



Deliverable D1.3

Successful strategies and tools for behaviour change



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Executive Summary

The aim of this deliverable is to inform the IMOVE MaaS trials of available behaviour change strategies, and the ways in which they can be incorporated into the pilot trial designs demonstrated by the Living Labs.

The report highlights the importance in understanding the target demographic in order to achieve success. It also draws attention to the fact that motivations to use a service may change over time, therefore it is important to be aware of this to maintain user interest and usage.

The report gives a review of successful strategies and tools for behaviour change, including:

- Rewards, points and discounts – which are beneficial in engaging users on a short-term basis, but need to be more carefully defined in order to maintain users' interest over a longer term;
- Prizes – which are also beneficial in the short term, however they can suffer from user boredom if the user perceives they are unlikely to win a prize;
- Games and competitions – these are positive at gaining users' interest and engagement over a longer time period, as they strive to beat their colleagues or their own best score, and can also be used to engage larger groups such as schools and communities;
- Free trials – these are most effective when offered during change points in users' lives, to help them create new habits, otherwise, they tend to revert back to previous behaviours once the incentive is removed;
- Nudges – these highlight the importance of considering the situation in which a choice is made.

The document then informs about how these behaviour change strategies have been customised in the context of the IMOVE Living Labs that decided to include them as part of the trial activities, which measures have been adopted and describes some feedback and notable facts about this process.

Abbreviations and Acronyms

API	Application Programming Interface
BoB	Biljett och Betal – translated as ‘Tickets and Payments’
B2B	Business to Business
B2C	Business to Consumer
CO2	Carbon Dioxide
ICT	Information Communication Technology
IRIMS	The Institutional Frameworks for Integrated Mobility Services in Future Cities project
LVM	Finland’s Transport Ministry
MaaS	Mobility as a Service
PTA	Public Transport Authority
PTO	Public Transport Operator
R&I	Research and Innovation
WP	Work Package

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1 INTRODUCTION

The overall aim of the IMOVE project is concerned with delivering large scale user access to combined mobility through a European Mobility-as-a-Service network. Specifically:

- To accelerate the development to full interoperability;
- To overcome the barriers to achieving the necessary scalability;
- To pave the way to a European wide roaming functionality.

Part of Work Package 1 of the IMOVE project is concerned with understanding how to unlock “scalability”, including the human factors involved in encouraging a wider adoption of a MaaS initiative. This comprises the various behavioural change aspects that influence the uptake of MaaS services to promote sustainable travel behaviours.

This report falls under Task 1.3 in Work Package 1 of the project, focusing on “enabling factors” of sustainable travel behaviour. This report explores how strategies and tools such as business model design, incentive schemes, gamification, and pricing models have contributed and can continue to contribute towards the take-up, success and viability of sustainable mobility initiatives for behaviour change, including Mobility-as-a-Service (MaaS), and their influence in promoting, and maintaining, more sustainable mobility behaviours.

It also provides an overview of the behavioural change tools and strategies implemented by the five IMOVE Living Labs (located in Berlin, Gothenburg, Madrid, Manchester and Turin) through their MaaS trials.

Successful change in behaviour results from an understanding of the target group and their wants and needs in terms of their mobility. People have different attitudes and values towards their mobility, and these influence the choices that people make, such as mode of travel, route taken, and at what price they wish to purchase their mobility. Attitudes towards mobility have changed dramatically in the last decade – to the extent to which they are disrupting every mobility market. By targeting these changing values and customer wants and needs, greater success in behaviour change can be achieved.

In this context, a “successful” behaviour change measure would be classified as one that achieves what it set out to achieve – whether that might be modal shift towards more sustainable modes in general, increased use of a particular mode, or even increased awareness or use of a new mobility product or service.

One significant development in recent years is a shift in thinking by the younger generations in particular; they are approaching mobility in a new way, moving towards a more digital society, and acting against long-held travel assumptions (e.g. the shortest or fastest route or mode will be chosen). A record number of teenagers are giving up on the idea of learning to drive, figures show. The number of 17-year-olds taking driving tests fell by 100,000 over the last decade – and there was a 20% drop in under-25s learning to drive over the same period [1].

There is increasing interest in more sustainable and shared modes of transport, and by understanding the reasons behind why some schemes may appear more successful than others, i.e. which behaviour change measures elicited the most success in a certain circumstance, key elements can be transferred to other schemes, thus boosting the success rates of successive schemes. For example, particular elements such as incentives, gamification and nudging have shown great promise in changing the behaviour of users, and encouraging them to try and even sustain new behaviours. In combination with an increasing awareness and concern towards climate change, this will further influence people’s mobility choices over the coming years.

Encouraging people to change behaviour is not only about providing the right alternative or giving the right nudge at the right time. It is also important to consider the **stage of change** that is being targeted – are you aiming to increase the number of first-time users (e.g. awareness, attraction, testing), or are you trying to get first-time users to become long-term users or to maintain usage levels of existing users (e.g. adoption, continued use, retention)? A common issue is based on the assumption that both new and existing users will be motivated by the same elements to continue using the service – a “user will use it once, be hooked, and continue using the service” mentality. However, in reality, behaviour change is a **process** and an initial decision to try a service and a decision to put continued effort into use of the service take place at different points in that process, and therefore are influenced by different factors. Furthermore, using a new service once is unlikely to impact a user’s lifestyle much; however, to adopt the service and continue to use it, this requires old habits to be broken and new habits to form which incorporate the new behaviour – a process that takes time and effort, and during which one can easily relapse into old habits.

Encouraging a shift in mobility behaviour is not an easy task, as it involves asking individuals to change their lifestyle and their habits. Many individuals’ mobility behaviours are determined or constrained by the household and are therefore not solely dependent on the desires of the individual. Mobility behaviours are also associated with personal identity and thus mobility behaviour is not a string of logical decisions but rather a reflection of history, cultural inheritance and personal values.

Therefore, in order to achieve behavioural changes or modal shift, it is crucial to place a higher focus on the people you are targeting. By ignoring these human factors, even the best strategy or tool is likely to miss its target group, through the wrong incentive or nudge, the wrong timing, the wrong people targeted, or the removal of an incentive before new habits have formed.

Below, an insight into a variety of behaviour change strategies and tools that have been used to try to elicit and maintain behavioural changes in different contexts is provided.

2 BEST PRACTICE STRATEGIES FOR ACHIEVING BEHAVIOUR CHANGE

To achieve mobility behaviour change, it is important to **target the right people, at the right time, with the right measures**. Different people will be enticed to change behaviour by different types of measure. This is because different demographics will have different values and attitudes towards their mobility, and therefore will respond differently. Five types of measures are explained in the following sections:

- Rewards, points and discounts
- Prizes
- Games and competitions
- Free trials
- Nudges

An “**incentive**” can be defined as anything “*that motivates or encourages someone to do something*”. By this definition, incentive schemes could also include **gamification** schemes, which are defined as “*the application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity, typically...to encourage engagement with a product or service*”.

By using incentive or gamification elements, this can increase the attractiveness of a service to different target groups (especially if a variety of incentives are offered) and hold their attention over a longer time. However, just implementing an incentive scheme without an understanding of the target population, or an appreciation of the local context, is unlikely to result in the maximum impact that could have been achieved; it is important to offer incentives that are salient or desirable to the target population. It is about **targeting the right measures to the right people at the right time with the right incentives**.

In addition to the type of behaviour change technique used, the **stage of change** that people have reached will also have a large influence into whether people adopt the new behaviour you are encouraging. Stages of change refer to how **ready** and **willing** people are to change their behaviour.

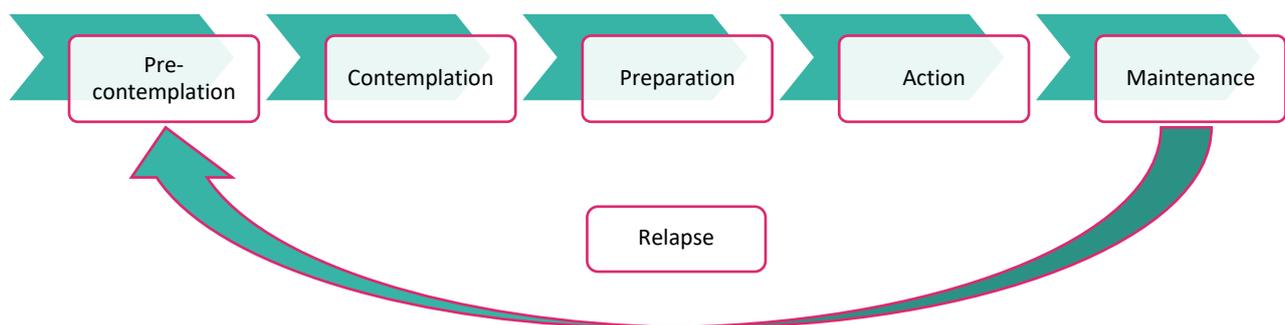


Figure 1 – The stages of change model (Prochaska & DiClemente, 1983)

The Stages of Change Model proposed by Prochaska et al. [2][3][4] describes five stages that people go through on their way to change. These stages follow the process of someone having no interest in changing their behaviour (no = **pre-contemplation**), beginning to contemplate changing their behaviour (maybe = **contemplation**), starting to prepare to change behaviour (prepare/plan = **preparation**), starting a new behaviour (do = **action**), and maintaining the new behaviour (keep going = **maintenance**). This model also incorporates **relapse** of the new behaviour, where the individual will revert back to the pre-contemplation phase

after stopping the new behaviour. Poor maintenance of the new behaviour, or lack of support in maintaining the behaviour, may lead to increased likelihood of relapse of the behaviour.

The “action” and “maintenance” stages are of particular importance in mobility behaviour change, because the **process** of initiating versus maintaining a behaviour is very different (making the initial decision compared to the continued effort). Initial attraction or willingness to try a new behaviour may be enough to encourage a shift into the “action” phase, but it is important not to assume that someone will continue a behaviour just because they have started doing it. In reality, creating new habits and breaking old ones is incredibly difficult, and there is a high likelihood of relapse during this time.

A similar process to the stages of change is the buyer decision process by Armstrong, Adam, Denize, & Kotler (2014) [5]. This process refers to the same stages as the stages of change model, however it also contains information on the specific buying behaviour of a consumer at each stage, which, as previously stated, requires different strategies for targeting consumers in different stages. In this sense, the purchase of a mobility service or adaption to a new mobility behaviour can be viewed as a complex purchase decision requiring application of the full methodology. Consumers tend to cycle through this process at differing rates (speeds), depending on the purchase being made, for example, the buyer decision process is very slow for a purchase of high complexity and high cost, i.e. purchase of a new car. Buyers of complex products or services spend time searching and analysing each alternative before making a purchase decision. For a less complex service such as a single trip with public transport or even a monthly pass on public transport (less complex due to less commitment time) the buyer decision process for mobility is iterated more quickly each time. This makes public transport users more susceptible to new solutions for their mobility needs. On the contrary, car owners generally have a long post-purchase behaviour with bias towards their decision due to high value depreciation and cost of operations. This means car owners are less susceptible to new solutions for their mobility needs since they have a high perceived financial loss associated with performing a new buyer’s decision process. Therefore, in the case of mobility behaviour change, the process of changing public transport behaviours can occur more frequently and at a higher rate compared to car owners’ behaviours, due to the post-purchase values involved.



Figure 2 – Buyer decision process (Armstrong, Adam, Denize, & Kotler, 2014)

A final point to mention is that of “**change points**”. These are specific points in people’s lives where they will be more “open” to new behaviours or mobility alternatives, when their existing behaviours are disrupted. Key change points include moving house, changing job, or having a baby – all these “life moments” cause significant change in an individual’s (or a household’s) life. If measures for behaviours change are targeted at this time and if done in the right manner, it can both ease the process of behaviour change and facilitate a lower chance of relapse.

The following chapters explore how successful different types of measures were in terms of encouraging uptake of a new behaviour, or keeping users engaged and maintaining use of a scheme.

2.1 REWARDS, POINTS AND DISCOUNTS

Rewards, points or discount schemes tend to follow the equation of “do “X” and receive “Y” reward/points”. Rewards and point schemes are increasingly common across many industries, in particular in groceries and retail – often referred to as “loyalty cards”. These schemes encourage users to return to a particular shop on multiple occasions to earn discounts (e.g. money off) or rewards (e.g. free coffee). They are highly successful, even though the returns to consumers are often small.

They are effective at encouraging users to sign up to schemes, however, many of them over time reduce the value of points for users (as the numbers of users increases and the scheme becomes more popular), making the schemes less attractive over time and users may stop using the schemes. It is important for the user to continue to see the value in collecting the points for them to stay motivated towards the scheme.

One increasing application is to encourage individuals to sign up to active health schemes – with the rewards being much more salient.

Vitality

Pay £99 upfront for Apple Watch Series 4 (RRP from £399), and pay nothing more if user remains active every month and tracks activity to earn Vitality points.
24 month contract, up to £12.50 a month if target not reached (*correct at time of writing November 2018*).

Virgin Active

Virgin Active gives points every time a member reaches 10,000 steps a day, or goes to the gym. If a certain number of points is met per week, the member is rewarded with a cinema voucher. Points can also be redeemed for Starbucks drinks etc.

The above examples from the UK are showing innovative ways to increase the activity levels of users, by incentivising with rewards that truly appeal to their audience. In terms of MaaS, this can relate to increasing active travel and promoting healthy lifestyles.

Mobility schemes are taking on board these types of approaches also. Many mobility schemes have been launched offering a variety of discounts and rewards to users, in exchange for users recording their activity or mode choices, or being tracked. These reward, retail discount and point collecting schemes for mobility have been shown to often have strong positive effects on travel behaviour, as well as providing important demand data about the users. However, these effects on behaviour are often short-term, and tend to subside as soon as the incentive is withdrawn. These schemes can be effective in attracting first-time users, but to maintain usage, most important is a sustainable business model that generates sufficient long term value for consumers.

Examples of schemes that use rewards, points and discounts to encourage changes in mobility behaviour have been outlined below. These include the BetterPoints reward programme (<https://www.betterpoints.uk/>), a smartphone application on which users log their activity to receive points, which can be redeemed as high street rewards or donated to charity. By tracking users, the app allows organisations to collate data to help local authorities/public health bodies to gather information and evidence to support transport planning and health activities. These kinds of schemes have



Figure 3 – BetterPoints app

been adopted in many locations around the UK and also tested in Italy, as referred to in the examples outlined below.

Bella Mossa – Bologna

Bella Mossa was a large-scale pilot programme in Northern Italy, to reduce the number of single-occupancy car journeys in the region.

The BetterPoints smartphone app senses which transport mode is being used for a journey, and users earn points according to the sustainability of the mode and the distance travelled. Users can compete against each other, and they are also offered discounts at 80 local stores in exchange for redeeming their points.

This 6-month campaign ran from April to September 2017, and following a big launch and support from the deputy mayor, resulted in a peak of 7,500 weekly users, with a total of 15,000 active users.



Figure 4 – Bella Mossa key data

In September 2017 it was awarded the European CIVITAS ‘bold measure’ award for its innovative approach to tackling air pollution. Bologna’s Deputy Mayor said Bella Mossa ‘has been one of the most effective tools to promote sustainable mobility in our city in an innovative, fun, and incentivizing way. Through Bella Mossa, the city of Bologna has been able to establish a very effective public-private partnership, involving public bodies, businesses and thousands of citizens in a great mobility game.’

70% of users reported that they had reduced their number of car trips, however, many users reported falling out of the new habit quickly. This highlights the success of this incentive in attracting new users, however, in order to maintain the behaviour, new incentives, or alternative measures, are required.

Bike Smart Reading – UK

BetterPoints delivered Bike Smart Reading as part of the EMPOWER project between March and July 2017 and was supported by Reading Borough Council. The aim was to incentivise cycling to help reduce traffic and air pollution in European cities.

616 users tracked their cycling, to earn points and for the chance to win prizes. Cyclists scanned QR codes along cycle routes to earn points. Points were also offered for attending cycle training sessions (e.g. the equivalent of £5 for attending a 2-hour session, or for referring friends to BikeSmart.

Users cycled a total of 332,000 miles (i.e. 13 times around the Earth!); saved 9 tonnes of CO²; and 65% of participants said the programme encouraged them to change their travel behaviour.

The above examples highlight the success that rewards and points-for-discounts schemes can be in encouraging users to try new behaviours. However, they also highlight the short-term nature of these changes, as is being found to be typical for many new apps (not just mobility), as interest wanes over time. Therefore, fully integrating the incentives app with a journey planning function therefore seems important, as well as any other functions that keep people coming back to the app, so that they remain exposed to the incentive options.

The Bonus System of the UbiGo/Go:smart Pilot, Gothenburg

The subscription model of the UbiGo pilot service in Gothenburg (Go:smart project 2013-2014) is well described in many reports, but less well known is the bonus system that was tested during the same pilot. One reason for this is that the results were far from being as positive as those for the service itself. This doesn't necessarily mean that a bonus system never works, rather it means that one should make sure it's made relevant and very easy to understand and use.

For every trip that was made, the system calculated how much CO² was saved compared to if the trip had been made by an average car.

Saved kilograms of CO² could then be converted into cinema tickets, entrance to leisure centres, museums or theatres; services like home delivery of groceries and audiobooks; and products such as backpacks and USB-memory sticks. All this was handled within the app, even if the physical tickets had to be collected in real life. Since the app didn't use position data, the lengths of trips were based on templates. Furthermore, trips made by private bike or by foot were not logged.

The evaluation, based on surveys and logged usage, shows that most users did not exploit the rewards offered by the bonus system, and those who did tended to do it at the very end of the pilot. Participants felt that if there was a bonus system, it should be tied to the service itself by giving transportation-related rewards, such as more car hours or public transportation tickets, rather than external rewards.

There is potential that through a combination of more marketing inside the app applying nudging, more attractive rewards, digital delivery of rewards, and more ways of collecting points (e.g. use of private bikes) the attitudes towards and usage of the bonus system could have been better. However, there are two very important messages to take away; 1) A bonus system is not the defining application of a MaaS service, it's the price

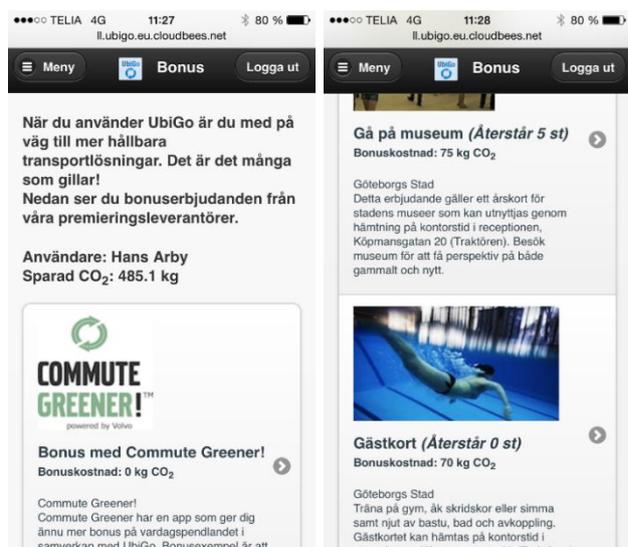


Figure 5 – Bonus System of the UbiGo/Go:smart Pilot

worthiness and the ease of use of the actual service; and 2) to be perceived as more effective, the rewards need to be part of the service itself or somehow related to the transport ecosystem.

EMPOWER

The EMPOWER project is an H2020 project that looked at how positive incentives can encourage citizens to reconsider their travel choices and reduce the extent to which they travel using conventionally fuelled vehicles in six Living Labs.

Gothenburg Living Lab focused on substituting longer commute car trips by Public Transport in two local communities, but the scope was broadened to the whole of Gothenburg later, and then also to Stockholm. The SMART-app was localised but used a reward system similar to the Enschede LL (see below). A wide variety of partners were involved in the Living Lab to support recruitment and incentive provision. Amongst those users accepting challenges in the app, a decrease of 29% in car kilometres was realised.

In Helsinki, the focus was strongly on the structures and processes needed to enable innovative collaboration with local stakeholders, and in particular with employers. The focus was on investigating existing collaborative relations and the obstacles to be overcome in order for implementation to take place. The experimental work involved a series of small scale tests with two employers. Furthermore, the overall interest in the subject led to a (self-organised) interest group on the topic of positive incentives in an employer setting.

Enschede LL focused on a reduction of car usage by stimulating a substitution of car trips with bicycle trips, using a series of challenges with points which could be converted to reward vouchers at local retailers. Monthly choice challenges resulted in a 10% reduction in car kilometres.

Manchester LL explored different business models around incentive provision by the local bus operator. The complexity of the decision-making process in a large organisation with semi-autonomous regional sub-groups highlighted the challenges to implementation in practice.

Milton Keynes LL focused on schemes to encourage cycling and use of the electric bus on Route 7. Using the Love to Ride and *zwitch app, two schemes were implemented where vouchers for local shops were the reward presented to users. The campaigns reached over 70 organisations and 888 registered users, resulting in 163 new cycle riders and 6443 bike trips.

Scotland LL focused on longer-term decision-making around private vehicle purchasing decisions and a change to Ultra-Low Emission Vehicles. Information and financial incentives were provided to participants using several dedicated web tools with employers as a proxy-organisation. The campaign Switched on @ Work increased the intention to purchase a ULEV within the next four years by 14% and decreased the number of people who did not decide because of a lack of information by 10%.

These Living Labs have now completed their trials, and the project will soon publish a report with some of the conclusions, including features such as traffic information, statistics and basic incentive schemes attract users but don't change behaviour; that proof-of-concept, trustworthy partners, easy-to-understand concepts and added value is important for the uptake of new mobility services; and that **personalisation of incentives** is a key aspect in the effectiveness of incentives.

2.2 PRIZES (COMPETITIONS AND PRIZE DRAWS)

Although reward, point and discount schemes are effective at attracting new users, often the rewards are fairly small. Prize draws and competitions therefore encourage users to change their behaviour by **“doing “X” to have a chance of winning “Y”**”, usually involving the opportunity to win more substantial prizes. Even though there is no certainty of receiving anything, they are still effective at enticing new users to register. These schemes are also effective at encouraging users to sign up, but in the same way as rewards and points schemes, users can lose interest over time if they don’t win something.

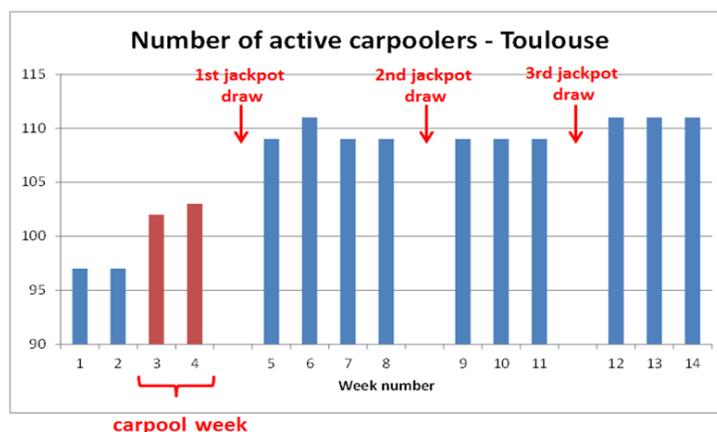
These schemes can be insightful as different demographics appear to value different forms of prizes. For example, more wealthy individuals tend not to be as motivated to take part for technological prizes, as they can already afford them if they wished to own one, however they are more motivated by experience prizes. The opposite tends to be true for lower-income individuals. There are also differences in how different generations respond to different prizes.

CHUMS project (Changing Habits for Urban Mobility Solutions) – Toulouse

Incentive used: *maintaining active carpoolers through monthly prizes*

By using monthly prize draws and an active promotional campaign, the number of active carpoolers at Toulouse Business Park increased during the promotional carpool week from 97 to 103 (+6%). These increased levels were then maintained thanks to the continued prize draws for employees of the site, further increasing from 103 to 111 active carpoolers (+7%).

The distance carpoled during the promotional period increased from 19,500km to 22,000km per week. An 11% increase.



Number of registered carpool members at Toulouse, source: carpool software SMTC-Tisséo

Figure 6 – Number of active carpoolers in Toulouse (CHUMS project)

Key lessons learned: the CHUMS project showed that younger people are by far the best audience for carpooling. In the Toulouse site, 72% of 18-29 year olds would consider carpooling, compared to just 47% of 50-59 year olds. This finding was replicated in other CHUMS sites during the project. The chance to share a space with new people to get to know them was a positive reason for younger people, but a negative barrier for older people.

Providing a “guaranteed ride home” service was also important in the success of the scheme – this ensures that a company car or taxi is provided in the instance that the carpoolers driver is unavailable due to unforeseen circumstances.

The CHUMS project also highlighted that different population groups respond differently to different incentives or rewards – at the Toulouse site, the prize of a meal for two at a high-end restaurant was highly desirable, whereas in other sites, employees were more attracted by technology rewards, such as iPads. This shows the importance of understanding your audience. Alternatively, offering a choice of prizes can be a suitable way of appealing to multiple demographics.

2.3 GAMES AND COMPETITIONS (PEER-TO-PEER COMPETITION, APPS)

Gamification has become immensely popular in alternative contexts in recent years, including in mobility. Gamification introduces the element of competing with others around you, whether they are friends, colleagues, or others at your school or university. These games have the means to motivate people – whether on an individual level or a workplace or school level.

Although gamification has proven popular and effective at engaging populations to increase active travel and take up of more sustainable travel, there is a concern that these are often reliant on portable personal technology (such as smartphones) and therefore exclude population groups such as the elderly or the very young. By focusing too much on a smartphone app, they can also be criticised for failing to engage communities, which are important in behaviour change and the psychology of why and how people do things.

The following examples have been very successful at engaging people on a community level, and changing mobility behaviours – and without relying on smartphones to do so. Beat the Street is one such example that is inclusive to everyone. It was shown to be effective at reducing inactivity and encouraging active travel.

Beat the Street (part of the SWITCH project)

Using technology and gamification to engage a whole population in active travel

Beat the Street turns a town into a giant game where people earn points as they walk, cycle and run. Members use “Beat the Street” cards, and tap “Beat Boxes” around the community.

It is unique in the gamification world due to its very high engagement rates – in some towns, over 30% of the local population took part.

In 2015, approximately **175,000 people in 21 areas of the UK participated**, representing an average of 14% of the population. Participants travelled over 2.4 million km! In 2016, 300,000 people took part, and in August 2018, **845,000 people had taken part worldwide**.

Key success factor: Beat the Street helps to introduce and reinforce new social norms towards more sustainable travel, including active travel. Beat the Street also does not rely on the use of the smartphone,



Figure 7 – Beat the Street communication campaign

making it ideal to engage the younger and older populations. Further, by engaging school communities, you get instant access to very large communities of children, their parents, and their wider families.

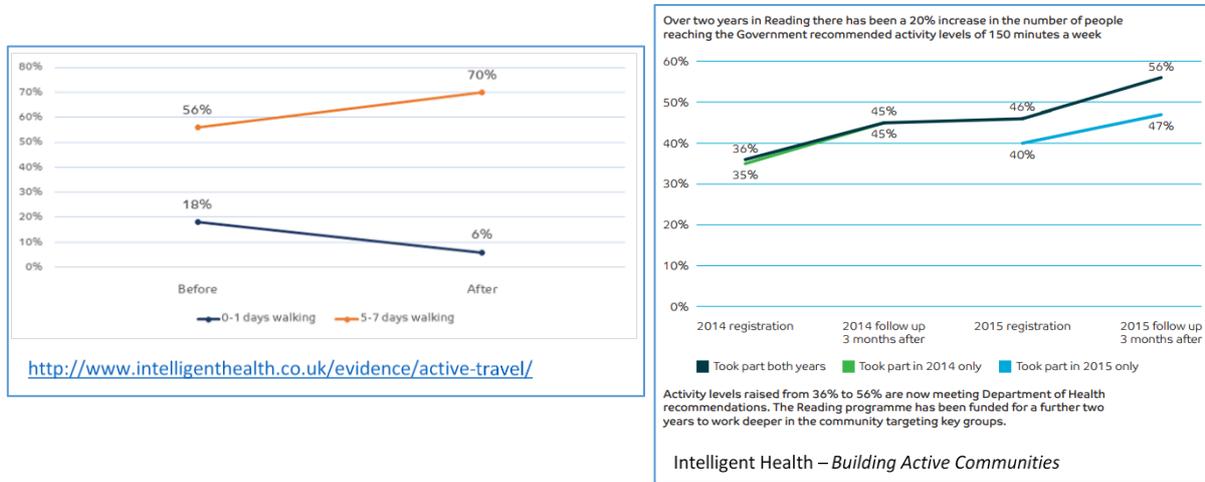


Figure 8 – Intelligent Health data

Beat the Street for example targets the whole community – circa 80,000 people in some communities. Only a fraction of these will keep the change up in the long term, but even this fractional change has a significant impact on public health and congestion in particular areas.

Traffic Snake Game

The Traffic Snake Game© is a campaign to promote walking and cycling to school for children aged 4-12 and their parents and teachers. It was created by Mobiel 21 and started out as a small campaign with only a handful of schools in Flanders, Belgium. However, over the years the number of European countries interested in playing the game has increased. Evidence has shown that the campaign increases the use of sustainable transport modes and reduces CO² emissions. As of November 2015 (6 months after the launch), 19 countries had signed up to play the game and taken advantage of this successful strategy which encourages parents and children alike to try alternatives to the car for home to school trips. The Traffic Snake Game Network has been established to share the experiences of the game with more cities and schools across Europe and beyond. This network disseminates the campaign, extends its impact and publicises the results and experiences that keep the award-winning campaign alive.

The project was awarded the Sustainable Energy Europe Award in the category ‘Promotional, Communication and Educational Actions’.

The above examples show that even without technology, high levels of engagement can be achieved, across entire communities. Gamification can also be used to increase awareness of behaviours that people may not actively think about – people don’t have to compete against others, even beating their best score can be motivating.

Glass of Water app – Toyota

The Glass of Water app was created by Toyota to encourage eco-driving. The aim was to reduce fuel consumption by 10%. As you drive, if you drive “inefficiently”, such as heavy braking or accelerating, water spills out of the glass. In order to spill as little water as possible, drivers must drive efficiently and gently. This encourages drivers to drive efficiently, and to drive better than they have done before – competing against themselves. This results in cost savings for the driver, but also in less emissions into the environment and less fuel used.



Figure 9 – Toyota - Glass of water app

Pokémon Go

All of the previously mentioned gamification and award strategies have been successful in increasing active or more sustainable behaviour (at least in the short term). An interesting gamification effect was that of the AR (augmented reality) game Pokémon Go. Bringing the classic game out in a reality context brought global spread in record time. The game holds the world record for the most downloaded game within one month (130 million downloads). A study performed only in the United States showed increased physical activity (thus mobility) of 25% compared to previous activity levels (Althoff, White & Horvitz, 2016 [6]). The same study also showed an increase among low-activity populations. It was not mapped how much of the new mobility was the same mobility as was needed prior to the game being available, but the point being made here is the effect that Pokémon Go has had in terms of gamification of “moving” and its long term sustainable business model. This game was not designed for a short term campaign but to generate profit by fulfilling user needs. It is estimated that three years after the launch the game still has more than a 100 million users worldwide.

Another unforeseen benefit of Pokémon Go was the effect it had for people with certain mental health disorders. It was found that feelings of depression and anxiety were reduced among those who played Pokémon Go, possibly because of the increased time spent outside and the gamification component.

2.4 FREE TRIALS

There is evidence to support a strong effect of providing free travel passes on changing travel behaviour. This can be most effective when provided at a “**life change moment**” – when an individual is going through a change in their life, such as moving house or changing job. At this point, people’s existing travel habits and routines are disrupted, revealing a ‘window of opportunity’ in which they are more receptive to trying new and alternative options (Thomas, Poortinga & Sautkina, 2016 [7]).

Västrafik test rider campaigns

For the last decade, Västrafik, the regional PTO in West Sweden, have been running annual campaigns targeting tens of thousands of car owners by offering free 2-weeks passes. The concept is highly automated and the usage during and after the test period is measured.

As a rule of thumb, half of those who receive the offer apply for the card and half of those applications are approved, i.e. don't already hold a pass, use their car regularly, will be able to use public transport etc. In one of the follow ups, of people receiving the pass, about half have used it for more than 10 trips over the 2 week period. Slightly less than half of the people receiving the pass state that they are still using public transport more after the test period, and about one fifth of them will stay as new regular users. That would correspond to a 5% increase – a high figure for campaigns targeting such a difficult market as travel behaviour.

If the cost of a large campaign (possibly including paper and outdoor advertising, TV and radio commercials, direct mail advertising) is 5€ per person in the target group, and the ticket revenue from every new customer is at least 200€ per year (or 10€ spread out on the whole group) the result is very good even from a purely economic standpoint. Furthermore, it can also have a notable effect on emissions and congestion if every new customer replaces two car trips every day.

The campaigns typically target over 100,000 car owners every year, with up to 40,000 receiving their 2-week pass. Interestingly, the good result seems to repeat itself every year – despite good results the previous year. This likely has to do with the fact that the population in Gothenburg is growing and the public transport network is continuously improving, thus making public transport relevant to more and more households.

When summarising nine campaigns since 2010, Västrafik can present impressive results: 2 million contacted, 500,000 test riders and 100,000 new customers.

"We love car owners – now we offer 250,000 of them free rides on public transport"



"Test ride for free"

Figure 10 – Vastrafik annual campaign advertising

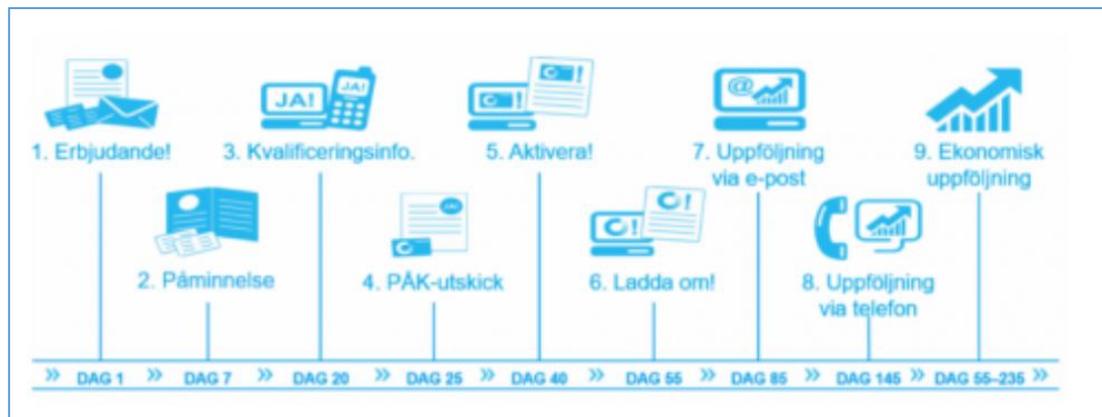


Figure 11 – The test rider process

The test rider process consists of:

- Sending out the offer, a reminder and checking if eligible
- Sending the 2-week pass to those who qualified.
- Follow up in the ticketing system of the activation and usage of the pass, as well as how many users that added a monthly pass or cash on the card after the test period.
- The test riders were contacted via e-mail/survey and some were contacted via phone.
- The economic follow-up is based on surveys etc.

UbiGo launch campaign (Stockholm 2019)

UbiGo, which previously delivered their Go:smart project in Gothenburg 2013/14, launched their new commercial service in Spring 2019 in select areas in Stockholm. The launch was tightly associated with a research project in order to establish behaviour change among the targeted user group from UbiGo. The research was based on extensive data sets in order to draw conclusions about mobility behaviour. It required potential users to record their mobility daily for two weeks ahead of getting access to the UbiGo service. It was planned that this data would then be compared with data from when the users were using the UbiGo service to inform evaluation.

In order to provide an incentive for customers to proceed with the time-consuming registration process for each day of travel, a mobility “cheque” was introduced, containing 10 daily tickets for public transport and 6 hours of car sharing. Since the perceived value of the mobility cheque was quite substantial, and was communicated from an actor not associated with local public transport, the offer was received with both enthusiasm and suspicion.

The result was mixed; some user data was collected but it also hindered several customers from signing up to use the service, despite the incentive. Six months in, an analysis was conducted of the customers who first signed up for the mobility cheque. The conclusion was that the incentive did attract users, however not the users who actually needed the service. After removing the incentive, customers with a higher usage and actual need for an integrated MaaS service signed up at a higher frequency. This emphasises the need for a business model which delivers real and lasting value to users rather than purely introductory incentive campaigns.

2.5 NUDGES

Behavioural nudges are indirect suggestions that act to influence the behaviour and decision making of groups or individuals. As Thaler and Sunstein put it [8]:

“A nudge...is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not.”

Nudges make it more likely that an individual will make a particular choice, or behave in a particular way, by altering the environment so that automatic cognitive processes are triggered to favour the desired outcome. Although nudges might not fit within the definition of an “incentive”, they can still be effective at prompting behaviour change. Their impact is increasingly being recognised and used across many fields other than mobility, such as health.

Nudges can help to **normalise** certain behaviours over time – for example cycling behaviour within employment sites. By subtly encouraging more people to take up the behaviour, the more familiar other employees become with the behaviour, and the more “normal” the behaviour appears – therefore the more likely employees are to try the behaviour. For example, at Milton Park in Oxfordshire, UK, the park offers a free bike loan scheme, which also includes locating the bikes in the public realm and with bike shelters in front of the buildings, rather than being hidden behind the buildings. These all reinforce the perception that the place is somewhere where people do cycle.

Nudges can also relate to the **default settings** within a mobility app – for example a journey planning app or a MaaS app. People tend towards defaults, as it is the option that requires the least cognitive effort to carry out. Therefore, by ensuring the default is not highlighting a private car journey, users will be shown alternative modes before they see the private car journey. Although some users may still choose the private car option, many users will see the benefits of using alternative modes.

The **phrasing** of options can also have a large impact on the resulting behaviour. A study was conducted into people's willingness to pay an optional “environmental” cost when booking an airline ticket. When this was referred to as a “carbon tax”, the number of people who paid the optional extra charge was minimal. However, when it was phrased as a “carbon fee” to offset their impact on the environment resulting from the flight, many people voluntarily chose to pay the additional extra.

Another nudge tactic is **delay propagation**, where a user may be offered an incentive during their journey, such as “the next train is full, here's a free coffee, are you willing to wait for the next train?”. The user is free to choose whether or not to accept or continue their original journey. Personal attitudes, experiences, and lifestyle constraints of individuals are highly likely to have an influence into whether the incentive is accepted or not – e.g. a commuter versus a leisure traveller.

These examples provided a brief insight into the potential impact of nudging on mobility behaviours.

2.6 CONCLUSIONS

The above case studies demonstrate that a variety of elements are important to ensure the maximum success in behaviour change and modal shift. Furthermore, there are different techniques that are important to consider when encouraging first-time users compared to maintaining users. If used in the right way or at the right time, these measures can encourage a change in attitudes towards more sustainable modes, and, when combined with a valued service offering, the behaviour can be maintained in the long term.

Some of the conclusions that can be drawn from the above case studies suggest that rewards should be transport-related (as seen in the Ubigo case study); income levels have an influence on what rewards are seen as most salient or attractive, therefore highlighting again the importance of understanding the demographic of your target population before launching the incentive; and also that changing the reward or incentive can maintain the interest of users for longer, and therefore maintain usage levels and active participation.

Although a common criticism or concern about many behaviour change initiatives is that they are reliant on technology and smartphones, many of the tools and techniques mentioned in this report can be adapted to be more inclusive and not reliant on smartphones (with the exception of many points-based schemes, as these require tracking or monitoring modes used, and asking individuals to log their behaviour on another device such as a computer has been found to result in lower usage as people forget).

Many of these elements have demonstrated success in changing behaviours, but all in all, there is no “one-size-fits-all solution” – it is about choosing and tailoring a measure to the characteristics and demographics of your site – understanding the people you are targeting and what motivates them, alongside ensuring that the underlying business model provides the user with value in order to retention their use.

Such an example of combining value-adding services and behaviour change elements is in Mobility-as-a-Service (MaaS). Integrating these techniques and offering a variety of services in a more convenient way could lead to higher take-up of a new service, more prolonged use of the service, and also help encourage and motivate users to try new modes.

However, technology is merely an **enabler** to engagement. It is important to focus on the underlying aim – that of helping to engage a large number of people, including those who don’t readily rely on smartphones. It is important to use incentives that are relevant to the target audience, and appropriate for the local context, in order to promote and establish more sustainable mobility behaviours.

3 MAAS BEHAVIOUR CHANGE STRATEGIES

The above case studies demonstrate and outline the wide range of initiatives that are being used to facilitate changes in user behaviours. They also highlight that there is not a single solution or single tool for behaviour change.

Mobility-as-a-Service (MaaS) is providing a playground in which to promote initiatives to elicit significant behavioural changes, by making it easier for the user to make better and more informed decisions.

Changing the way people make decisions by highlighting the availability of alternatives.

If multiple measures can be implemented into a MaaS scheme, it becomes possible to reach multiple populations, thereby attracting more people to the platform based on elements they find salient for different reasons. However, MaaS is not just about providing a service; you can implement the best MaaS system in the world, but if you don't understand the user and their underlying mobility needs, values and preferences, you won't achieve the maximum impact possible in terms of behaviour change.

By combining a selection of modes into one platform, this can create additional value for the user, by making a journey easier or more convenient. It can remove or reduce salient "pain points" in a user's journey such as having to purchase a single ticket for each mode of transport or service operator, or allay fears such as fear of missing a transport connection. MaaS can also serve to complement constraints in an individual's or household's lifestyle, and also adhere to individual values, such as a willingness to pay for convenience. Other added value can be elements such as improved flexibility, real time notifications of disruption and diversions, and better value for money. These can provide additional reasons for a user to maintain use of the platform. However, it is important to remember that added value for one user may not be the same as for another user – it is a match between the service and the individual context.

It is important to note that the perceived value of MaaS will be different depending on services provided, local context, and the local market for mobility. It is therefore difficult to categorise which added value one MaaS service may provide compared to another. One commonly applied methodology is the MaaS topology (Figure 12), which defines different "Levels" of MaaS-service integration. Using this topology it is possible to categorise some of the in-common values provided to users at the different levels of MaaS.

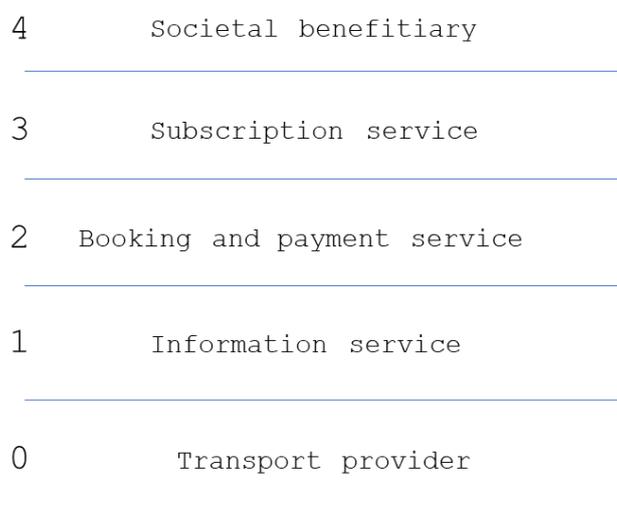


Figure 12 – Service integration Levels in MaaS topology (Sochor, Arby, Karlsson, & Sarasini [9])

MaaS **Level 1** services integrate information from different means of transport and can meet values such as improved convenience, e.g. from real-time notifications of disruption, or flexibility in choice of mode of transport when it rains. Being able to search multimodal trips gives insights into transportations opportunities which may not have been previously considered by the MaaS user. For example, Google Maps was one of the first services to include e-scooters in their available modes of transport. This provides more information to a user, and thereby adds value to the user who wants knowledge about their upcoming trip in order to make a relevant decision. One such example of Level 1 MaaS is the Smart Ways to Antwerp Route Planner.

Smart Ways to Antwerp – Route Planner

The biggest obstacle for many living in Antwerp was being informed about and choosing from all of the available mobility options. After consulting technology providers, it became clear that no truly intermodal travel planner was already available on the private market that supported the goals of the City of Antwerp. It was decided that taking an “off the shelf” app was not an option, and therefore a new travel planner was developed together with a market leader in smart mobility.

This new multi-modal route planner forms the backbone of the digital platform “Smart Ways to Antwerp”. It operates as a data platform, aiming to provide the motivation and the means for sustainable mobility for public space users. It offers integration between walking, cycling, VELO (bike sharing), tram, bus, train, ferry, car, and Park & Ride. This mobility measure is part of an extensive and elaborated

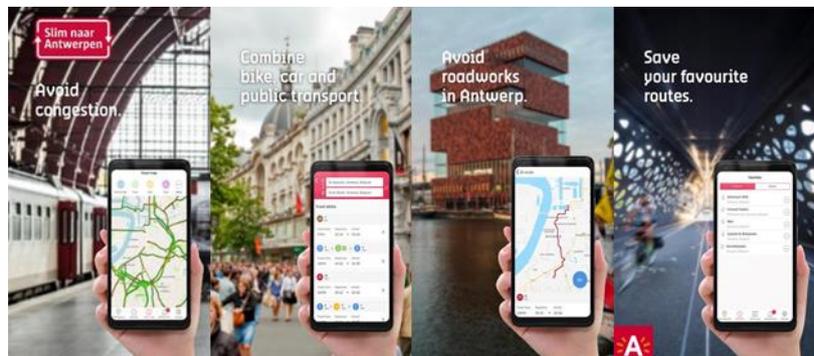


Figure 13 – Smart ways to Antwerp advertising

marketing strategy, called “Smart Ways to Antwerp”, based on soft measures, which aims to inform, inspire, convince and nudge citizens, visitors, commuters, employers, entrepreneurs and mobility providers to choose/provide sustainable mobility solutions and thus create a mental, modal, location and time shift or increase in service efficiency.

Existing satellite navigation systems and travel apps often only suggest the fastest route by car but don’t take into account the time lost in congestion or finding a parking space in the city centre and the stress associated with it (44% of all car drivers (according to British Parking Association) in the city centre lose

time trying to find a parking space). Using the dedicated Smart Ways to Antwerp route planner offers more possibilities for multi-modal travel and time/health gain, along with opportunities to avoid congestion due to roadworks and big events taking place in public spaces.

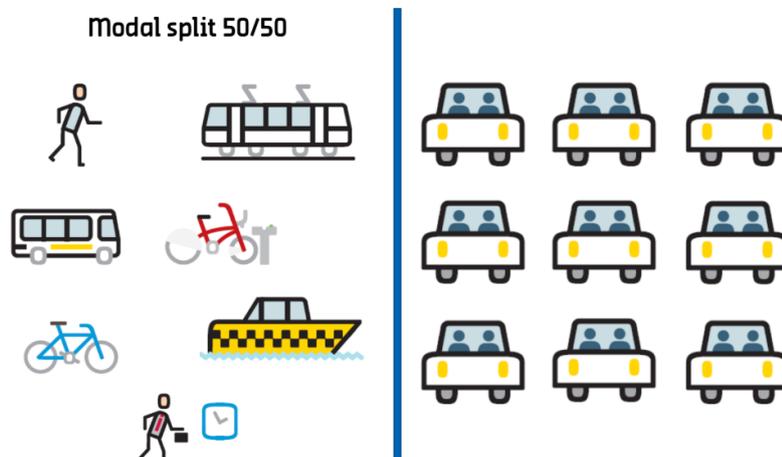


Figure 14 – 50/50 modal split concept

The main objective of this measure is to create a modal split of 50% for the people traveling in Antwerp (from private car to another mode of transport).

Single-mode trips (door-to-door) are always shown first, followed by the multi-modal routes. The results are then ranked by distance, travel time and number of transfers. Walking routes are only shown for distances under 2km, and if the distance covered is less than 7.5km, the route planner will always recommend the bike as the smartest option (in many cases, cycling is also the fastest way of getting around in the City of Antwerp). Using the VELO bike sharing system is also suggested if there is a VELO station within a 500-meter radius from the point of departure and arrival of the journey. Journey options are also responsive to planned events, such as construction works or large events, as well as unplanned events such as accidents and disruption on the transport network.

The city is planning to give even more personalised travel advice by adding user profiles to the route planner. This will allow users to give preferences, availability of transport modes (e.g. bike owner, having a season ticket of public transport, etc.).

Since 2016, 2 million users have visited the dedicated website of Smart Ways to Antwerp www.slimnaarantwerpen.be. A specific campaign, with the slogan “check your best route before you leave”, was run between February and March 2018, which resulted in 52% higher usage rate during the campaign. This also resulted in a 45% increase in numbers of users during the media campaign.



Figure 15 – Smart Ways to Antwerp usage during advertising campaign

Five months after the launch, the route planner app had been downloaded 5,000 times.

A **Level 2** service also integrates payment and ticketing for the user, thus further enhancing the user experience from a convenience perspective. Even if the user has information about all available modes of transport, it is a pain point for the user to actively find tickets for each mode and leg of the journey. The user may simplify their journey by avoiding a leg of the journey which required an additional ticket. This level therefore enhances the value already present at Level 1, with improved flexibility and convenience for the user.

Account-based travel, with or without a subscription, gives us the chance to optimise the use of each model with an internal bonus system. Let’s say the price for car-sharing is independent of car-size just to make it simple, and the price for public transport is independent of time of travel, but that we keep score for rewarding smart-use in the form of free hours or days next week. In that way we can keep the price models simple while still creating the right incentives. Such a system can also introduce the prosumer concept. By sharing my car or ride, I will earn points that can be turned into trips or a lower subscription fee. It is however a fine balance between offering an attractive mobility solution – maybe better than owning a car – and on the other hand making the use of the convenient modes less convenient.

A **Level 3** service offers more intricate values to a user depending on how the service is designed. In general, the user value of “bundling” services can be seen as double-sided. On one side, bundling mobility into a subscription (or some sort of pre-payment) can be seen as a pain point for users, as this involves committing to costs before they have occurred. On the other side, however, is the benefit that all mobility is pre-paid or simplified into one payment (depending on the MaaS process involved), therefore simplifying the user’s

decision making process, and removing the buyer decision process (see chapter 2) for each leg of the journey, and for each trip. In addition, the hassle associated with multiple tickets and multiple payments is removed. The main motivation therefore for adopting a Level 3 service is the convenience and flexibility of access to mobility.

The design and price models of these mobility subscriptions services will create strong incentives, good or bad. The key point is to find principles that make the customers find behavioural patterns that benefit not only themselves, the MaaS operator and the transport service providers, but also the city and society as a whole. There should be an economic incentive to use the most sustainable mode, including not using public transport for a distance that is easy for walking or cycling, particularly during peak hours. Luckily, more sustainable modes also typically cost less to use, and it's important that this is reflected in the price models. An example of Level 3 MaaS is Whim in Helsinki.

[Whim, Helsinki](#)

Whim is a commercial MaaS service that has been running in Helsinki since November 2017. It offers different subscription options, enabling it to offer semi-tailored subscriptions to users, based on their mobility wants and needs.

	Whim Urban 30 €59,7 / 30 days	Whim Weekend €249 / 30 days	Whim Unlimited €499 / month	Whim to Go Pay as you go
Public transport	HSL 30-day ticket	HSL 30-day ticket	Unlimited HSL single tickets	Pay as you go
City bike	Unlimited	Unlimited	Unlimited	Not included
Taxi (5km)	€10	-15%	80 rides (max 5 km)	Pay as you go
Rental car	€49/day	Weekends	Unlimited	Pay as you go
	Read more	Read more	Read more	Read more

The service and early insights into the usage and trends have been analysed by Ramboll in a report released on May 21st 2019 [10][9]. The report is the first coherent early insights into a commercial MaaS service. The report has concluded a certain number of key insights, however, since there is no analysis survey done on users prior to gaining access to the service, it is difficult to conclude definitely on user behaviour change. The report attempts to compensate for this by analysing the general travel behaviour of citizens in the same area. One interesting behaviour presented in the report is that Whim users are combining their trips more frequently with a taxi service and bike sharing compared to other residents. Users of Whim also have an on average higher use of taxi services compared to the average population. Other than that, the conclusion is that the Whim user is rather similar to the normal Helsinki traveller. There are tendencies towards Whim users being more open towards decreasing car ownership, but there is no data presented to empirically support this conclusion.

One of Whim's subscriptions is the slightly controversial "Whim Unlimited" package, which includes, alongside unlimited public transport and city bike, unlimited private rental car and a huge number of taxi rides, albeit for a substantial price. Offering unlimited mobility is a strong selling point to car owners, but it can have negative consequences, at least with today's rather resource inefficient options. A high monthly fee that allows free use of not only public transport but also of taxi or rental or shared car will encourage the use of the car, just as car ownership does. Without a roll-over of the subscription to the next month, there will be an urge to maximise the usage, and perhaps create the wrong incentives for the user. There are of course ways to steer the user to more sustainable choices, such as taxis can only be used for the first or last mile (if cycling is not an alternative), during night time, or requiring that any taxi journeys taken are "pooled" – open to others sharing the ride.

If the subscription instead is based on pre-paid credits (general or mode specific), and if also possible to save what is not used for use in the next month, customers will have an incentive to use the resources as effectively as possible. It will still be a bundled service and even if the price model is graded to ensure the subscription is tailored to the customer, they will have a stronger incentive within the scheme to be economical in their mobility decisions. Such a scheme would also have lower barriers to joining – nothing would be lost at the end of the month if unused. This may help in the initial months of joining, where a user may be unsure how much mobility they wish their subscription to contain. The choice of credits can also influence usage by minimising lock-in effects. A monthly pass for public transport creates an incentive to take the bus on a day with bike-friendly weather. Single tickets create an incentive to use the car as people tend just to focus on the price of the fuel (rather than the “hidden” upfront cost of the car and maintenance), and justify that 2-3 public transport trips per day is therefore more expensive. A subscription based on days better corresponds to the decision that is made every morning: Am I a PT, bike, or car user today?

UbiGo – Behaviour change

UbiGo initiated their commercial service in Stockholm in April 2019. The launch was limited in scale in order to properly analyse the effects of the service before scaling up more rapidly. Between April and November, the customer base was expanded until it reached the threshold for analysis. Although the analysis requires a longer period of comparison and time for customers to adopt to the offered services, certain early conclusions based on user data and surveys were drawn in November 2019. UbiGo has had the explicit ambition to challenge car ownership and offer a service that is able to compete with the mobility that a car offers, in relation to the different costs. Although behaviour change from car-based mobility to public transport or other active means of mobility is a major change not possible to achieve within a 6-month period, early results show promising indications of the initial phases of behaviour change. The interviews and surveys showed larger awareness of mobility costs, more positive attitudes towards combining MaaS with other services in order to reduce mobility need (grocery home delivery as an example), and almost half of respondents stated that, with access to UbiGo, they have considered decreasing the number of cars in their household. The user data also shows these early tendencies, for example the usage of car sharing or car rental is a significant part of the overall usage of the UbiGo service, indicating that UbiGo is offering a service in which car sharing is an integral part of the offer and that UbiGo customers can fulfil their car based mobility needs by means other than by car ownership.

Furthermore, UbiGo has trialled a daily ticket at a competitive commuter price, instead of the standard 24hr ticket offered by the local public transport operator. The ticket has been heavily used by UbiGo customers and is much appreciated. Looking at the usage patterns, it is clear to see a pattern in the use of daily tickets – that of variation. The UbiGo customers are acting flexibly in their usage of the daily commuting tickets. UbiGo customers are using public transport when they need it and other modes when public transport is not specifically needed for that journey, and thus aligning the incentives with a sustainability goal.

(Source: UbiGo is a co-author and has contributed with yet not public data)

In accordance with the above, it is clear to see there are different roles for pricing models and other tools for behavioural change depending on the type of MaaS service introduced. If MaaS Level 3 services focus on the big decision (to own or not to own a car) that will influence subsequent choices; MaaS Level 2 services focus on the individual trip choices. Note that a good Level 2 service, and especially good transport services to choose from, can have a strong long-term effect on the attitude and behaviour of the users, ultimately leading to users selling their car.

Therefore, in both Level 2 and Level 3 services, nudging, gamification and reward schemes will be important, alongside appropriate price models and bundling principles. Dynamic pricing could also play a role, but the method of implementation for this needs more research and understanding.

If a MaaS service is supposed to be financed by transaction margins or commissions, it is important to treat the different transport services (and the customers) fairly, even if they are not equally profitable. There are higher margins on rental cars (and almost all other modes) compared to public transport, while public transport and active modes (walking and cycling) are most sustainable. It will be a challenge to balance commercial and sustainability goals – someone will have to pay for the IT – and the marketing cost of Level 2 platforms.

One final point is that of pre-defined versus tailored subscription packages. Currently, there are only pre-defined mobility subscription models on the market, but one current finding is a desire from users to create their own mobility package. This may help people use their subscription more efficiently, as they only pay for what they use, and if there is no roll-over of services to the following month, could help encourage people to trial the service without fearing over-paying.

All in all, Mobility-as-a-Service schemes come in varying forms, with different effects, and with each providing users with different reasons to change their behaviours, and maintain use of the platform.

4 BEHAVIOUR CHANGE STRATEGIES IN IMOVE TRIALS

Through the IMOVE project, five Living Labs have trialled their own MaaS schemes.



In Year 2 of the IMOVE project, prior to the MaaS pilots being conducted, the Living Labs (LLs) were provided with Version 1 of this report, which provided information and case studies on different strategies and tools that can be used to elicit behaviour change (Chapter 1 and 2). The Living Labs were free to choose which of these strategies and tools (if any) they wished to implement, alongside the other research outcomes developed through the project.

This section outlines which strategies and tools were introduced into the IMOVE MaaS pilots to elicit behavioural changes. More general information on the different LLs is not included in this report and can be found in other IMOVE deliverables (predominantly related to WP4).

Berlin

Berlin trialled a subscription model during the IMOVE project. The subscription on offer was use of Nextbike bike-sharing (to the value of the monthly fee + 30 min) and €25 for car sharing. This subscription was at first priced at €29. However, despite targeted campaigns and messages to users with a known high usage of car sharing and bike sharing in previous periods, the number of users who purchased a subscription was not satisfactory, therefore the LL decided to try different prices for the subscription in order to understand when it would be an attractive offer. Different prices were offered at different times, and at one point the entire package was priced at €1. The thorough evaluation of this process showed that it was still difficult to acquire users at the expected rate even with the very low price.

Changing the habits of users was one of the most challenging parts – as evidenced by the relatively low number of active users that continued to use the service during the trial. Despite using high value incentives to obtain behaviour change, the evaluation resulted in a limited adoption rate. Two general reasons can be put forward for this; firstly, the Berlin LL was excluded from integrating public transport tickets into the MaaS trial by the lack of interest of the Public Transport Operator (PTO), external to the IMOVE consortium, even though the original intention was for public transport to form part of the subscription on offer. Seeing as public transport

is an integral part of a MaaS offering this means that there is room to question what “added value” the service was able to offer to consumers. Secondly it is important to consider if this incentive was the right one for the local context and user group. Perhaps the incentive value or included services were not attractive or relevant to the target market.

Gothenburg

In Gothenburg, the PTO Västtrafik has had a history of trialling different MaaS initiatives, however in the IMOVE project, for the first time, they as the PTO trialled a facilitator role and ran 3 pilots, each covering a different segment of the market.

Pilot 1 – Park & Ride: Integrating public transport tickets into a parking payment app. After a successful technical feasibility study, the pilot involved working with a public parking company to integrate ticketing and payment. The price for the public transport tickets was kept the same throughout the pilot and it did not include any incentives at all to increase usage, rather the update was brought to parking app users without notice. This is because the focus of the pilot was predominantly on the technical issues required to offer this service. Despite no incentives being in place, the usage became rather frequent among several users and they were reported to be interested in the service and reported that it was simple and easy to use. The data collected was too limited to detect any stable trend towards a durable behaviour change, however, there was an interesting coincidence where users that had parked at a less central parking location, paid, and then purchased a public transport ticket. Although it is not enough to draw any conclusions, it is possible that users were able to park more remotely and continue by public transport to the city centre.

Pilot 2 – Car-free, new build development: Combining MaaS with a new housing development. The aim of this pilot was to attempt to create a car-free housing complex where residents would not own cars, but rather rely on MaaS as the supplier of mobility, paid through their rent. Viva in central Gothenburg comprises of 132 apartments across six buildings, and has no residential car parking for tenants, and only a few visitor parking spots. In an attempt to reduce the overall environmental footprint, Viva also includes novel approaches to apartment layouts, building materials, shared resources and energy supply (Riksbyggen, 2016 [11]). Viva’s residents moved in to occupy the buildings between winter 2018 and spring 2019, as each of the six buildings became ready. The pilot has been run under the brand EC2B which is a collaboration between consultancy firm Trivector and MaaS platform supplier SmartResenär.

At Viva, the transport services available through EC2B include:

- GoRide bike sharing (electric bikes and electric cargo bikes);
- An electric Zbee ‘moped’ from May 2019) in the on-site bicycle garage, which includes a ramp and elevator, charging facilities and repair room;
- Västtrafik public transport (two bus stops and a tram stop are within walking distance);
- And Sunfleet car-sharing (four electric cars are parked outside Viva and other types of cars can be found within walking distance).

EC2B functions as a Level 2 MaaS service and the app, launched in February 2019 (after some residents had already moved in) and still under development, features booking and payment, payment history and special offers. As of June 2019, slightly over 100 residents had downloaded the app (approximately half of the total tenants). Customer support is provided from EC2B and the transport providers; meet-ups (evening introduction meetings) and personal consultation sessions were also organised after the launch of the app.

There were three major incentives introduced in this pilot. Firstly, a soft incentive was trialled in the form of an information campaign explaining the pilot to new residents as they moved in, and in addition to this, during two

weeks in May 2019, 40 residents (approximately one-third of the residents at that time) could try Västtrafik for free.

The second incentive was introduced later on. Primarily, the tickets sold with public transport were not heavily used early on in the pilot. They were the same price as tickets purchased through the Public Transport Operator (PTO) channels, however, through the PTO application the user would receive a 20% discount if more than four tickets were purchased within a week. This discount could not initially be matched in the pilot. However, it was later decided to go beyond the discount offered by the PTO, and the property developer decided to give a 25% discount on public transport tickets, available through the app. Following this, public transport ticket purchases increased many times over.

The third incentive was more of an integral part of the service offering. Normally, the car sharing company in the plot would require a membership fee in order to access the shared cars, but this access was instead financed through the rent paid together by all the residents in a building. This enabled a reduced cost of usage when actually using a car-sharing car.

To evaluate the residents’ stated attitudes and behaviour regarding EC2B, a “before” questionnaire was administered as they moved in (32 responses), and a “during” questionnaire during October 2019 (39 responses). Some transport service use data is available as well. A selection of findings from the questionnaires and use data are presented here. Unfortunately, data allowing the matching of respondents’ answers across questionnaires was not made available for this analysis, therefore it is not clear how many respondents answered both questionnaires, nor is it possible to perform statistical analyses of differences, e.g. between expectations (“before”) and experiences (“during”).

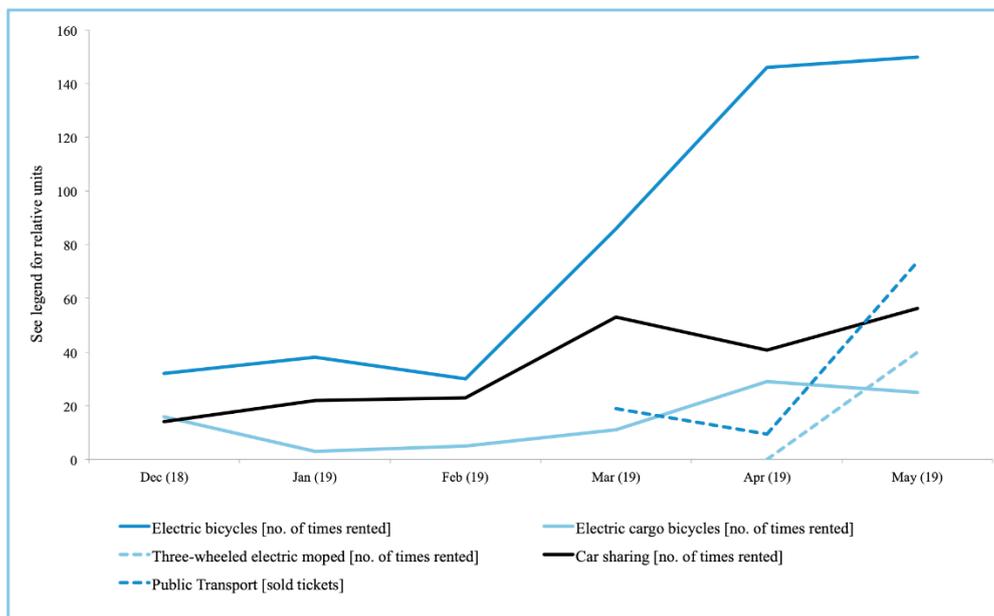


Figure 16 – Use of EC2B’s transport services at Viva (Smith et al., 2019 [12])

Regarding the use of the transport services, the usage data made available for this report is from the time period when residents were still moving into Viva (through May 2019), so it is unclear how use has changed and/or stabilised since. In Figure 16 – Use of EC2B’s transport services at Viva (Smith et al., 2019 [12]) from December to May 2019, one can see low initial sales of public transport tickets, which increases after the introduction of the ticket rebate via the EC2B app. The overall status as of June 2019 is that Sunfleet car-sharing had a faster uptake and greater use of vehicles than in “regular” Sunfleet projects; bike-sharing use is increasing although it is not clear how much of this should be attributed to seasonal variation, and there is

discussion of purchasing an additional cargo bike; and the Zbee electric moped has generated a lot of interest and is mostly used in the evenings and on weekends (Trivector presentation, 2019 [13]).

An important aspect to bear in mind is that the EC2B MaaS service at Viva was introduced as part of an entirely new housing concept, thus it is not possible to isolate the effects of the introduction of EC2B (a new type of service) from the overall effects of moving into a new home (likely in a new area of town, and perhaps entirely new town) and with no residential car parking. For example, of the 31 “before” responses for the two questions on area and type of residence before moving to Viva, only 55% were already living in the city centre (with 29% in the city non-centre or suburb, 10% in a town and 6% in the countryside) and only 45% were already living in an apartment (with 55% living in some type of house).

Furthermore, in terms of vehicles, of the 29 responses on car access before moving to Viva, 69% said they had access to one or more cars (31 cars in 20 households), but only 24% indicated they would have a car at Viva (7 cars in 7 households). Thus, the changes experienced by many households when moving to Viva were far more comprehensive than purely the introduction of new MaaS service. With such comprehensive changes, it becomes even more vital to offer support throughout the change process to help minimise drop-outs (Strömberg et al., 2016 [14]), e.g. customer support, meet-ups (56% of “during” respondents had attended a meet-up), one-on-one meetings, etc.

The “during” questionnaire responses also indicate that moving into Viva did impact car ownership and use. Car ownership dropped and may drop further, with 11% of “during” respondents stating they sold their car when they moved to Viva, and 19% stating they may sell their car in the future. Of those who sold or may sell their car, the lack of residential car parking appears to be the factor of greatest importance, with 64% stating this was a very important reason behind their decision. A total of 45% said that living centrally was very important as well as that they no longer needed a car as the EC2B transport services covered their mobility needs. Only 27% indicated finances as a very important reason to have sold or perhaps sell their car. And although not directly comparable as discussed above, from the “before” and “during” responses, one can see a decrease in car ownership, and increase in car-sharing membership, and also, interestingly, a decrease in bicycle ownership. This indicates that MaaS introduced *together* with other policies (such as no residential car parking) has a greater chance to shift car ownership and travel behaviour patterns.

Regarding attitudes towards the EC2B service, the many simultaneous changes make it impossible to attribute affects to any particular change. For example, on top of moving to a new home with no parking and being introduced to a new MaaS service, the EC2B app itself was launched after some residents had already moved in, and it is still under development, which in and of itself could also affect residents’ satisfaction with the service. In interviews conducted by Smith et al. ([12]), some interviewees expressed frustration with features in the app which were visible but not functional, e.g. the journey planner, and that special transport offers were not included from the start. Also, some interviewees found it confusing as to what EC2B was, versus each included transport mode – was EC2B the housing concept, the MaaS service, the app itself, a company who had come to talk to them, or a combination of these? For example, some interviewees referred to the app specifically as EC2B and the transport modes by their individual names, e.g. Sunfleet for car-sharing. Thus, more transparency regarding the brand identity, the app, the included services, etc., and what can be expected from the service and app, and when (e.g. features, special offers) could likely reduce some user frustration and improve satisfaction.

Regardless, overall, a majority of the “during” respondents (58%) state that they were satisfied with EC2B (and a very small percentage (3%) were dissatisfied), that they have reduced the number of private car trips, that they used public transport to a greater extent, and they have reduced their environmental impact due to travel. Furthermore, a large minority (over 40%) state that they have used car-sharing and bike-sharing to a greater extent, and that their transport expenses have been reduced.

However, higher levels of agreement regarding EC2B in addition to other alternatives meeting needs (versus EC2B alone) indicate that additional services or alternative pricing plans could be used to improve the current offer as there appears to be actual or perceived gaps in service for some modes and types of trips. For example, open-ended responses provide suggestions such as being able to book other modes such as taxis and electric scooters, which have become very visible in Gothenburg, and a reasonably-priced option for trips of a longer duration, as car-sharing does not currently target this and is therefore not reasonably priced for such trips. Service gaps were previously identified in the UbiGo Gothenburg pilot in 2013-14 as well, including the same issue of some trips becoming economically infeasible due to the pricing models of rental cars and car-sharing – a weekend trip was perceived as too expensive with either mode (Sochor et al. [15]). It is important to use such feedback to improve MaaS offers so as to truly offer a comprehensive alternative to private car ownership and use.

Concerning behaviour change, this pilot had many features outlined in the above section, since it was a new property development it was possible to target users at a change point in their lives (changing accommodation) and they tested different incentives to get users to trial the service. However, a negative from this pilot was that several residents, instead of parking in the housing parking garage (which was removed for this project), instead parked their car in the parking spaces available alongside the road. Unfortunately, therefore, not a swift change of behaviour, however the trial has only been going for a short time and there is scope for greater changes during a longer time period.

Pilot 3 – Local business trips: The aim was to trial business-to-business MaaS and the pilot was designed and prepared to be ready to start. Partners in this pilot are awaiting finalisation and approval of a few remaining details of the accounting integration by the city's local district administration (involved entity external to the Consortium) and therefore the actual start will occur after the project end.

Madrid

Madrid joined the IMOVE project half way through, after a call for interested cities. Madrid was already in the process of trialling a Level 1 MaaS system within the city, and their involvement in IMOVE have enabled them to develop this concept and its inter-operability towards a Level 2 MaaS service during IMOVE and potentially onto Level 3 later on. 19 different mobility operators are working with EMT Madrid (the public transport operator) for the IMOVE MaaS trial.

The information and guidance related to strategies and tools for behavioural change have not led to direct measures in the pilot, however they can be a baseline for the development of further initiatives towards sustainability, complementing the environmental effect of lower impact transport modes.

Manchester

The Manchester MaaS trial was centred on understanding the organisational and commercial context to build up a functional MaaS scheme, aimed at building expertise in joining different transport modes in a combined offer, to deal with operational matters and facilitate a better understanding of user behaviour.

The trial was a B2C approach, conducted with Manchester Airport employees. The airport has around 6000 employees, and always has a full car park, so they recognised the need for a MaaS scheme such as this, to move people away from single-occupancy private car. The trial ran for 3 months, with 64 employees. One of the initial issues faced was the challenge of bringing together a de-regulated bus market, in terms of combining data and ticketing. The scheme also integrated train and tram, Local Link DRT, and Enterprise Car Club (although there was a very low uptake for this service).

Turin

During the IMOVE project, Turin hosted a Living Lab organised in two phases, to test a public sector driven (the Municipality is a consortium partner) MaaS initiative with the organisational support of 5T and leveraging on the IT platform operated by Urbi. The aim is to encourage the use of non-private-car modes for commuting and work trips. Via the IMOVE app, participants could plan, book and pay for public transport, bike sharing, e-scooter sharing and shared taxis. Incentives included €30 IMOVE credit to start, and the ability to earn “sustainability points” by choosing more sustainable/green options, to be rewarded with IMOVE mobility credit at the end of the pilot.

Phase 1 – B2B (General Motors): The Municipality published a tender to select a company willing to offer the chance to its employees to take part into the MaaS initiative. The local branch of General Motors has over 700 employees, of which 35 opted for being involved in this IMOVE MaaS trial, using the URBI application. In this pilot, the LL attempted to facilitate behaviour change using several means of incentives ranging from information, financial incentives and gamification. Much of the communication was done through the company mobility manager in the form of soft incentives. As gamification environment statistics were included in the application, the users using the most environmentally friendly transport were awarded with ecology points. There was also a prize subsidised by GM, for the users with the highest number of points each month. The winner received €30 in mobility credits, and second place received the equivalent of €20. This pilot showed very good results in terms of people reporting increased public transport and bike-sharing usage. The data and analysis from the LL show that the combination of bike sharing and public transport proved to be the most appreciated mix to cope both with short range and longer trips.

Phase 2 – B2C (Living Lab open to citizens upon invitation): The second phase of the Living Lab, initially envisioned as targeting a selection of employees of the Municipality, has actually been opened to citizens upon invitation. A group of 40 people participated in the trial. A combination of a “Free Trial” schema (chapter 2.4) and a “Rewards, Points and Discount” approach was used, where users could trial the MaaS service for free, and the reward came after the start of the survey completion. The “Free Trial” was in the form of a “welcome bonus”, in order to protect the budget of the project, but it was conceptually the way to provide this new kind of service initially for free. In both cases, the amounts (€10 as a welcome bonus and €10 more for questionnaire completion) were provided as mobility credits to be spent on the IMOVE platform.

To assess participants’ behaviour and attitudes, “before” and “after” questionnaires were administered during both phases.

The gender split was opposite in each respondent group, with only 31% females in the “GM” group but 65% females in the “citizens” group. The age, household type, and income distributions differ somewhat, but both groups have similar rates of driver’s license possession, car and bicycle ownership, and car-sharing membership. Also of note is that more “GM” respondents do not have a public transportation pass compared to “citizens” (76% versus 50%) and are not members of a bike-sharing scheme (83% versus 65%). It must also be noted that both groups may be more interested in mobility-related issues than the general public, due to their types of employment.

Regarding motivation to participate, the strongest motive was curiosity with 76% of “citizens” rating it as a very important factor in their decision to participate in the pilot, and 0% rating curiosity as not important. Environmental sustainability was the second strongest motive (71% important, 24% not important), followed by economy (65% important, 18% not important) and being persuaded by a friend/colleague (65% important, 24% not important).

These results reinforce the findings from the UbiGo Gothenburg pilot in 2013-14, where 63% of participants chose curiosity as their primary motivation, with all other motives lagging significantly behind, including

convenience, economy, environment, being persuaded by a family member, or trying to live without owning a car (Sochor et al.[16]). In that UbiGo pilot, the participants' curiosity faded over time, but the appreciated practicalities of the service kept the participants incentivised to keep using the service, thus emphasising the importance of a MaaS service offering added values or relative benefits over other solutions (Rogers [17]).

In terms of the “citizens” previous solutions for commuting and work trips (i.e. trips conducted for work purposes and not to/from work), only half stated they were satisfied with their current solution for commuting trips, and even fewer, only 31% were satisfied with their current solution for work trips, so there is clearly an opportunity for improvement in the daily transportation experience. Of interest is that in the “end” questionnaire, 53% said they were satisfied with the IMOVE Turin MaaS service, only 31% were satisfied with the app, and 47% thought the app was easy to use. It is likely that respondents felt the range of modes included in the trial was too narrow, as: only 38% agreed that IMOVE Turin presented many mobility options; only 31% agreed that IMOVE allowed them to choose the most appropriate mode for each trip; and only 27% agreed that the current services were adequate. When asked about other potential services, 80% wanted to add parking payment, 47% car-sharing, and 40% long-term car rental. On the plus side, a majority (56%) agreed that IMOVE made it easy to test new mobility options, so if the app can be made to be easier to use and more modes can be included, satisfaction levels may be improved.

Another satisfaction-related issue may be a gap in the perceptions of what the IMOVE Turin service could offer, versus what it could deliver. This can be seen as a difference in expectations versus experiences, e.g. 65% had an expectation that IMOVE Turin would help reduce their transport expenses, but only 19% felt the service had actually reduced their transport expenses. Also, 59% expected shorter travel times due to IMOVE Turin, but only 6% perceived that their travel times had become shorter. There were good matches between expectations and experiences when it came to reducing environmental impact (59% expected this, and 50% reported experiencing this) and using public transport to a greater extent (59% expected this, and 56% reported experiencing this).

Although, based on perceptions rather than “revealed preference” data, it is important to remember that relative benefit or added value is a matter of perception as different individuals may assess the same offer differently. This depends on how they assess the effort associated with adopting a service, or on how well they feel the service offer matches their personal/household need.

This emphasises the importance of transparent communication regarding what can be expected of a MaaS service/app, especially when the service is in the start-up phase, which can entail greater changes and “growing pains”. However, it is important to try to find a balance in how many “growing pains” can be tolerated, as learning how to use a service/app (including re-learning due to changes in a service/app) also entails an effort, and if a service or changes in the service are perceived as too difficult or time consuming, users may be deterred (Rogers in [17] mentioned the complexity/simplicity as an intrinsic factor of an innovation).

Regarding use of transport modes during the IMOVE Turin pilot, a majority (56%) stated they used public transport to a greater extent, 38% stated they reduced the number of trips by private car, but only 6% stated they used bike-sharing to a greater extent. Also of interest is that the service does not appear to have generated many multimodal trips, with large or very large majorities stating they never or rarely combined modes – only 31% said they sometimes/frequently/always combined car and public transport, and only 19% bike and public transport (with even lower numbers for other combinations), although the reasons for this would need to be explored via e.g. interviews or focus groups.

Overall, from the results, one can see that the IMOVE Turin MaaS pilot generated curiosity and did seem to contribute to a (perceived) increase in public transport use and a (perceived) reduced environmental impact. One can also see that there is room for improvement in the service offer, but how it can be improved also depends on the goals of the service. For example, if more multimodal trips are a goal, then one may need to

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improve city infrastructure such as transfer points and mobility hubs, offer “single” tickets for an entire journey even including mode changes, etc., whereas if reducing private car ownership and use is a goal, offering more modes and with pricing models that cover all types of trips may be more effective at facilitating behaviour change.

5 CONCLUSIONS

This report aimed to understand which different behavioural change tools and strategies can be designed and how have they been already implemented in different contexts and how the IMOVE Living Labs could test these strategies and tools in their own contexts.

The behaviour change strategies deployed in IMOVE have been based on first identifying relevant case studies and summarising conclusions on behaviour change. The Living Labs then took this material presented in chapter 2 (prepared in the first year of the project), in order for them to have support in implementing measures for behaviour change, and customised it to their own situation and local context, using their own strategies during the preparation and running phase of the Living Labs. This highlights the importance of having a “toolbox” of behavioural change strategies and tools that are flexible and adaptable for local contexts. In the final stage of IMOVE, it has been possible to draw conclusions on the different applications and means of incentivising users in each Living Lab. Looking at the different success factors of the different cases and the LLs, there are features that enable higher interaction and retention of customers.

There was a large variation in the implementation of behaviour change measures among the LLs. However, when dealing with incentives, there is always a scale by which they are delivered, such as informational incentives, which therefore have been implemented to some degree in all Living Labs. As mentioned earlier in Chapter 4, the Living Labs were free to choose which, if any, of the measures to implement during their trials.

The Living Labs were substantially varied in terms of their local context – residential, workplace, airport, and city-centre. Although the sites varied, one finding that was similar across many of the Living Labs (specifically reported from Berlin, Madrid, and Turin), was a difficulty to get users to take part in the trials. It was thought that this was mainly through a lack of understanding of what MaaS was, and therefore a lack of understanding of what the service would provide or do. It is important to ensure that the target population understand the concept of MaaS, in order to change their attitudes towards mobility, and for them to find the mobility offer more appealing than their current mobility methods. In addition, in Berlin, another reason for the low uptake was the service offer, specifically the lack of public transport integration. It is also important to recall that an incentive alone is not enough for behaviour change; there needs to be an elaborate plan and well-thought business model and service in place.

The below conclusions on the LL successes are based on information received by the end of the project. Due to delays occurred to some of the LL pilots, a limited set of data had been collected through questionnaires and operational data. For the Living Labs of Berlin and Manchester, available data is focused on actual take-up of the services or participant responses and therefore no general conclusions on a larger scale can be drawn. However, Berlin’s proactivity in response to the scarce user take up should be noted, as when users were not responding to nudges to use the app, URBI then implemented other incentives such as discounts and reduced pricing for the service. For Madrid, there was no incentivisation strategy in place in the pilot, however feedback was received that the information provided on different forms of behaviour change measures were to be used to inform future developments into their existing MaaS system. In order to quantify impacts on behavioural change in the abovementioned LLs, more data would have been needed.

For Turin’s pilots, the user questionnaire data reported that one of the main drivers for use of the new services was curiosity, above any of the other incentives that were available, and this curiosity was particularly prevalent when the services were recommended by a friend or colleague. This demonstrates that behaviour change, or at least users trying out new services, can sometimes occur naturally, without incentives involved.

However, Turin did report an increase in public transport and shared bike usage during the pilot trials, and although there is no evidence to support cause and effect, this may suggest success in the use of incentives

in this context. Additionally, there was also a boost in *perceived* increased use, detected by surveys, which suggests that the trial was relatively successful in generating more positive attitudes towards these mobility modes, and reducing private car use. Although there is room for improvement in the service offer, and the resulting increases were small, it still suggests success for the pilot.

Regarding the pilot at the Viva housing complex in Gothenburg using EC2B, the data showed a faster uptake of modes such as Sunfleet carsharing and bike sharing compared to previous trials of these modes. Although the data cannot show cause and effect, it can be suggested that by not providing residential car parking at the new complex, in addition with this being a change point in peoples' lives as they move house and therefore create new habits, this did successfully encourage a shift in attitudes and behaviour towards more sustainable mobility, by making trying new modes of travel easy and convenient. This indicates that MaaS introduced *together* with other policies (such as no residential car parking) has a greater chance to shift car ownership and travel behaviour patterns, and, when combined with change points in peoples' lives, is a positive way to encourage residents to change the way they think about their mobility needs. In addition, by meeting users' needs as they trial new services, this can lead to successful longer-term changes in lifestyle and attitudes.

The Living Labs show that different measures should be tailored to the local context. Each site took the above best practice and developed it into a strategy tailored to local conditions.

In-common for almost all the incentives put in place is that they have been reactive; very few of the discounts and prizes were planned from the beginning. They were reactive measures in order to address a problem of low usage. The other incentives such as subscriptions, nudges and free trials were, however, more planned and part of either the business model or the market plan for the Living Lab.

There are several learnings that can be taken from the IMOVE Living Labs. Firstly, the importance of having a toolbox with multiple successful tools for behaviour change that can be applied in a flexible and adaptable manner to individual contexts. Thanks to the best practice guidance sent earlier in the project, whilst not all pilots were able to integrate incentive measures, overall this resulted in an increased level of understanding, and future initiatives are more likely to include incentives or other behaviour change tools and strategies. Secondly, since behaviour change is slow, and it would never have been possible to achieve some of the results outlined in the behaviour change chapter during the short timeframe of the IMOVE trials. However, what is important is that a seed has been sown and with the continuation of development of business models in combination with the most suitable tools for the local context, future successful behaviour change through incentives will be possible.

REFERENCES

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- [1] DVSA, 2017; <https://autovistagroup.com/news-and-insights/new-figures-reveal-decreasing-number-young-drivers-uk>
 - [2] McConaughy, E. A., DiClemente, C. C., Prochaska, J. O., & Velicer, W. F. (1989). Stages of change in psychotherapy: A follow-up report. *Psychotherapy: Theory, Research, Practice, Training*, 26(4), 494.
 - [3] Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of consulting and clinical psychology*, 51(3), 390.
 - [4] Prochaska, J. O., Redding, C. A., & Evers, K. E. (2015). The transtheoretical model and stages of change. *Health behavior: Theory, research, and practice*, 125-148.
 - [5] Armstrong, G., Adam, S., Denize, S., & Kotler, P. (2014). *Principles of marketing*. Pearson Australia.
 - [6] Althoff, T., White, R. W., & Horvitz, E. (2016). Influence of Pokémon Go on physical activity: study and implications. *Journal of medical Internet research*, 18(12), e315
 - [7] Thomas, G. O., Poortinga, W., & Sautkina, E. (2016). Habit discontinuity, self-activation, and the diminishing influence of context change: evidence from the UK understanding society survey. *PLoS one*, 11(4), e0153490.
 - [8] Thaler, R.H, Sunstein C.R., Nudge: Improving Decisions about Health, Wealth, and Happiness, 2008
 - [9] Sochor, J., Arby, H., Karlsson, I. M., & Sarasini, S. (2018). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals. *Research in Transportation Business & Management*, 27, 3-14.
 - [10] Ramboll, 2019; https://ramboll.com/-/media/files/rfi/publications/Ramboll_whimply-2019.pdf
 - [11] Riksbyggen. (2016). *Länge leve brf viva*. https://www.riksbyggen.se/globalassets/1-riksbyggen/2-bostad/1-bostadsratter/vastra-gotaland/brf-viva/bofakta_brf_viva_web.pdf. Accessed November 25, 2019.
 - [12] Smith, G., Sochor, J., Karlsson, I.C.M. (2019). Adopting Mobility-as-a-Service; An empirical analysis of end-users' experiences. 2nd International Conference on Mobility as a Service (Tampere, Finland, December 3-4, 2019).
 - [13] Trivector (2019). Avstämning kring utvärdering av EC2B i BRF Viva. Presentation, June 11, 2019.
 - [14] Strömberg, H., Rexfelt, O., Karlsson, I.C.M., Sochor, J. (2016). "Trying on Change – Trialability as a Change Moderator for Sustainable Travel Behaviour". *Travel Behavior and Society*, Vol. 4, pp. 60-68. doi: 10.1016/j.tbs.2016.01.002
 - [15] Sochor, J., Strömberg, H., and Karlsson, I.C.M. (2015). "Implementing Mobility as a Service: Challenges in Integrating User, Commercial, and Societal Perspectives". *Transportation Research Record: Journal of the Transportation Research Board*, No. 2536, Vol. 4, pp. 1-9, Transportation Research Board of the National Academies, Washington, D.C. doi: 10.3141/2536-01.
 - [16] Sochor, J., Karlsson, I.C.M., Strömberg, H. (2016) "Trying Out Mobility as a Service: Experiences from a Field Trial and Implications for Understanding Demand". *Transportation Research Record: Journal of the Transportation Research Board*, No. 2542, Vol. 4, pp. 57-64, Transportation Research Board of the National Academies, Washington, D.C. <http://dx.doi.org/10.3141/2542-07>
 - [17] Rogers, E. M. (2003). Diffusion of innovations/everett m. rogers. NY: *Simon and Schuster*, 576.