Supplementary Material: Privacy in Transport? Exploring Perceptions of Location Privacy Through User Segmentation

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Abstract

This is the supplementary material for the HICSS 2021 accepted paper 'Privacy in Transport? Exploring Perceptions of Location Privacy Through User Segmentation' [1]. Appendix A lists the changes that we have made in to the existing scales in order to fit them to our context, and newly created questions. Appendix B lists the reduced question set we arrived at after clustering and recursive feature elimination. These question sets are also available in other version, please consult the GitHub repository at `https://github.com/watercrossing/privacy-in-transport`*.*

A. New or amended initial survey questions

This section lists the survey scenarios and questions that were newly created for our study. The Scenarios in Appendix A.1 were adopted from [2] for the location environment. The questions in Appendices A.2 and A.3 are inspired by questions by [3]–[5], and were refined through an iterative process with a set of domain experts.

A.1. Adopted scenarios

For each of the following scenarios, please indicate your response on the four attributes: Unlikely / Likely, Not probable / Probable, Possible / Impossible, Willing / Unwilling, Trivial / Serious [7-point scale]

- You are visiting a shop on the high street. The shop offers a discount membership scheme. If you use a social media app to let the world know that you visited this shop, you receive the membership for half price.
- A sports tracking application offers a premium program: if you let your location be tracked by the app 24/7 you receive a discount of 50%.
- A health insurance policy offers a substantial reduction in premiums for members who jog/cycle to work and drink less. In order to qualify, you are required to share your location with the company between 7am-10pm.

A.2. Online relationship section

"Some websites ask for you to register with the site by providing personal information. When asked for such information, what percentage of the time do you falsify the information?" [never / <25% / 26–50% / 51–75% / >76%]

"How frequently have you personally been the victim of what you felt was an improper invasion of privacy?" [Infrequently / Rarely / Sometimes / A moderate amount / Frequently]

"How much have you heard or read during the last year about the use and potential misuse of the information collected from the Internet?" [7-point scale from 'Not at all' to 'Very much']

A.3. Transport questions

"How frequently do you use any of the following apps?" [Google maps / Apple maps / Other maps applications / Strava / Endomondo / MyFitnessPal / Runtastic / Nike+, on a never / rarely / monthly / weekly / daily scale]

"To what extent do you agree or disagree with each of the following statements?" [7-point scale from 'Strongly disgree' to 'Strongly agree']

- I am not concerned when apps request to have access to my location data.
- I feel positive about the increased connectedness of transport systems.
- I think that moving away from privately owned cars and towards mobility as a service is a cause for concern.

- All things considered, I think participating in the transport sharing economy is a good thing.
- I mind that I have to provide my location data to so many phone apps.
- I feel positive about the introduction of new types of transport services (e.g. autonomous shuttles).
- I am not concerned when apps retain my location data in order to personalise my experience.
- It is likely that transport service providers know my location at any time.
- I am concerned about the increased use of internet connected technology in private vehicles.
- Sharing my location on my phone applications has a number of benefits.

B. Reduced survey set

The following 17 questions represent our reduced question set:

On a 7-point scale from 'Strongly disgree' to 'Strongly agree':

- Companies seeking information online should disclose the way the data are collected, processed, and used. [IUIPC]
- It is very important to me that I am aware and knowledgeable about how my personal information will be used.
- I am unconcerned when a Web site uses my PII to customize my browsing experience. [Earp et al., reversed]
- I mind when a Web site monitors my purchasing patterns.
- I want a Web site to disclose how my PII will be used.
- I mind when my PII is traded with or sold to third parties.
- I mind when a Web site that I visit collects (without my consent) information about my browser configuration.
- Sharing my location on my phone applications has a number of benefits. [our addition]
- I am not concerned when apps retain my location data in order to personalise my experience. [our addition]

For each of the following statements, please indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation. [7-point Likert scale from 'Extremely Unlikely' to 'Extremely Likely', all from DOSPERT]

- Going camping in the wilderness.

- Going whitewater rafting at high water in the spring.

People often see some risk in situations that contain uncertainty about what the outcome or consequences will be and for which there is the possibility of negative consequences. However, riskiness is a very personal and intuitive notion, and we are interested in your gut level assessment of how risky each situation or behavior is. For each of the following statements, please indicate how risky you perceive each situation. [7-point Likert scale from 'Not at all risky' to 'Extremely risky', all from DOSPERT]

- Betting a day's income at the horse races.
- Passing off somebody else's work as your own.
- Engaging in unprotected sex.
- Bungee jumping off a tall bridge.
- Walking home alone at night in an unsafe area of town.

For the following scenarios, please indicate your response to the attributes: Not probable / Probable [7-point scale]

- A health insurance policy offers a substantial reduction in premiums for members who jog/cycle to work and drink less. In order to qualify, you are required to share your location with the company between 7am-10pm.

References

[1] I. Becker, R. Posner, T. Islam, P. Ekblom, H. Borrion, M. McGuire and S. Li, *'Privacy in Transport? Exploring Perceptions of Location Privacy Through User Segmentation'*, in *Proceedings of the 54th Hawaii International Conference on System Sciences*, Hawaii, US, 2021.

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