

1 **CHALLENGES IN INTEGRATING USER, COMMERCIAL, AND SOCIETAL**
2 **PERSPECTIVES IN AN INNOVATIVE MOBILITY SERVICE**

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0. ABSTRACT

1 This paper presents insights from a six-month field operational test (FOT) in Gothenburg,
2 Sweden, during which 195 participants tested the UbiGo transport broker service for everyday
3 travel. The service integrates both public and private solutions into a new type of “collective
4 transport”, thereby contributing to Swedish societal goals of a reduction of private car use and
5 ownership. A triangulation approach to data sources and collection methods has been adopted
6 in order to identify matches and mismatches between the expectations and experiences of
7 three stakeholder groups: users (FOT participants/customers), commercial actors (the
8 transport broker and service providers), and society. Identified matches include the
9 “transportation smorgasbord” concept, reducing private car ownership, and increased pre-trip
10 planning. Identified mismatches relate to the greater than expected reduction in car use; the
11 respective business models of the transport broker and service providers; back office
12 administration; and the smartphone platform. Gaps include the infeasibility of some trips and
13 the need for more carsharing sites. All in all, the FOT was successful with 93% of participants
14 satisfied with their travel and 97% wanting to continue using UbiGo. However, the
15 mismatches and gaps need to be resolved or at least deliberated upon in order to create a
16 commercially viable transport broker service. Based on the experience gained, the authors
17 conclude that truly “collective transport” must involve close cooperation between public and
18 private actors, and the consideration of at least these three, sometimes conflicting,
19 stakeholders’ perspectives, in order to create integrated solutions. Furthermore, new business
20 models are needed to address the challenges associated with future, integrated, urban mobility
21 solutions.
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KEYWORDS

24 field operational test, multimodality, seamless travel, travel service, stakeholder, user, travel
25 broker, service provider, society, private car ownership
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27

1 1. INTRODUCTION

2 Urbanization is an on-going development trend across the globe. It is predicted that the need
3 for transportation will rise, resulting in an even further increase in emissions and noise, in
4 overloaded infrastructures, and in congestion. Hence, urban mobility is considered as one of
5 the major challenges for the future, e.g. (1).

6 Some cities have already faced the challenge by introducing different types of
7 schemes. In addition to economic and legal measures, such as congestion charging etc.,
8 commuters have been the targets of information and education campaigns to raise awareness
9 and change attitudes towards public transport. Considerable efforts have been made to
10 increase the attractiveness of public transport by introducing vehicles (i.e. buses, trams, trains)
11 with new designs and not least by launching improved traveler information services, in
12 particular ICT- solutions such as real-time information and different types of multi-modal
13 travel planners, e.g. (2-5). Other efforts have encouraged increased cycling and walking (6-9)
14 by for example introducing new cycling and walking lanes. However, the effects of the
15 achievements are, albeit positive, too limited to meet the challenges ahead. A way to bring
16 about more radical changes is required.

17 Innovative urban mobility solutions encounter, however, a number of barriers. The
18 environment in which urban mobility management operates is, according to Arthur D. Little's
19 report "The Future of Urban Mobility" (1), fragmented and there is a lack a holistic approach
20 by which synergies could be achieved between different modes of transport. In addition, "...
21 decisions are often mainly based on 'public actions' and do not sufficiently address interfaces
22 with the private sector and what contribution it could make to the achievement of urban
23 mobility goals" (1, p.26).

24 The Go:Smart project (10) in Gothenburg, Sweden has been an attempt to create better
25 conditions for sustainable urban travel, i.e. a reduced share of trips with fossil-fuelled
26 vehicles, an increased share of travel by "collective transport" (including public transport),
27 and reduced emissions (noise, CO₂), by demonstrating how new business models and
28 partnerships can reduce the need for private car ownership in favor of "mobility services".
29 Three main assumptions shaped the project and the subsequent service:

30 • "Collective transport": The desired changes cannot be brought about by the
31 development of a single transport mode or by focusing solely on a shift from fossil-fuelled,
32 private cars to public transport, but by the integration of different transport services including
33 both public and private solutions, i.e. "collective transport", cf. (1).

34 • Current societal trends: Current shifts in individuals' attitudes and values, cf. (11), in a
35 more environmentally conscious direction, and the trends towards joint/shared ownership or
36 no ownership at all – including car- and bikesharing (12-14) – open up new possibilities for
37 new types of travel offers or services, such as Uber (15), lyft (16), moovel (17), Qixxit (18),
38 etc.;

39 • Advances in and dissemination of mobile ICT: The technological developments in the
40 field of Information and Communication Technology (ICT) as well as the dissemination of
41 mobile ICT has made it increasingly possible to create and test new types of offers (19-20).

42 From a societal perspective, an integrated mobility service has the potential to increase
43 the utilization of shared resources and decrease private car ownership. However, a
44 prerequisite for this potential to be realized is that it is possible to create a service that is both
45 commercially viable and adopted by its customers. For this to happen, user demands and
46 commercial prerequisites must meet.

47 This paper explores how the commercial, user, and societal perspectives met during a
48 real-world trial of a new and innovative transport broker service. Questions posed are: What
49 were the challenges in establishing cooperation between private and public transport services?
50 Where did the stakeholders' expectations and experiences match up successfully? Where

1 were there mismatches that will need to be addressed, and What gaps will need to be filled, in
2 order to create a successful, integrated mobility service in the future?

3 4 **2. THE UBIGO TRANSPORT BROKER SERVICE**

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

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

16 For its users, the UbiGo service offered one-stop access to the range of travel services
17 through a web-interface adapted to smartphones (subsequently referred to as the app).
18 Customers, in the form of households (comprised of any number of individuals including both
19 adults and children, i.e. typically a family), paid a monthly subscription adapted to their
20 transport needs, which included a personalized combination of, and amounts of credit for, the
21 different travel services. During the FOT, the minimum limit for prepaid credit was 1200
22 SEK/month, or approximately 130 EUR or 162 USD as of November 2014. (As a reference
23 value, the 2013 gross median income for Gothenburg County was 244,463 SEK, or
24 approximately 26,400 EUR or 33,000 USD) (21). Credit could be topped up or rolled over
25 depending on how much credit the household utilized, and the subscription could be modified
26 on a monthly basis. In order to encourage participation in the FOT, any unused credit was
27 refunded to the participants at the end of the test. Also, the project could compensate
28 participants for not using a private vehicle during the FOT, i.e. to offset insurance, parking,
29 etc. up to a fixed limit. This incentive resulted in 20 deliberately unused private vehicles
30 during the FOT.

31 To access their travel services, the UbiGo traveler logged into the app via a Google- or
32 Facebook-login, where they could activate tickets/trips, make/check bookings, and access
33 already activated tickets (e.g. for validation purposes). The app also allowed them to check
34 their balance, bonus, and trip history, and get support (in terms of FAQ/customer service).
35 Each participant received a smartcard, used for instance to check out a bicycle from the
36 bikesharing service or unlock a booked car, but also charged with extra credit for the public
37 transport system in case there was any problem using the UbiGo service. UbiGo also included
38 a customer service phone line open 24 hours per day.

39 The transport broker handled everything so as to create a “seamless” customer
40 experience. The broker procured transport from different transport service providers (the
41 public transport authority, one taxi company, one car rental company, one carsharing
42 company, and one bikesharing company) by becoming a “business client”. By representing a
43 large number of customers, the broker could often negotiate lower prices for the individual
44 trips. The back-office function also handled administration and billing, and kept track of
45 credit that was added or rolled over, extra fees from rental cars and carsharing, subscription
46 changes, rebates, etc.

47 In addition to the transport broker, transport service providers, and users, additional
48 project stakeholders included service developers (ICT), research institutes, and society
49 represented by the city and the region.

50

3. METHOD AND MATERIAL

In order to address the research questions and identify matches, mismatches and gaps, a triangulation approach has been applied concerning information sources as well as data collection methods.

3.1 Data Collection

The first, primary information source was 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, individual and household interviews, focus groups, and “before” and “during” travel diaries, as well as workshops and logging of customer service issues. Statistical analyses of the questionnaire data were performed with the software IBM SPSS. Ratings discussed in the text below are on a 7-point Likert Scale with 7 being the most favorable. Instances where a question was only answered by the main participant group (due to questionnaire pre-testing by 19 participants) are indicated with an * in the text.

The second information source was the “commercial” stakeholder group, consisting of both service providers and the UbiGo service team. Information regarding the travel broker’s and the service providers’ expectations was collected from reports from the pre-studies for the development of the service, as well as from the work done in connection to funding applications (in which one of the current authors participated). Experiences from the FOT were gathered through participatory observation, where the authors were present at the meetings during which the running of the service was discussed and decided upon. The authors also participated in mid-level customer service and other back-office duties.

The third information source was “society” as a stakeholder. In addition to information regarding societal expectations from pre-studies, funding applications, and general local and regional development plans, representatives of the local and regional authorities participated in project meetings at which the authors were present.

3.2 Socio-demographics and Ex-ante Travel Behavior

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 unused during the FOT; 17 from single-vehicle households.

From the “before” questionnaire (164 responses), 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 transportation 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.)

An initial analysis of the “before” travel diaries (846 trips from 24 women and 16 men) revealed that the participants differed somewhat from the average Gothenburg resident (22). In terms of car use, the participant group was most similar to the average person living

1 in Central Gothenburg (27% versus 24%, respectively). However, their use of alternative
 2 modes differed somewhat in that more participants used public transportation (34% versus
 3 26%, respectively) and fewer walked (24% versus 39%, respectively).

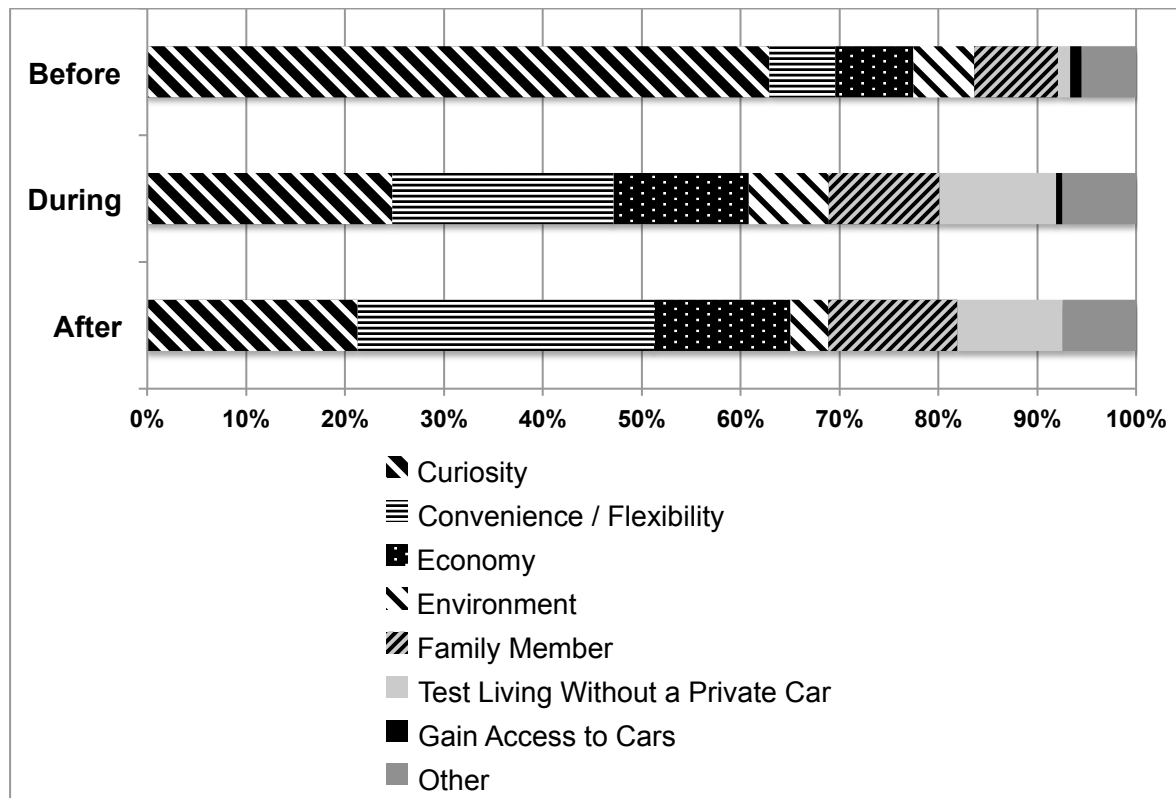
4. RESULTS

6 In order to identify and discuss the matches and mismatches that arose between the
 7 stakeholders during the project, it is necessary to first present their respective expectations
 8 going into the project. The matches and mismatches in expectations, and gaps in service are
 9 discussed subsequently. To provide additional context, an overview of mode use, change, and
 10 satisfaction during the FOT is provided in Table 1.

4.1 Stakeholders' Expectations

4.1.1 Users' Expectations

15 The major motive behind the participants' initial interest to join UbiGo was curiosity (62.8%,
 16 BQ, see Figure 1), suggesting that they could be considered innovators or early adopters, cf.
 17 (23-25). However, beyond their curiosity, they also had expectations of what an integrated
 18 mobility service could offer them in their daily lives.



20
 21 **FIGURE 1 Primary incentive of the participant group over time.**

23 One practical reason that the participants bought into the service was to try and see
 24 whether it was possible to live without a privately owned car – consider selling (“shedders”)
 25 or gaining access without buying (“accessors”), cf. (26). Many driving forces behind the wish
 26 to not own a car were stated in the interviews. One reason was that owning a car involves a lot
 27 of work and cost, such as parking, maintenance, insurance, congestion charges, seasonal tire
 28 changes, etc. Several of the participants' need for a car had been recently reduced due to other
 29 life events such as a new job, moving, or that the children had moved out. This opened up the

1 possibility to get rid of the car, or one of the cars, but as participants were not sure they could
2 manage without, entering this project was one low-risk way of finding out. Pro-environmental
3 reasons also contributed to the willingness to try to live without a private car as they felt that
4 by selling their car, which they did not need as much as before, they would reduce their
5 unnecessary and habitual use of the car when other modes of transport were equally good. For
6 participants who did not own a car going into the FOT, but who were considering such a
7 purchase, they instead saw the UbiGo service as an opportunity to test whether they really
8 needed to buy a private car or not. These were households that had discussed purchasing a
9 vehicle, often because they recently had a child.

10 Many of the participants also expected the service to reduce their overall travel costs
11 (4.87 of 7, BQ). Participants also saw the joint household account and one subscription to all
12 services would make it easier to pay for their travels and that they would have more control
13 over their expenses (5.66 of 7, BQ).

14 A further expectation was that they would get access to more modes of transport (5.49
15 of 7, BQ*). However, this demanded that the accessibility to those services would be good
16 with high quality public transport, and with car-sharing sites close at hand (30.3% rated it as a
17 “critical” factor, BQ*). Based on the wider choice of transport modes, participants also
18 expected that they would be able to better adapt the choice of transport mode to the individual
19 trip requirements (5.29 of 7, BQ*).

20 On a more practical day-to-day level, the participants expected that the service,
21 primarily the app, would be easy to use (36.6% rated it as a “critical” factor, BQ*). It was
22 also vital that the service be secure in terms of protecting personal information (35.9% rated it
23 as a “critical” factor, BQ*) as well as in terms of preventing unrestricted access (37.2% rated
24 it as a “critical” factor, BQ*). Customers also expected the travel broker to take care of any
25 problems that could arise and had a high level of trust that they would (6.25 of 7, DQ), even
26 though several participants mentioned in the interviews that they were more lenient towards
27 problems since it was a test of something new and innovative, and that they would have
28 oversight with billing errors and the like, as long as they felt they were not being cheated.

30 *4.1.2 Commercial Expectations*

31
32 **4.1.2.1 The Travel Broker’s Expectations** The mission statement of the travel broker was
33 to make it easier and rewarding to use sustainable modes of transport in urban areas. The
34 main idea was to provide their customers with different kinds of travel services, more
35 sustainable than a private car, in a simpler, packaged way than the current situation, where a
36 customer has to turn to each of the included services individually to get the same access.
37 Realizing that the entire household was the customer, rather than each separate individual,
38 was a part of the simplification as well.

39 The travel broker saw their role as: performing market analyses to find the right
40 customers and travel service providers; procuring and selling trips in specially adapted and
41 packaged travel offers; and developing or procuring the software necessary to support the
42 broker service. They expected that accomplishing these tasks would require a close
43 collaboration with the travel service providers and good relations with key public actors and
44 agencies to facilitate the establishment of the company after the FOT. They also expected to
45 be able to utilize currently available ICT platforms and transport services, where the broker
46 would essentially just function as a “uniter” of readily available services.

47 The company expected to earn revenue based on travel service margins, i.e. by taking
48 a percentage of the transactions between customer and travel service provider (like a credit
49 card company), made possible by getting cheaper prices by pre-paying trips in bulk. This
50 would require that they could handle the business in an efficient manner and with added value

1 to the customer so that they would be prepared to pay in advance. Other revenue streams
2 included interest on money generated by the pre-paid trips, possibilities for franchising fees,
3 and add-on services for businesses.

4
5 **4.1.2.2 The Travel Service Providers' Expectations** The motives behind the collaboration
6 from the transport service providers' side were that they hoped to expand their customer base
7 in a new direction, increasing their marginal revenue. Collaborating with UbiGo would
8 hopefully mean larger business volumes, with UbiGo acting as one of their "business clients",
9 and increased capacity utilization. The recruitment of new customers through UbiGo also
10 meant that these customers were tied to using their services, as they were the only travel
11 provider of that kind available through the UbiGo service.

12 *4.1.3 Societal Expectations*

13 From the societal point of view, an important reason to get involved in and support this
14 project (particularly the local government and regional development council) was the hope
15 that this kind of service would contribute to the Swedish national and local societal goals of a
16 reduction in the number of privately owned cars in the city, an increase the use of shared
17 resources, a reduction in environmental impacts of transportation, etc. The short- and long-
18 term expectations were that a reduced number of privately owned cars would reduce
19 congestion, open up areas (now used for parking) for other types of land use (such as parks or
20 housing), and ultimately help reduce the environmental impact of the city, both globally via
21 reduced greenhouses gases and locally through less air pollution and noise. Furthermore,
22 economic support was provided with the additional expectation that the project would result
23 in a new, "green" business, contributing to more sustainable development (27-33).

24 **4.2 Matches and Mismatches during the Field Operational Test**

25 An overview of the matches and mismatches (Section 4.2) as well as the gaps in service
26 (Section 4.3), is provided in Table 2.

27 *4.2.1 Matches: Where Expectations and Experiences Proved Mutually Beneficial*

28 UbiGo's integration of travel services into a "transportation smorgasbord" with households as
29 customers has been perceived as an added value by the participants, for which they were
30 willing to pay. Participants felt that they had more transportation alternatives available to
31 them (5.44 of 7, AQ) and that it became easier to pay for their travel and keep track of their
32 transportation expenditures (5.74 of 7, AQ). This match between UbiGo and its customers
33 also resulted in more customers to the service providers and a move towards sharing
34 resources.

35 UbiGo also became a platform for testing new offers, such as expanded public
36 transport zones and daily tickets, which the participants greatly appreciated. This meant that
37 the participants often had better alternatives or prices than they normally would, which gave
38 UbiGo a competitive advantage and encouraged a modal shift away from private car use.

39 There was also a match regarding the move away from private car ownership, as
40 related to access to a modern, maintained, varied car fleet (via carsharing and car rentals).
41 Participants rated their use of carsharing and rental services as more frequent than before
42 (5.21 and 4.16 of 7, respectively, AQ) and their attitudes towards these services as more
43 positive than before (5.18 and 4.26 of 7, respectively, AQ). They also rated their use of a
44 private car as less frequent than before (2.92 of 7, AQ) and their attitude towards private car
45 became less positive (3.71 of 7, AQ). As described in Section 4.1.1, some of the participants
46 stated that they either sold their cars before the FOT started, or that they considered it during
47 the FOT, or that they were exploring if UbiGo was an alternative to a car purchase. Thus,
48
49
50

1 there is potential for an integrated mobility service like UbiGo to provide the right conditions
2 for reduction of private car ownership. UbiGo benefits as well as this becomes a Unique
3 Selling Point (USP), which also offers access to a range of modern vehicles to users, who can
4 adapt the car to the needs of the trip. As a result, the car service providers gain customers and
5 society sees movement towards general societal goals of reduced private car ownership and
6 reduced emissions, where even more progress could be made with increased availability of
7 electric vehicles in the carsharing and rental fleets.

8 Perhaps a less expected match was the increase in pre-trip planning. This was one of
9 the travel behaviors that participants rated as having changed the most (34.4% stated this had
10 changed, while only 2.9% stated that they were dissatisfied with the changes in their travel
11 behavior, AQ). Participants also agreed that their travel planning had become more effective
12 (4.79 of 7, AQ). Interview results revealed that participants felt that they had gained insight
13 into and a better overview of their travel behavior due to the FOT and the necessity of
14 deciding their monthly subscription. Through this, UbiGo benefits as a more accurate
15 subscription means less back office administration (top-ups and rollover), while society
16 benefits as individuals and households gain awareness of their travel behavior.

17 4.2.2 Mismatches: Where Expectations and Experiences Failed to Meet

18 The first type of mismatch relates to behavioral changes. In the “after” questionnaire, a
19 majority of participants (64.4%) stated that they had experienced changes in their travel
20 behavior during the FOT, with the most common being changes in transport mode (42.5%).
21 Participants also stated that they became more satisfied with their travel (5.13 of 7). As
22 described earlier, participants also used private car less often, but it turned out, because the
23 targeted group (inner city) had such good access to public transport, there was even less car
24 use than anyone, even the participants themselves, had expected. UbiGo found that
25 participants purchased credit for approximately 30% more car hours than utilized, leading to a
26 lowering of subscriptions and/or refunded credit at the end of the FOT. Although the
27 participants were highly satisfied, and lower car use is a Swedish societal goal, this lower
28 revenue is not beneficial to UbiGo from the profit-driven company-perspective; and whether a
29 particular service provider gains or loses also depends on the behavioral changes and modal
30 shift.
31

32 Other mismatches relate to aspects of the current basic structure of the UbiGo service.
33 First, that public transport is the core UbiGo service is positive for customers as a necessary,
34 basic service, and for society as it is a Swedish national and local societal goal to increase
35 public transport use. However, because of the way public transport is subsidized by taxes, it
36 is not possible to for UbiGo to benefit from volume purchasing, and since customers would
37 not buy the service if public transport within UbiGo were more expensive than it is normally,
38 it is difficult for UbiGo to make any profit based on public transport. It is unclear if the
39 public transport core is a gain or loss for the other service providers (likely depending on the
40 degree of competition with public transport for a specific, individual trip). Second, the
41 service providers act as a type of “subcontractor”, which is beneficial to customers due to the
42 centralized access to multiple providers, and beneficial to UbiGo as it means a range of
43 services to the customers as well as more UbiGo brand exposure. Service providers also gain
44 customers, but they lose brand exposure as they are “under” UbiGo. Third, that the providers
45 are exclusive within UbiGo was unpopular with the participants, who wanted multiple
46 providers of the same service to choose between (taxi, carsharing, rentals). This desire for
47 change is a disadvantage for UbiGo when the customers see lower rates, higher quality, or
48 greater accessibility in external service providers, although having exclusive providers means
49 an advantage in negotiations as those who become UbiGo providers will have near exclusive
50 access to their customers. The providers benefit from the lack of competition, although

1 society as a whole likely does not benefit as it makes UbiGo less attractive than it could be to
2 customers. Fourth, UbiGo is treated as a “business client” of the service providers. While this
3 is convenient for the service providers as UbiGo then fits into their current business models,
4 business needs do not always match the private needs of the UbiGo customers, which could
5 be a problem for UbiGo if it leads to customer dissatisfaction.

6 A third category of mismatches is related to the business model of UbiGo. First, that
7 UbiGo has a minimum, pre-paid subscription means that UbiGo gets income in advance of
8 trip utilization, which gives UbiGo negotiating power with the service providers, while
9 guaranteeing business for the service providers. However, the participants found paying their
10 subscription in advance to be less flexible than they would have preferred, not only regarding
11 the content of the subscription (days of public transport and hours of car use), but also
12 regarding monthly expenditure that may exceed necessity. The minimum subscription price
13 also potentially excludes certain types of customers, e.g. single-person and low-income
14 households with travel expenditures lower than the minimum subscription price, as such
15 persons would need to team up with other persons under one subscription. Second, that
16 UbiGo works with volume purchasing from the UbiGo service providers is a double-edged
17 sword. Often, this is an advantage with greater negotiating power on the part of UbiGo, with
18 service providers gaining a big customer (UbiGo), and with lower prices to the UbiGo
19 customers. However, it is not always the case that volume purchasing leads to the cheapest
20 prices on the overall market. In these cases, customers will purchase trips outside UbiGo, and
21 UbiGo and the internal service providers will lose trips and revenue.

22 The fourth type of identified mismatches is related to the back office. First, that
23 UbiGo provided a centralized customer service that not only managed the subscriptions,
24 various pricing schemes, etc., but also provided support has been greatly appreciated by the
25 participants. Having only one number to call is convenient. The participants also highly
26 trusted UbiGo to solve any problems that might occur (6.16 of 7, AQ). Although this created
27 added value, which is positive for UbiGo, it also meant more work. However, the service
28 providers gained from less work. Second, the integration of multiple travel services under
29 one UbiGo interface was very convenient for participants. However, the expectation of
30 “easily” uniting already available travel services (more precisely their software and
31 information systems) proved to be much more work than expected. This extra work was
32 mainly for UbiGo and the project partners in charge of ICT development (integrating multiple
33 software and information systems as well as keeping up with updates and developments from
34 the providers as well as from Google and Facebook), but also for the service providers
35 themselves who needed to keep UbiGo informed in a timely manner, which required close
36 collaboration with key contact persons within the providers’ organizations.

37 Finally, the technological aspect of UbiGo as a smartphone-based service was mostly
38 positive, but the participants felt several issues needed to be addressed, including the design
39 of the app. On the one hand, participants found it convenient to have “everything” in the
40 smartphone, with the bonus of it being easy to remember; “I can forget my public transport
41 card, but I cannot forget my phone”. On the other hand, there were issues with battery life,
42 the necessity of network access, and the ability to show that one had a valid ticket to a ticket
43 controller. From UbiGo’s perspective, the smartphone gave an added flair of trendiness and
44 innovativeness, while from society’s perspective it is not beneficial to exclude those without a
45 smartphone from becoming a UbiGo customer.

46 **4.3 Gaps in Service during the Field Operational Test**

47 Based on the participants’ experiences, there appears to be a gap in the UbiGo market, where
48 some types of trips are neither possible to cover by public transport (due to distance or
49 location), nor possible to cover by carsharing or car rental (due to the activity time, i.e. too
50

1 long for carsharing or too short for car rental to justify the expense under the current pricing
2 schemes). They fall somewhere in between. These include trips to one's summer house, but
3 mostly day trips to golf courses, riding schools, friends and family in remote places, or the
4 beach or other nature areas. This lack of trip coverage is not good for any of the stakeholder
5 groups: not for service providers because they are not able to provide the service customers
6 are willing to pay for; not for UbiGo as they will lose this trip revenue; not good for
7 customers who cannot perform desired trips; and not good for society if these types of trips
8 still require the use of privately owned cars.

9 Another identified gap is in the placement and number of carsharing sites. The need
10 for a car – for the kind of travel suitable for carsharing, such as running errands – is greater in
11 the areas outside of the inner city where there are few or no carsharing sites. These are areas
12 where commuting can be done by public transport, but errands such as shopping and trips to
13 accompany or collect somebody else are harder to perform. The lack of carsharing is due to
14 that these areas are primarily residential, and the carsharing provider judges that the capacity
15 utilization would be too uneven – low during daytime, and possibly too high during evenings
16 and weekends – for the placement of vehicles in these areas to be profitable. However,
17 without carsharing available, such as in the inner city, it will be difficult to reduce private car
18 ownership. Having a carsharing site nearby was identified as a critical factor for the UbiGo
19 service (see Section 4.1.1). This lack of carsharing coverage is again negative for customers
20 who cannot perform desired trips, for UbiGo due to lost revenue, and for society due to higher
21 private car ownership. Although the carsharing company may argue that this is positive
22 within their current business model, it is negative for other providers as they likely lose
23 customers due to private car use. Expansion of the carsharing system, which depends both on
24 the carsharing company, but also on public policy (e.g., parking permits and policies (34),
25 taxation (35)), will be vital to expanding UbiGo's customer base, particularly in areas other
26 than the inner city.

27 Similar observations can be made regarding the bikesharing system, although the
28 impact of owning a private bicycle is negligible compared to that of a private car. The
29 bikesharing sites are only located in the inner city, thus targeting tourists, those who both live
30 and work in the inner city, or inner city errand trips. Thus it is still often necessary for local
31 residents to complement the bikesharing system with a private bicycle for e.g. commutes from
32 outside the inner city or for longer trips in distance or time.

33 Likewise must public transport infrastructure be accessible (with appropriate levels of
34 service) as it is generally one of the primary alternatives for work and school commutes and
35 specifically the core of the UbiGo service. In such areas where there are perceived or real
36 gaps in public transport service, perhaps other types of schemes to lower private car
37 ownership (or use) will be more appropriate, such as local ridesharing.

38 39 **5. CONCLUDING REMARKS**

40 The importance of involving public and private actors to create the integrated solutions is,
41 according to, for instance, Arthur D. Little's report "The Future of Urban Mobility" (1),
42 needed in order to address the challenges associated with future urban mobility. This paper
43 has described experiences from a field operational test of a new travel broker service for
44 everyday travels. The service integrates both public and private solutions into a new type of
45 "collective transport", hereby contributing to societal goals for a reduction of private car use
46 and ownership.

47 It is argued that prerequisites for the successful implementation of this kind of new
48 transport service are consideration of (at least) three perspectives: the transport service's
49 customers representing the user perspective; the transport broker and the service providers
50 representing the commercial perspective; and societal perspective including "the city" and

1 “the region”.

2 The analysis (see Table 2) has identified a number of aspects where “matches” as well
3 as “mismatches” exist between the three perspectives. Some of the mismatches can be
4 attributed the fact that the UbiGo service was a test, but the trial highlighted some important
5 barriers to integrated solutions; for example the respective business models of individual
6 service providers which do not necessarily fit the scope of a transport service broker. Present
7 business models also present some of the identified gaps. It is crucial for the notion of sharing
8 resources to have easy access to both public transport and carsharing. The customers cannot
9 have too far to go to access a car, particularly for encumbered trips with children or shopping.
10 This is a prerequisite for customers to be able to manage without a private car, and, thus, a
11 decisive factor if the customer base is to expand, particularly outside the inner city. Hence,
12 integration of services requires new and integrated business models.

13 There is an important match between the customers’ need for accessibility to cars and
14 the service provider’s offer of cars in terms of carsharing or rental cars. However there is also
15 a mismatch between society’s, and partially the customers’, goal to reduce car use in general,
16 and the fact that the travel broker can really only make a profit when the customers use
17 carsharing or car rentals. As long as public transport is partly subsidized through taxes, it will
18 be hard for a travel broker to purchase such trips for less than what the individual traveler can
19 with a monthly or yearly pass. This issue will be one of the challenges associated with
20 integrating public and private transport service. There is a further challenge in the fact that
21 public transport is the core of the integrated service. A transport broker, such as UbiGo, must
22 build close collaboration with the local government authorities in charge of public transport as
23 well as with public transport providers. The broker service challenges the public transport
24 organization’s own attempts to develop as a brand and build contact with their customers, as a
25 broker manages customer relations with public transport as a “subcontractor” like any other.
26 Therefore, cooperation in order to create integrated solutions will become a question of policy
27 for the public actors, versus a primarily commercial question for the private sector service
28 providers. The support from the top management of the “city” and/or “region” is no doubt
29 critical for achieving a sustainable solution.

30 Further work includes a follow-up with the FOT participants regarding their post-
31 UbiGo travel behavior. Regarding the future of the UbiGo service, a formal company has
32 been established and the service is planned to be re-launched after some revamping of e.g. the
33 app and the back office system.

34

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1 **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 19% use private vehicle at least 3-5 times/week 35% are SF members	Subscribed for 904 hours/month Utilized 620 subscription hours/month* 1% use SF at least 3-5 times/week 0% use HZ at least 3-5 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

1 **TABLE 2 Identified Matches, Mismatches, and Gaps by Stakeholder Perspective**

Aspect	Stakeholder Perspective			
	User	UbiGo Service Broker	Service Provider	Society
Matches				
Smorgasbord of transportation alternatives	+ more choices	+ unique selling point (USP)	+ gain customers	+ shared resources
Testing new types of offers	+ often better prices/choices	+ competitive advantage	+ testing ground	+ modal shift
Access to a modern, varied car fleet	+ variation, quality, adaptability	+ range to customer		+ reduced emissions
Potential to reduce private car ownership	+ reduced costs	+ USP	+ gain customers	+ societal goal
Increased pre-trip planning	+ overview, insight	+ efficiency		+ awareness
Modal shift and behavioral changes	+ satisfaction	+/- depending on direction of shift	+/- depending on direction of shift	+/- depending on direction of shift
Less car use than expected	+ satisfaction	- lower revenue	+/- dep. on provider	+ societal goal
Public transport as core UbiGo service	+ necessary basic service	- no profitability	+/- dep. on provider	+ societal goal
Providers as UbiGo “subcontractors”	+ centralized access	+ range to customer, more brand exposure	+ gain customers - less brand exposure	
Exclusive providers	- fixed choices	+ negotiation advantage - less customer satisfaction	+ no competition within UbiGo	- no competition within UbiGo
UbiGo a “business client” of the providers	- business needs do not always match private needs	- less customer satisfaction	+ fits into current business model	
Minimum, pre-paid subscription	- less flexible, expenditure may exceed use	+ revenue in advance, negotiating power - potentially excluding	+ guaranteed business	- excludes certain types of customers
Volume purchasing	+ often lower prices	+ negotiating power	+ gain big customer	
↳ Fixed price not always the cheapest	↳ - go outside UbiGo	↳ - fewer UbiGo trips	↳ - lose some trips	
Centralized customer service	+ convenient	+ creates added value - more work	+ less work	
Integration of multiple systems	+ convenient	+ creates added value - more work	- more work	
Smartphone-based service	+ convenient, easy to remember - battery, internet, ticket control	+ trendy and innovative		- excludes those without smartphones
Trip gap (some types of trips not feasible)	- missed trip/activity	- lower revenue	- lower revenue	- restricted mobility
Placement and number of carsharing sites (and bikesharing sites)	- not universally accessible	- fewer customers	+/- dep. on provider	- more private car ownership/use
Access to public transportation infrastructure	- not universally accessible	- fewer customers	+/- dep. on provider	- more private car ownership/use
Gaps				
Mismatches				