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Poster: Towards Privacy-Awareness in Using Smartphone Apps for Mobility Services

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ABSTRACT

This poster presents the first steps towards a data-driven methodology to design material for raising awareness on personal data collection and use by smartphone apps for mobility services (e.g., trip planning). Through an online survey, we collected a sample of 300 responses from regular users of these apps in the Paris region, in France, who share their perspectives on privacy concerns and their need to be better informed.

KEYWORDS

Privacy, smartphone apps, mobility services, user awareness.

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1 INTRODUCTION

Today's services offered by mobility operators heavily use smartphone applications (or mobility apps), e.g., trip planning, navigation, ticketing. The roll-out of these mobility apps raises several challenges in terms of digital privacy as they require the collection of user data to operate. Several examples reported in the news^{1,2} have shown how mobility behaviours can easily be exploited as a new feed of data for user profiling. Despite the enforcement of data regulation frameworks (e.g., EU General Data Protection Regulation (GDPR), European Digital Service Act), embedded trackers in mobility apps can be executed in the background to collect personal information that is not a requirement *per se* for delivering the requested mobility service.

In this work, we investigate data privacy, *i.e.*, how data is exploited, in the context of mobility apps developed to support mobility practices (e.g., active mobility, Mobility-as-a-Service). The objective is to design material in the form of privacy visualization support [1] in order to raise awareness and inform users of these

¹[Online] - <https://mashable.com/archive/redditor-muslim-cab-drivers> - Accessed 01-07-24

²[Online] - <https://www.theguardian.com/technology/2014/jun/27/new-york-taxi-details-anonymised-data-researchers-warn> - Accessed 01-07-24

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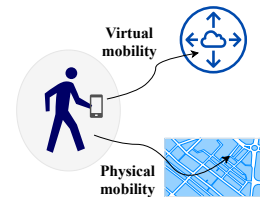


Figure 1: Mobility apps and two forms of mobility.

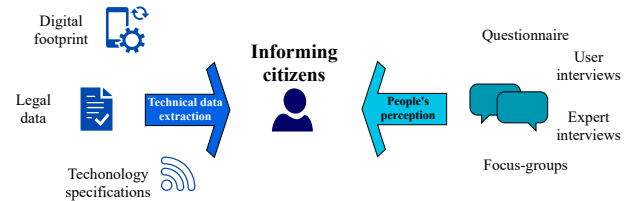


Figure 2: Overview of the proposed data-driven methodology to develop awareness-raising material.

mobility apps about their digital mobility and associated privacy implications. Privacy concerns and perception of a risk associated with smartphone apps use do not necessarily lead to privacy practices as the benefits of the service provided by the app often outweigh privacy concerns [2]. In addition, users often feel that they lack control on how apps use their personal data. While privacy policies are regarded to be the most important tool for informing users about the collection and use of personal data, most of the written privacy policies (*i.e.* Terms and Conditions - T&C) fail to communicate privacy practices to users and often do not comply with regulations [3]. Visualized privacy policies are useful means to increase transparency as well as to build trust and a perception of control over the privacy [1].

2 DATA-DRIVEN METHODOLOGY

Mobility apps introduce a coupling between physical mobility, *i.e.*, to go from locations A to B, and digital mobility, *i.e.*, through the types of data collected when a user asks to go from locations A to B and the exploitation of that data for internal and/or third-party exchange processes. This coupling is illustrated in Figure 1, where the user of a smartphone plans a trip using a mobility app. The scope of the user (represented as a grey area) extends beyond the physical space to the digital space through the device and its connection to the Internet.

To access mobility services offered through an app, users are typically requested to give their consent of the T&C of the digital service while being often unaware of the implications [3].

In this work, we develop a methodology based on the analysis of different types of data sources to design educational material targeted to the general public on what it entails from a privacy perspective to use a mobility app. We restrict the scope of our research efforts to the European area (and France as a starting point) where the GDPR framework is enforced given that it defines legal guidelines on digital privacy. The methodology is depicted in Fig. 2. It involves two components:

Collection and analysis of technical data, including legal information extracted from T&C associated with mobility apps, tracker information embedded in the apps (using open source datasets), and information about the functionality of these apps (e.g., types of communication technology employed). The objective is to characterize the specifics of privacy in the context of mobility apps that can be turned into citizen-focus insights.

Collection and analysis of the perception and perspective of mobility app's users and practitioners in the domain of digital privacy through the administration of a user survey, interviews with domain experts and users, and the organization of focus-groups around collaborative activities for the design of visual supports.

The objective is to collect feedback on which support and what type of information respond to a co-constructed need from the people.

3 COLLECTING USERS PERCEPTION

To collect the perception of users on privacy, we disseminated an online survey³ among a community of students and employees of several Higher Education and Research institutes located in the Paris region. The survey is divided in four sections. The first section focuses on background information related to the general understanding and awareness of data privacy. Questions include knowledge of the respondents of the GDPR, perception of its effectiveness, degree of concern with respect to data privacy online and sense of control over online privacy. The second section deals with the use of smartphones and applications, including type of operating system used, data subscription plans, applications installed and regularly consulted. The third section covers the perception of privacy-related practices when using an application. Due to the focus of our work, we only consider apps that provide mobility services that we classify in four groups : navigation and trip planning apps, ticketing apps, vehicle reservation apps and electric vehicle charging apps. In terms of privacy-related practices related to the use of these apps, we question more specifically respondents on how they give access to personal data for different types of apps given that previous research has shown that the willingness to transfer personal data depends on contextual factors [4]. We also ask questions about T&C format and content for these specific apps. The last section includes general demographic questions such as respondents' age, gender, education and primary occupation.

	Navigation	Charge	Ticketing	Reserve
Photos and videos	6.29	4.3	2.32	5.96
Contact List	4.97	3.31	1.66	3.97
Location	90.4	67.22	47.35	64.24
Banking information	0.99	21.85	41.72	36.09
Audio data	2.32	1.32	0.99	0.66
Email address	21.52	25.17	48.68	46.36
Phone number	17.22	22.52	37.75	39.4
Search and browsing history	18.87	9.93	12.25	11.26
Messages	1.99	1.99	2.98	4.3
Device ID	12.58	15.23	14.9	11.92
None of the listed above	6.29	25.93	18.87	18.54

Figure 3: Willingness to share different types of information per type of applications (in % of responses).

4 RESULTS AND PERSPECTIVES

We obtained responses from 300 participants (156 men, 136 women, 4 non-binary and 4 participants who prefer not to answer). Over half of the respondents are aged between 18 and 35 (55.3 %). In addition, the majority is highly educated (74.5 % have at least obtained a Master degree). 195 of the respondents are fully employed, most of them in a managing or executive position (76.24 %).

As shown in Fig. 3, users are not inclined to share personal data with navigation applications except location data that is usually necessary to enjoy the full functionality of these apps. Location is considered more sensitive personal data in other contexts such as ticketing applications. For the latter, almost half of the respondents are willing to give access to their banking information and email address that are often required to buy tickets online. Personal data such as photos, videos, contact list, audio data and messages are not perceived as to be shared with mobility apps. These results illustrate that the willingness to share personal data with an app is highly dependent on the type of data and the context of data sharing, *i.e.*, the service that the application provides.

Our objective is to build on the results of the different questions of our survey to create educational material that will be employed during focus-groups to discuss how user-facing privacy information can be improved.

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