

The importance of door-to-door journey planning in Mobility as a Service

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SUMMARY

Interest and investment in Mobility as a Service (MaaS) is expanding, and the technology is anticipated to play a key role in affecting behavioural change towards more sustainable personal transit choices on a societal level. As yet there is little published research on the prioritisation of various in-app features with respect to their impact on user experience (UX); an important consideration if stakeholders are to achieve the widespread uptake of MaaS needed to realise their broad environmental and social aims. We examine the impact of the absence of turn-by-turn navigation; analysing data from a set of user trials to identify the uptake implications of this deficit.

KEYWORDS

Mobility as a Service, user experience, sustainable travel

Introduction

Mobility as a Service (MaaS) is a burgeoning concept widely hoped to be a solution to a number of critical issues relating to transport sustainability and social equity. MaaS is intended to be a one-stop shop for personal transport, allowing users to plan, book, pay for, and navigate multimodal journeys in their local area through the use of a single integrated platform (Daniela et al., 2023). These apps are hoped to facilitate a switch away from the private car as the default (Jittrapirom et al., 2020), and promote the use of greener options to overcome the first and last mile problem often cited as a barrier to the wider uptake of public transport (Mohiuddin, 2021). Through the facilitation of sustainable travel, MaaS is anticipated to affect behavioural change and contribute to a reduction of emissions, noise pollution, and road congestion, and an improvement in public health. However, to achieve these goals there must be widespread uptake and long-term engagement and retention of users. Perception of a high cognitive workload and disjointed user experience will reduce satisfaction and inhibit uptake (Hensher and Xi, 2022), highlighting the importance of further research into the user experience (UX) and prioritisation of various functionality features within MaaS. In this paper we investigate the UX implications of the absence of what may be considered an optional feature of MaaS; turn-by-turn navigation. This typically includes step-by-step navigation instructions, real-time audio and text-based cues, route plotting on a digital map, and live location projection. This feature doesn't yield explicit financial return, thus from a business perspective there may be limited investment incentive. However, in the wider context of user acceptance and actualising large-scale behaviour change, we consider the impact of the absence of turn-by-turn navigation on UX and long-term user engagement and retention.

Method

We conducted user trials of an app which provided in-app ticketing and multimodal journey planning – including walking, buses, trains, hired and owned bicycles, and hired e-scooters – but where the only navigational guidance was a static route plotted on a basic digital map. There was no

provision of step-by-step instructions, audio or text-based cues, or automatic rerouting to support the journeys made by users. Twenty participants were recruited including 11 women (mean age of 45.82, SD = 15.57), eight men (mean age of 40.13, SD = 17.43), and one non-binary person (age 31), each of whom completed a set of four journeys. Participants employed Think Aloud protocols throughout the trials which were audio recorded and subsequently transcribed, and following each journey completed three Likert scale surveys to capture their perceptions of workload (NASA TLX from Hart and Staveland, 1988), usability (System Usability Scale from Brooke, 1995), and satisfaction (acceptance scale from Van Der Laan et al., 1997). They then completed a free-form post-trial questionnaire (PTQ) comprised of 18 questions inviting text responses regarding their experiences during the trial and thoughts about the app, and whether they would choose to continue using the app in the future. Statistical analysis of the quantitative survey data was completed using IBM SPSS Statistics. Overall differences between journey scores were examined, and participant scores compared according to whether they struggled using the navigation function (yes $n=9$, no $n=11$) and whether they would choose to use the app again in the future (yes $n=12$, no $n=8$). Normal distribution of data, where applicable, was confirmed using the Kolmogorov-Smirnov test, and data was then analysed using either the paired t test or the 2-sample t test. Non-normally distributed data was analysed using either the Wilcoxon matched pairs test or the Mann-Whitney U test.

Results

Qualitative and quantitative data indicated that the limited navigational guidance provided was inadequate for participants' needs unless they possessed sufficient local knowledge to compensate for the app's deficits. Think Aloud and PTQ data showed difficulties were experienced particularly during the 'first mile' stage of navigating to a hub: as one participant said, 'it doesn't give me the direction to the bus stop so if I didn't know where [it] was, I would have to guess or get lost.' These experiences could be frustrating for participants, with one agitated participant tersely expressing 'Wish it'd just tell me where the hell I'm supposed to be heading, for God's sake.'

The third journey undertaken by participants necessitated a complex walking route to move between two public transport hubs. Nine of the 20 participants experienced difficulty with navigation during Journey Three, and of the 11 who did not struggle, all but two possessed local knowledge that rendered in-app route guidance unnecessary. In contrast, the other three journeys undertaken by participants involved comparably shorter and more straightforward walking routes, and fewer incidents of difficulty with navigation were identified. This trend was reflected in the quantitative data, with Journey Three receiving significantly lower scores for usability ($p = 0.042$) and satisfaction ($p = 0.017$) than the other journeys.

Average usability scores trended lower, and workload scores higher, for participants who experienced difficulties in navigating ($n = 9$) compared to those who did not ($n = 11$). Average satisfaction scores were significantly lower ($p = 0.026$) for participants who experienced difficulties, and lower satisfaction scores correlated with a decreased likelihood of user retention, although statistical significance was borderline at $p = 0.052$.

Conclusion

These results suggest that in order to fully realise the environmental and social benefits of MaaS, stakeholders must consider turn-by-turn navigation to be a priority feature. Although local knowledge may allow some users to compensate for an app's navigational deficits, comprehensive route guidance is a necessity to meet the needs and expectations of those who lack familiarity with the local area or are not already regular users of sustainable modes of transport. Without the provision of adequate in-app route guidance, user satisfaction will be reduced, engagement and retention of users will be hindered, and the concept of MaaS as a one-stop shop promoting and facilitating a more sustainable future of transit is likely to remain merely an ideal.

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