), public transport and carsharing use increased with a majority gaining a more positive attitude towards these modes, and private car use decreased with 26% gaining a more negative attitude towards this mode. In Table 3, one can also see that Group 1 reported higher percentage changes for all travel behaviors, e.g. 89% for pre-trip planning and 74% for mode. Note however that despite these many changes, there are no significant differences between groups in terms of travel satisfaction, neither between groups in terms of to what extent they expected their behavioral changes to last.
Interviews revealed that Group 1 discovered that public transport in Gothenburg works rather well and that they needed car modes (carsharing and car rental) even less than they had expected, although some trips were skipped or adapted due to high expense for using these modes for e.g. one day. All in all, it seems that Group 1 embraced the opportunities for change that UbiGo offered and became engaged in the service and testing alternative modes.

Analysis of Group 2 – Car "Keepers"

Group 2, who owned one or more cars, but decided to keep their car(s) during the FOT, was generally interested in gaining access to cheaper public transport. Despite not giving up a car, this group did expect their environmental impact to decrease compared to Group 4, non-car owners who also gained access to carsharing. This indicates that they planned to test alternative modes, despite keeping their car(s).
Not giving up a car perhaps also led to Group 2 not being as open to the other services during the FOT. Group 2 did report significantly greater bus/tram use compared to Group 4, so perhaps they did test out gaining access to cheaper transportation, or, as supported by the interview results, they at least exploited their daily ticket once they had paid for it. But Group 2 also reported significantly less carsharing use and more private car use compared to all other groups, and less car rental use compared to Group 3. Group 2 was most pessimistic to carsharing overall, with significantly lower satisfaction compared to both Group 1 (who shifted from private car to carsharing) and Group 3 (ex-ante carsharing members), as well as significantly more negative ratings regarding the accessibility of carsharing sites and cars compared to Groups 3 and 4 (car non-owners). Although it remains to perform a geographic analysis, given that only 60% of Group 2 lives in apartments compared to 94-96% of the other groups, the land use patterns may be linked to relatively worse access to carsharing infrastructure for Group 2, which would likely lead to their relatively more negative opinions of carsharing. Compared to Group 1, Group 2 also contacted customer service significantly less often and found the app significantly harder to download.
Group 2 was also in the middle regarding expectations of environmental impact both during and at the end of the FOT, expecting a reduction but significantly less of one compared to Group 1, who set aside a car, and significantly more of one compared to Group 4, non-car owners who gained access to carsharing. At the end of the FOT, Group 2 still had significantly less carsharing use and a more negative attitude towards carsharing than Groups 1 and 4, and more negative ratings regarding accessibility of carsharing sites and cars compared to all other groups. Given the continued use of the private car, it is not surprising that Group 4 said their travel was significantly less physically demanding compared to Group 1, who set aside a car.
From Group 2's self-reports (see Table 2), a slight majority reported increased public transport use (and gain in positive attitude), while a slight majority reported decreased private car use with 31% gaining a more negative attitude towards this mode. As for carsharing, a minority reported increased

use, with 48% gaining a more positive attitude towards it. The most common reported behavioral changes were mode and pre-trip planning with 31% each, although this was the lowest percentage for mode change of all the four groups.
Keeping one's car likely lead to difficulty in overcoming inertia for Group 2, although the incentives or opportunities offered by UbiGo (cheap daily public transport tickets and carsharing membership) resulted in at least some experimentation. If the problem is related to land use patterns, then the determining factor for change is likely the access carsharing infrastructure, as discussed in (13).

Analysis of Group 3 – Already Carsharing

Group 3, who were non-car owners already using carsharing, largely expected their travel to remain the same during the FOT, just that the UbiGo "packaging" would make things easier. This expected lack of behavioral change is reflected in fairly neutral ratings of expected changes regarding: time efficiency of travel, environmental impact, and choice of modes, where Group 1, who set aside a car, expected significantly more extreme changes.
Group 3's mode use, etc., differed mostly from Group 2 during the FOT, where Group 3 rented cars and used carsharing significantly more, and used private car less than did Group 2, who kept their car(s). Group 3's satisfaction with carsharing was also significantly higher than Group 2's, as were their ratings regarding the accessibility of carsharing sites and cars. As for travel experiences, Group 3 felt that their environmental impact had decreased to a lesser extent than did Groups 1 and 2 (ex-ante car owners). This group also perceived fewer changes to their travel patterns and mode choices compared to Group 1, who set aside a car; and, not surprisingly, perceived that the choices available to them had not increased as much as Group 4 perceived, who gained access to carsharing.
At the end of the FOT, Group 3's use of bus/tram had changed significantly less than Group 1; and the use of and attitude towards carsharing had changed less compared to Groups 1 and 4. Group 3 also perceived less cost savings than did Group 1, who set aside a car, and was more favorable towards the accessibility of carsharing sites and cars compared to Group 2, who kept their car(s). Despite ex-ante carsharing membership, Table 2 shows that a slight majority reported increased use in carsharing, while 50% gained a more positive attitude towards it. There was also a decrease in private car use and a shift towards a more negative attitude. Although 41% reported no changes in travel behaviors (see Table 3), 41% reported changes in mode use and 32% changes in pre-trip planning.
Interviews revealed that although this group had ex-ante access to the modes provided via UbiGo, they were highly satisfied with and willing to pay for the *package* of integrated services. Having to make active choices from the "transportation smorgasbord" prompted them to reevaluate their travel behavior and mode choices for their various trips; and having access to cheap, daily public transport cards instead of a monthly card (i.e. closer to a pay-per-use system) made them feel free to choose other options, even active modes of bicycling or walking. Although UbiGo did not offer anything new for this group in terms of actual mode choice, it clearly offered other added values in terms of integration of service and pricing, and a sense of freedom to vary one's choices.

Analysis of Group 4 – Car "Accessors"

Group 4 had neither owned a car nor were ex-ante carsharing members, i.e. they were "accessors" who wanted to gain car access. Likely due to the fact that Group 4 was used to living without a car, this group had relatively less pessimistic expectations of changes in time efficient travel compared to Group 1 (who set aside a car); and surprising given that they were gaining access to carsharing, Group 4's rating of the importance of having accessible carsharing sites was the lowest of the four groups (although it was only significantly lower than Group 1, who set aside a car). Gaining carsharing access also influenced Group 4's expectations of an increase in their environmental impact compared to Groups 1 and 2 (ex-ante car owners who expected decreased impacts).
During the FOT, Group 4's self-reported mode use, etc., did not differ much from the other groups except that they did maintain the highest level of bus/tram use (although it was only significantly greater than Group 2 at this point). To a greater extent, Group 4 felt that their travel patterns and mode choices had stayed the same compared to Group 1. Having gained access to carsharing, they felt that they gained access to more choices compared to Group 3, who was already using carsharing. And

Group 4 was significantly more positive to the accessibility of carsharing sites and cars compared to Group 2, who kept their car(s).
At the end of the FOT, Group 4's bus/tram use had increased significantly less compared to Group 1, who set aside a car. Group 4 also used carsharing significantly more often and gained a more positive attitude towards carsharing compared to Group 2, who kept their car(s) and Group 3, who already used carsharing. Self-reports also show that private car use did decrease for this group as well, with 37% reporting less seldom use and 17% reporting a more negative attitude. Interesting given that this group were car "accessors", 48% reported changes in mode choice, but 41% reported no behavioral changes. Interviews revealed that Group 4 used the car modes (carsharing and car rental) even less than they had anticipated, partly due to: little need for a car due to their ex-ante lifestyle, that they were not in the habit of driving, and that some trips were difficult to perform by car due to high expense for using these modes for e.g. one day. But overall, UbiGo did illustrate a way for this group to gain access to car modes when needed (although it proved to be less often than they thought it would be) without the need for private ownership.

Travel diaries

An initial analysis of the "before" travel diaries (one week covering 846 trips from 24 women and 16 men) revealed that the participants differed somewhat from the average Gothenburg resident (See Table 4) (29). In terms of car use, the participant group was most similar to the average person living in Central Gothenburg (27% versus 24%, respectively). However, their use of alternative modes differed somewhat in that more participants used public transport (34% versus 26%, respectively) and fewer walked (24% versus 39%, respectively).
In an initial analysis of the "after" travel diaries (one week from 36 of the 40 contributors of the "before" diaries), it was found that the greatest percentage decrease was in private car use (50%) and the greatest increase was in carsharing (200%). In general, there was a shift away from private car towards alternative modes, including carsharing, bus, and bicycle (see Table 5). A more complete analysis of the travel diaries remains to be completed, e.g. analyses of those who set aside a car versus those who did not, versus non-car owners, etc.

Concluding remarks

This paper has described experiences from a field operational test of a new travel broker service for everyday travels. The service integrates both public and private solutions into a new type of "collective transport", hereby attempting to contribute to Swedish national and local societal goals of a reduction of private car use and ownership.
Although four groups with differing car ownership and use situations were identified – "shedders", "keepers", already carsharing, and "accessors" – each group's mode choice shifted in a more sustainable direction during the FOT. Given the groups' varied situations, it is even more remarkable that there were no significant differences between the groups in terms of their satisfaction, where: 93% of the total participant group were satisfied with their travel situation; 69% had become more satisfied with their travel; 97% wanted to keep using the service after the FOT ended; 93% would recommend the service to others; and 97% of those who reported behavioral changes were satisfied with those changes.
It can be argued that the FOT participants may not represent the "average traveler" and that the results therefore cannot be generalized across the larger group. This was however never the purpose of the FOT, as the service was developed to target urban households, with a certain level of access to the existing transport solutions, and large enough travel needs for the service to be financially competitive with their current solution. Generalizability will instead be reached by further investigating the transport needs and requirements of multiple, different target groups in order to create a service with the necessary flexibility to attract a broad range of users. In addition, earlier analyses (26) have indicated that the participants could be classified as innovators and early adopters. However, as observability is an important aspect of an innovation in relation to its rate of adoption (28), reaching innovators and early adopters can be an effective strategy. Seeing others perform the behavior can act as a vicarious trial. Thus, it may be valuable to conduct smaller, targeted initiatives with positive

results in order to get the ball rolling, and to make sure that the participants' positive experiences are observable by others.
Given the findings, it is argued that the FOT results illustrate that an innovative approach to mobility, in this case a personalized "transportation smorgasbord" package of services, can offer "something to everyone". In the case of UbiGo, even the group who were already carsharing found added value in the integration of services. Furthermore, the FOT results serve as a reminder to transportation researchers, practitioners, and policy makers that as different groups have different pre-requisites and motives, one targeted approach or policy is not enough to affect the broad changes required to meet the challenges ahead; rather a holistic approach of integrated transportation services is needed.
It is also vital to involve public and private actors to create the integrated solutions, which, according to, e.g., Arthur D. Little's report "The Future of Urban Mobility" (1), is needed in order to address the challenges associated with future urban mobility. One example from this FOT is the cooperation needed in order to promote alternative modes and shared resources, as the necessary infrastructures (e.g. public transport, carsharing sites and parking, and bikesharing) will need to be easily accessible to the users in order to facilitate their testing and use of reasonable alternatives. Moreover, neither will sustainable business models be achieved without such cooperation. As such, considering (at least) these three stakeholders' perspectives – user, commercial, and societal (including the city/region) – will be vital for successfully implementing this kind of new transport service (13).
Planned further analyses include: deeper analysis of the travel diaries and group differences introduced here, the users' motivational process and its implications for sustainable development, the motivational process of the participating transport providers, etc. Also underway is an analysis of a follow up with the participants (six months later) regarding to what degree they have maintained any changes in their travel behavior in the months following the FOT.

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Table 1 - Overview of Mode Use, Change, and Satisfaction during the UbiGo FOT

Mode (Service Provider)	Pre-UbiGo Mode Use (BQ, n=164)	Average Subscription and Utilization Levels; Self-Reported Use Levels (DQ, n=161)	Self-Reported Change in Use (% less – equal – more use) and *Change in Attitude Towards (% less – equal – more positive)* (AQ, n = 160)
Public Transport (Västtrafik VT)	88% have a public transport card 65% use bus/tram at least 3-5 times/week 9% use local trains at least 3-5 times/week	Subscribed for 2220 days/month Utilized 1920 days/month 63% use bus/tram at least 3-5 times/week 4% use local trains at least 3-5 times/week	VT bus/tram use change 4% – 46% – 50% *VT bus/tram attitude change 2% – 46% – 52%* VT local train use change 7% – 75% – 18% *VT local train attitude change 3% – 71% – 26%*
Bicycle (Styr&Ställ S&S)	81% own a private bicycle 17% use bicycle at least 3-5 times/week 19% are S&S members	For Nov., 241 S&S rentals for 28 active users From Mar., 80 active S&S users 6% use S&S at least 3-5 times/week (Note that S&S was not available Dec. – Feb.) 16% use private bicycle at least 3-5 times/week	S&S use change 16% – 61% – 23% *S&S attitude change 1% – 57% – 42%* Private bicycle use change 19% – 65% – 16% *Private bicycle attitude change 3% – 83% – 14%*
Car (Sunfleet SF) (Hertz HZ)	88% have a driver's license 41% have daily personal access to a car 43% use a car at least 1-2 times/week 35% are carsharing members	Subscribed for 904 hours/month Utilized 620 subscription hours/month* 5% use SF at least 1-2 times/week 1% use HZ at least 1-2 times/week 9% use private vehicle at least 3-5 times/week (* Actual use hours can be greater than the utilized subscription hours due to special offers)	SF use change 6% – 37% – 57% *SF attitude change 3% – 36% – 61%* HZ use change 13% – 59% – 28% *HZ attitude change 4% – 75% – 21%* Private vehicle use change 48% – 48% – 4% *Private vehicle attitude change 23% – 74% – 3%*
Taxi (Taxikurir TK)	1% use taxi at least 3-5 times/week	For Nov. – Mar., 11 rentals/month 0% use taxi at least 3-5 times/week	TK use change 12% – 68% – 20% *TK attitude change 6% – 76% – 18%*
Walk	36% walk at least 3-5 times/week	50% walk at least 3-5 times/week	Walk use change 6% – 73% – 21% *Walk attitude change 2% – 82% – 16%*
Satisfaction with Current Travel	77% satisfied (rating 5-7 of 7) 19% very satisfied (rating 7 of 7)	88% satisfied (rating 5-7 of 7) 40% very satisfied (rating 7 of 7)	93% satisfied (rating 5-7 of 7) 51% very satisfied (rating 7 of 7) 79% want to continue as UbiGo customers 18% want to continue under certain conditions 3% do not want to continue as UbiGo customers

Table 2 - Overview of Public Transport and Car Mode Use and Change by Group

	Public Transport (Västtrafik VT)	**Car (carsharing = Sunfleet SF)**
Group 1 – Owned and set aside car (n=19)	BQ 79% have a public transport card 47% use bus/tram at least 3-5 times/week DQ 63% use bus/tram at least 3-5 times/week AQ bus/tram use change 0% – 26% – 74% *bus/tram attitude change 5% – 37% – 58%*	BQ 100% have a driver's license 90% have daily personal access to a car 95% use a car at least 1-2 times/week 11% are carsharing members DQ 16% use SF at least 1-2 times/week 11% use private vehicle at least 1-2 times/week AQ SF use change 0% – 21% – 79% *SF attitude change 0% – 21% – 79%* Private vehicle use change 95% – 5% – 0% *Private vehicle attitude change 26% – 63% – 11%*
Group 2 – Owned and kept car (n = 52)	BQ 90% have a public transport card 60% use bus/tram at least 3-5 times/week DQ 48% use bus/tram at least 3-5 times/week AQ bus/tram use change 6% – 34.5% – 59.5% bus/tram attitude change 2% – 36% – 62%	BQ 90% have a driver's license 64% have daily personal access to a car 65% use a car at least 1-2 times/week 19% are carsharing members DQ 2% use SF at least 1-2 times/week 44% use private vehicle at least 1-2 times/week AQ SF use change 9.5% – 54% – 36.5% *SF attitude change 8% – 44% – 48%* Private vehicle use change 54% – 40% – 6% *Private vehicle attitude change 31% – 65% – 4%*
Group 3 – No car, but carsharing (n = 34)	BQ 91% have a public transport card 68% use bus/tram at least 3-5 times/week DQ 71% use bus/tram at least 3-5 times/week AQ bus/tram use change 9% – 59% – 32% bus/tram attitude change 0% – 68% – 32%	BQ 91% have a driver's license 21% have daily personal access to a car 9% use a car at least 1-2 times/week 100% are carsharing members DQ 3% use SF at least 1-2 times/week 3% use private vehicle at least 1-2 times/week AQ SF use change 12% – 32% – 56% *SF attitude change 3% – 47% – 50%* Private vehicle use change 26.5% – 73.5% – 0% *Private vehicle attitude change 12% – 88% – 0%*
Group 4 – Neither car nor carsharing (n = 46)	BQ 91% have a public transport card 76% use bus/tram at least 3-5 times/week DQ 76% use bus/tram at least 3-5 times/week AQ bus/tram use change 2% – 57% – 41% bus/tram attitude change 2% – 48% – 50%	BQ 91% have a driver's license 3% have daily personal access to a car 15% use a car at least 1-2 times/week 0% are carsharing members DQ 7% use SF at least 1-2 times/week 9% use private vehicle at least 1-2 times/week AQ SF use change 2% – 20% – 78% *SF attitude change 0% – 17% – 83%* Private vehicle use change 37% – 54% – 9% *Private vehicle attitude change 17% – 83% – 0%*

Table 3 - Overview of Behavioral Changes during the UbiGo FOT

Car status / Reported change	Total answering all questionnaires (n = 151)	Group 1 – Owned and set aside car (n=19)	Group 2 – Owned and kept car (n = 52)	Group 3 – No car, but carsharer (n = 34)	Group 4 – Neither car nor carsharing (n = 46)
Mode	44%	74%	31%	41%	48%
Pre-trip planning	34%	89%	31%	32%	17%
Destination	23%	47%	19%	18%	20%
Trip chaining	22%	37%	23%	21%	15%
Exercise	22%	37%	23%	26%	11%
Travel time	20%	53%	19%	18%	9%
Route	19%	37%	19%	15%	13%
Transfer	13%	32%	15%	9%	4%
Arr./dep. time	12%	37%	10%	9%	7%
Travel companion	6%	16%	6%	6%	2%
No change	36%	11%	37%	41%	41%

Table 4 - Mode Share of Participants Compared to Averages for Gothenburg & Central Gothenburg

Mode	"Before" Travel Diary from UbiGo participants, n = 40	Average Gothenburg Resident	Average Central Gothenburg Resident
Car	27%	42%	24%
Public Transport	34%	25%	26%
Walk	24%	24%	39%
Bicycle	10%	6%	8%
Other	5%	4%	4%

Table 5 - Modal Shift Results from "Before" and "During" Travel Diaries

Mode	"Before" Travel Diary from UbiGo participants, n = 40	"During" Travel Diary from UbiGo participants, n = 36
Walk / Run	25%	- 5%
Bicycle	10%	+ 35%
Private Car	25%	- 50%
Carsharing	2%	+ 200%
Tram	15%	+ 5%
Bus (Local)	15%	+ 35%
Bus (Express)	3%	+ 100%
Train	2%	+ 20%