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Feedback Gathering for Truck Parking Europe: A Pilot Study with the AppEcho Feedback Tool

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Abstract. Feedback communication channels enable end-users to express their needs and problems when using a software system. This feedback can increase a software company's knowledge about real software usage and can positively affect software evolution and maintenance. However, research shows that gathering feedback can be cumbersome for software companies. In a pilot study with Truck Parking Europe, we explore how we can enable truckers to communicate feedback on an app for parking slots. Results of our pilot study, consisting of a small group of truckers, show that the truckers provided useful feedback through a dedicated, mobile, and screenshot-based feedback tool. As stated by the Truck Parking Europe team, the feedback received is understandable and relevant for improving the parking app. In our future work, we will investigate the extent to which an integrated feedback tool can allow many truckers to provide feedback simultaneously and the extent to which the gathered feedback can aid in improving software evolution and maintenance activities at Truck Parking Europe.

Keywords: Post-Deployment End-User Feedback, User Involvement, User Participation, Mobile Application, Software Evolution.

1 Introduction

1.1 User Involvement for Software Evolution

User involvement can positively affect software development and evolution [1] as it increases a software company's knowledge about real software usage [2]. To engage end-users in software evolution and requirements elicitation activities, software companies can either solicit feedback or allow end-users to trigger the feedback communication process [3]. Both cases entail explicit feedback where end-users provide the input deliberately. In contrast, software usage data that is unintentionally provided by end-users is treated as implicit feedback [3]. Explicit feedback communication chan-

nels that allow end-users to remotely communicate their needs, opinions, and problems with a software system can include public channels such as online forums, social media, and app stores as well as non-public channels like email, contact forms and phone. Research on dedicated tools that support gathering of end-user feedback has increased [4][5], and there are various commercial service providers who offer feedback gathering solutions such as Usabilla (usabilla.com), Usersnap (usersnap.com), and UserVoice (uservoice.com). However, previous work shows that in several cases, software companies are not satisfied with the quantity and quality of the feedback received from their end-users [6]. Moreover, the characteristics of the feedback communication channels can contribute towards the end-users' willingness to provide feedback, along with the existing hurdles that discourage end-users from providing feedback [6][7].

In our study, we focus on a specialized end-user group who are not easily accessible for user involvement activities in practice because they are working under time pressure and are constantly on the road, i.e., truckers.

1.2   Feedback Gathering for Truck Parking Europe and Study Goal

Truck Parking Europe (TPE) is the largest free European platform for truck parking facilities (truckparkingeurope.com). More than 25,000 parking spots are updated and assessed by a pan-European community of more than 500,000 truckers. The app that shares the same name (Fig. 1) helps truckers find the best truck parking space on their route across Europe based on their needs related to infrastructure, comfort, and security. Moreover, the TPE app can help to avoid overcrowded parking areas by supporting a better utilization of parking spaces. *PTV Planung Transport Verkehr AG*, the German company behind the idea of the app, supports the TPE project. The app is available for free for iOS and Android users.

User involvement at TPE and PTV is an emerging topic. For the last few years, preliminary user involvement activities have been evolving, and both TPE and PTV are using several feedback communication channels (e.g., surveys, Facebook pages, app stores) to gather end-user feedback. However, TPE and PTV are not always satisfied with the quantity and quality of the feedback. Thus, they want to improve their feedback gathering process in the long run. To facilitate this, a comparison of current and new feedback channels is planned. New feedback channels like dedicated screenshot-based feedback tools are not just promising to support end-users to describe (with additional textual description) the *exact location* (e.g., button) and *context* (e.g., active page) of the feedback object but also allow the feedback receiver to understand the issue behind the feedback [8][9]. However, before starting a complex study and providing such a feedback tool to all the truckers, we want to test whether a small sample of truckers can use the feedback tool at all during their daily work.

In particular, we explore *whether a dedicated, mobile, and screenshot-based push feedback tool enables truckers to express their feedback (RQ1), how satisfied the truckers are with this feedback gathering approach (RQ2)*, and *whether the feedback received is useful for the TPE team (RQ3)*.
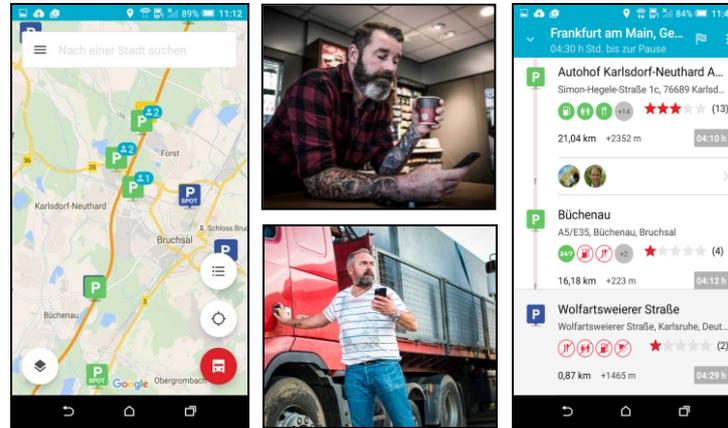
Fig. 1. Truck Parking Europe (TPE) app supports truckers to find the best parking slot. (Pictures: truckparkingeurope.com)

2 Study Procedure and Data Collection

2.1 Our Criteria for the Feedback Tool

For our pilot study, we had two reasons for deliberately opting against an embedded feedback tool solution that is integrated in the TPE app. First, we would have to wait for the next release of the TPE app to start the pilot study. Second, we would have to convince the stakeholders that an integrated feedback tool would neither adversely influence the performance of the TPE app nor the end-users' opinion of it. Thus, we had to find a *dedicated*, *mobile push* feedback tool that is *standalone, but easy to access* [9]. Because commented and marked screenshots are very promising feedback formats (see previous section), the tool needs to support *text input* and annotations of a created or uploaded *screenshot*.

2.2 AppEcho – The Chosen Feedback Tool

By applying the aforementioned criteria, we conducted an unsystematic analysis of research tools and commercial service providers. The *AppEcho* app [5] was the only app that satisfied our criteria. The AppEcho Android app guides the end-user step by step in a wizard-like interface to document feedback on other applications and on the mobile platform in situ. When the trucker wants to communicate feedback on the TPE app, she takes a screenshot of the app and opens AppEcho by clicking on the feedback tool icon in the Notification Center. The latest screenshot is automatically inserted (Fig. 2a), but can be replaced by any other picture file (folder symbol at the top-right corner). The trucker can use two simple annotation functions: a marker to highlight elements and segments on the screenshot (Fig. 2b), and an eraser to void areas. The trucker can type a short text in the window that pops up after three seconds of user inactivity (Fig. 2c). In this study, we de-activated the option to provide an audio

message (Play, Record, and Stop buttons shown in Fig. 2c), because we assumed that we would receive recordings with a lot of background noise and also estimated that we would have limited resources to transcribe verbal feedback. Finally, after clicking on the send button, the trucker receives a confirmation message, the AppEcho app closes automatically, and the latest active screen of the parking app is displayed. In contrast to other available mobile feedback tools, the trucker can get an overview of the sent feedback (not shown here). In our previous work, this was identified as an important feature [10].
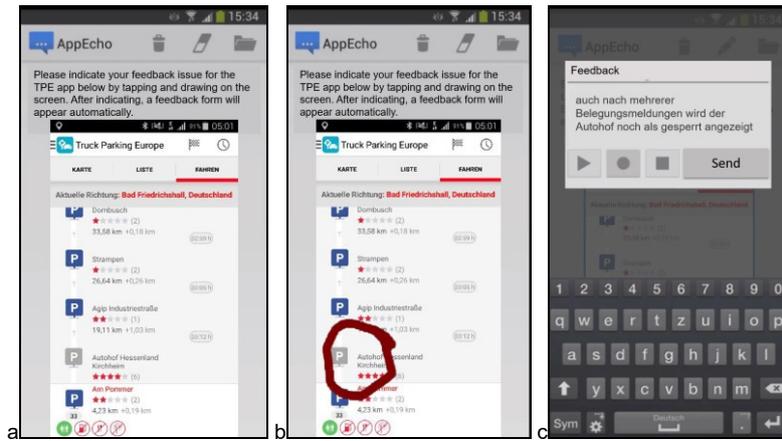

Fig. 2. Main interaction steps in the English version of the mobile feedback tool, AppEcho [5], exemplified with an original feedback documented by a trucker (in German).

2.3   Sampling and Task Alignment

The truckers, who received an Amazon voucher of €20 as a monetary incentive for taking part in the study, were invited to the study by the TPE Facebook group, the TPE newsletter, and the TPE website. After their registration to the study, we briefly explained the study procedure via email, including their task to provide feedback whenever they had a positive or negative experience with the TPE app. Then, the truckers downloaded the AppEcho app from the app store on their smartphones. They used the app in German or English. The truckers viewed an illustration of all the functions of AppEcho through a short one-minute video and they were able to familiarize themselves with the feedback tool by sending a test feedback after the installation of AppEcho and prior to the study period. In total, nine truckers (one female, eight males, mean age = 46.9, SD = 7.4) participated in our study in the capacity of a feedback sender for a two-week period.

2.4   Feedback Sender's Questionnaire

After two weeks, the truckers completed a short online questionnaire on their experience with the AppEcho app. We were interested to know (i) whether they could imagine themselves giving feedback on the TPE app *again with the AppEcho app* (yes/no

format), (ii) what they *liked about the AppEcho app*, (iii) how we should *improve the AppEcho app*, and (iv) what would be the *best feedback communication channel* for them to provide feedback on the TPE app (ii-iv in free text format).

2.5   Feedback Receiver's Questionnaire and Discussion Session

We also wanted to explore how useful the feedback is for the TPE team. To answer this question, five TPE team members (Product Management, Marketing, Design, Usability Engineering; multiple roles possible) judged each feedback that was documented in the form of (annotated) screenshots and texts. For this, each representative rated the *understandability* and the *relevance* of a feedback entry on a 5-point scale (1 = not understandable/relevant, 2 = slightly understandable/relevant, 3 = moderately understandable/relevant, 4 = understandable/relevant, 5 = completely understandable/relevant). With understandability, we indicated how clearly the feedback was formulated and whether the feedback documentation included all the necessary information required to understand the issue being reported. Regarding relevance, we probed as to what extent did the feedback included information that helped the TPE team to ensure a high quality of the parking app. After completing the rating questionnaire individually, the academic author moderated a brief discussion with all the five representatives regarding the study procedure, results, and the next steps. The data was analyzed by the academic author. The ratings were aggregated among the raters and the feedback entries.

3   Results

3.1   Number and Characteristics of Feedback Entries (RQ1)

In total, nine truckers sent 40 feedback entries, referring to shortcomings (n = 27), followed by feature requests (n = 16), and praise (n = 3) (multiple categories possible). On average, each of the truckers provided 4.4 feedback entries (MIN = 1, MAX = 8). Interestingly, none of the truckers repeated the same feedback issue several times, and only one issue was communicated by two truckers (missing zoom function). The feedback entries had an average length of 19 words (SD = 11.1) with a minimum of one word ("sometimes") and maximum of up to 41 words. The eraser function was not used at all. In more than half of the cases, the marker was used. In 14 cases where the marking function was not used, the truckers referred to problems or feature requests that were valid for the TPE app in its entirety (e.g., request for a landscape mode) or when the feedback issue did not pertain to any object of the current view. The marker was not used exclusively to locate the object of the feedback by framing an object with a circle (n = 13) (Fig. 3a: wrong parking spot status) or to point to an object with an arrow (n = 6) (Fig. 3b: overlaying column of the list). The marking function was also used in three cases where the truckers communicated feedback regarding the entire TPE app or the visible screen. For this, they drew an exclamation point (Fig. 3c: missing option to add a parking slot on this screen). In addition, four truckers used free-hand drawing to sketch where a function or information

should be located on the app screen. For example, the location for a zoom function was sketched (Fig. 3d) while another trucker indicated that additional characteristics of a parking slot should be represented as an icon (Fig. 3e).
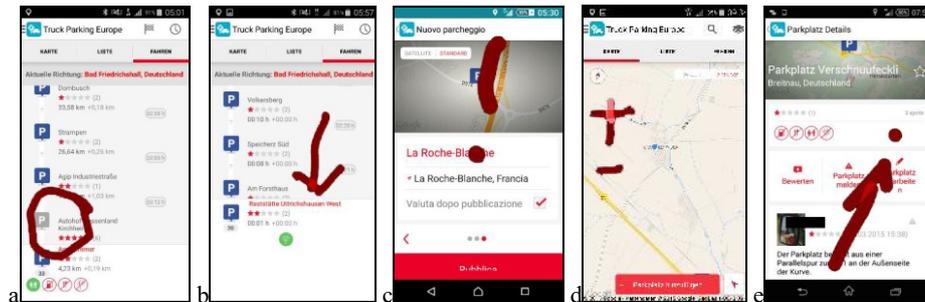

Fig. 3. Original marked screenshots sent with the mobile feedback tool. Name and photo of the trucker have been blackened by the authors (e).

3.2 Feedback Sender's Experience (RQ2)

Seven of the eight truckers, who completed the questionnaire, could imagine themselves using the AppEcho app again to provide feedback on the TPE app. The truckers stated that it was simple to provide feedback as AppEcho was user-friendly. Improvement ideas included suggestions to make it possible to send feedback without a screenshot and to clearly mention the receiver of the feedback in the app. The truckers stated that email (n = 4), the AppEcho app (n = 3), a feedback screen that can be accessed within the TPE app (n = 2), and phone (n = 1; multiple answers possible) are the best communication channels for providing feedback on the TPE app. Interestingly, email was chosen as the best channel although it requires the trucker to open an external application, similar to the AppEcho app. One of the explanations for this could be that the information about the feedback receiver was not communicated in the AppEcho app (see improvement idea above), while it is obvious when writing an email to TPE.

3.3 Feedback Receiver's Experience (RQ3)

Most of the feedback entries rated by the five TPE members varied from understandable to completely understandable (Mean = 4.3, SD = 0.8) and from relevant to completely relevant (Mean = 4.2, SD = 0.6). They stated that the feedback helped them not only to confirm their presumptions about the weaknesses of the TPE app, but also to be aware of the unknown issues that were identified by the truckers. The team was pleasantly surprised regarding the low amount of effort needed for feedback gathering and about the relatively high number of feedback entries that were received in a short time-period from nine truckers – given that their end-users were usually unavailable for user involvement activities. Please note that we did not compare the results of the pilot study with the quantity and quality of feedback received from other feedback communication channels as we did not define a baseline yet.

4   Discussion

4.1   Threats to Validity

Regarding the feedback data collection process, the main limitation is that we cannot guarantee to what extent the truckers would use the AppEcho app over a *longer period* and without getting paid for study participation. Furthermore, our *sampling* might be biased due to self-selection of the truckers and advertising of the study not in the TPE app (where the advertisement would ideally reach all truckers) but on the TPE website, Facebook, and newsletter. These channels might not be used by all truckers.

Regarding data collection from the TPE team, the feedback quality ratings might be affected by the biased *selection of raters* as we chose availability as the only criterium. However, we assumed that the five raters represented the whole TPE team, including the development team's perspective. The *understandability* and the *relevance ratings* were averaged for all the raters and the feedback issues, without handling outliers and extremely divergent judgments. We assume that the presented ratings were underestimated because most of the divergences were caused by only one or two raters who gave low ratings. Unfortunately, as we had time restrictions and as the rating was paper-pencil based, we could not compare and discuss the values of the individual ratings in the session.

4.2   Conclusion and Next Steps

In this pilot study, we explored a tool-supported approach to enable truckers to communicate their problems and needs regarding a parking app. Together with TPE, we have shown that the nine truckers, who participated in our pilot study, could use a dedicated, mobile, and screenshot-based feedback tool to provide feedback on the TPE app (RQ1). Barring one exception, the truckers could imagine themselves using AppEcho again to provide feedback on the TPE app, and we received positive comments as well as improvement ideas regarding the AppEcho app (RQ2). Most of the 40 feedback entries that were received were rated by the TPE team as understandable and relevant for improving the TPE app (RQ3).

In our future work with TPE, we want to solve the limitations of our pilot study. First, we want to *scale* our study by involving more truckers for a longer duration. Second, we plan to use an *embedded* feedback gathering tool that was developed in the SUPERSEDE EU project [11]. In contrast to the AppEcho feedback app, this tool supports a wide range of feedback formats, such as advanced marking functions and customizable categories and ratings. We assume that the SUPERSEDE feedback tool supports the investigation of how to best assist truckers to provide feedback on the TPE app in their everyday work. Third, we will test the extent to which such a dedicated feedback tool can increase the feedback quality and quantity compared to feedback received from other feedback communication channels such as the app store or email. Fourth, we will trace the influence of a single feedback in the decision-making process of the TPE team, including, what feedback is finally considered in the TPE app evolution. Finally, we will investigate the contribution of end-user feedback in improving TPE's software evolution and maintenance processes.

8

Acknowledgment

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