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## **Understanding Widget Downloading Preferences**

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# **Executive summary / Internal release**

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March 2011

## Abstract

This paper explains the results of a user study on 131 participants in Finland. The study measured how feedback information influences customers' decision making, and what impact individual feedback elements have. The study was conducted using a research prototype that simulates a real world widget sharing website. Our results indicate that customer reviews are the most important feedback element, followed by overall ratings and widget description. Our results also indicate that, with the exception of developer information, individual feedback elements can provide adequate decision support, and that relatively simple feedback information can result in positive user attitudes towards decision performance.

## 1 Introduction

Nowadays decisions that involve risk and uncertainty are performed regularly over the Internet. For example, when purchasing items from eBay, we face the risk of financial loss, and we are uncertain about the true intent of the seller as well as the quality of the products we are purchasing. Another example is booking a hotel over the Internet. In this case we must choose the hotel without seeing the hotel room and we face the risk of receiving poor quality for money when the true quality of the hotel is unknown. Trust is a critical factor in situations that involve risk and uncertainty [3]. We are not willing to purchase items from eBay or to book a hotel online unless our perceived trust is suitably high [6]. In order to foster trust, many web sites incorporate support for user reviews and other forms of feedback information. For example, eBay allows customers to rate and comment transactions, while sellers can provide information about themselves and products. Hotel booking sites, on the other hand, commonly provide at least hotel photos and customer reviews.

The importance of feedback information on trust formation is widely established. For example, analysis on eBay has indicated that positive customer ratings lead to price premiums for the sellers [1,9,13]. As another example, the picture of a person has been shown to increase trust on remote co-workers [19]. While the factors that influence trust decisions in online commerce and cooperative work have received much attention (see Section Related Work), relatively little is known about how different feedback elements influence customers' decisions. In this paper we provide insights into this issue by describing a study that measured how different feedback elements on the widget sharing site influence users' downloading preferences. The study was performed as an online survey in Finland. In total we collect 131 responses and analyse 87 full valid responses. We also interview 10 users to study their preferences of feedback elements when making widget download decisions. Our results indicate that customer reviews are the most important feedback element, followed by ratings (especially the visual

part, i.e., the five-star ratings) and customer-generated photos. Our results also indicate that, with the exception of rank information, individual feedback elements can provide adequate decision support, and that relatively simple feedback information can result in positive user attitudes towards decision performance.

## 2 Literature Review and Hypotheses

The importance of trust to online transactions has resulted in a large number of studies on online trust. Especially factors that influence customer trust on Internet stores have been widely studied. For example, Jarvenpaa et al. [10] have shown that the perceived size and reputation of a store influence customer trust, and that customer trust, attitudes and risk perceptions influence the willingness to buy items. Srinivasan et al. [15] studied customer loyalty in e-commerce and found support for eight factors that serve as antecedents to customer loyalty. Yoon [18] showed that web site satisfaction and trust correlate strongly with each other and they have a strong influence on purchase intent. We refer to [7] for a more thorough overview of studies on online trust. Also the effects of the communication medium have been analysed. For example, Basso et al. [2] found that interactivity and voice interaction can indirectly influence the likelihood of a customer sharing information and returning to the site for future purchases. Zheng et al. [19], on the other hand, studied how different cues can facilitate trust formation among remote workers.

More closely related to the work in this paper are studies that analyse the role and impact of feedback elements. First of all, various studies have analysed the effects of ratings, especially in the context of eBay. For example, Houser et al. [9] and Melnink et al. [13] have shown that the seller's reputation can lead to price premiums. Ba et al. [1] further analysed ratings and found that the number and nature of ratings influence perceived trust. Moreover, together with product price, the perceived trust was found to influence the extent of price premiums. Riegelsberger et al. [14] found mixed results about the use of photos on e-commerce websites. In general, photos of persons seemed to make it harder for customers' to distinguish between trustworthy and non-trustworthy websites. Finally, recently the analysis of customer reviews has received more attention. Talwar et al. [16] used text analysis methods to study correlations between ratings and reviews on TripAdvisor. Observations about existing reviews and pre-expectations were found to influence the actual ratings. Gretzel et al. [8] conducted a panel study on TripAdvisor users about the role and impact of travel reviews. In terms of feedback elements, the study indicated that reviews are very important for deciding where to stay, but not equally important for other types of decisions (what to see, where to eat etc.). The study also suggests that readers use various cues to judge whether the review should be taken into account. While a large number of studies have analysed individual feedback elements, we are not aware of other studies that would analyse and compare different kinds of feedback elements. Moreover, while the influence of human factors on trust has been widely studied, less is known about the impact of feedback systems used in widget sharing platforms on user attitudes and perceptions of download decision performance.

Our study on the impact of feedback elements on users' download decision making was designed based on the following hypotheses:

**H1.** The more experience participants gain from the using of widget sharing services, the higher tendency to evaluate information they have.

**H2a.** Users tend to rely on objective information, such as description and preview

image, provided by widgets publishers.

**H2b.** Users having high tendency to evaluate information focus on textual information, while users having low tendency to evaluate information prefer visual information, e.g., preview image.

**H3a.** All users value third-party evaluation information, such as ratings, when they make their decision in downloading widgets. **H3b.** Experienced users or users with high tendency of evaluation tend to value third-party evaluation in a textual form, such as reviews. (Reviews are the most useful feedback element for experienced/high tendency of evaluation users.)

**H4.** Negative security information holds the "power of veto" in users' decision-making when eliminating widgets from their download choices, although users might ignore positive or neutral security information.

**H5.** Developer information can influence the trustworthiness of the widgets from the correspondent developer.

### 3 Research Method

This survey was a quantitative study using a questionnaire with structured questions to collect data to answer the key research questions: (i) what the data indicate about the target user group's decision-making preferences in terms of feedback elements, (ii) if the data could inform feedback system designers about likely areas of support required by users during their decision-making process, and (iii) whether the results from this survey could be used to improve the feedback system design (e.g., UI design) of online widget sharing communities. We conducted the survey study using an Internet-based questionnaire that provides access to unique populations [17], i.e., to reach a large number of demographically-similar people who are interested in using online services. Initially, the items of the draft online questionnaire were evaluated by researchers with experiences in conducting online survey in widget sharing field. The subsequent draft questionnaire was then piloted on 10 students between 18 and 30 years old in the University of Helsinki. Most (9) of them were studying Computer Science and the other one was studying Social Science.

The final iteration of the questionnaire was published online and the survey link was distributed via email to several mail lists for students from the University of Helsinki and Aalto University in Finland. The online questionnaire was open to the public during a three-month period. Each participant was assigned a unique token by registration to access the questionnaire. During the registration, no personal information was collected and the participation was voluntary.

The questionnaire initially required the participants to provide some demographic information including age, gender, residence country and the highest education level. The participants were also asked about the frequency of browsing widget sharing communities and the frequency of downloading widgets online. This was followed by six banks of questions that sought the users' widget searching preferences and decision-making processes, i.e., when given a group of similar widgets, how do the users narrow down the list of candidates and how do they select one of the widgets to download. These questions concerned the users' instructional preferences by asking them to rank different feedback elements according to their perceived importance to the individual's decision-making in widget selection. The feedback elements listed in each of the questions for ranking are: *Description, Rating, Developer, Security information, Reviews*

and *Preview image*, which are commonly used in widget sharing communities<sup>1</sup>. Each question is followed by an open-ended question (i.e., "Comments") that ask the participants to provide their own unprompted opinions. In the end of the questionnaire, participants were asked if they were willing to join in the following interview session and those who gave positive responses could give their personal contact information after they finished the questionnaire. All the answers to the online survey were stored in a database and analysed after the three-month survey study. In total we collected 131 responses and analysed 87 full responses (26 were from females and 61 from males). Based on the responses, we invited 10 users (3 novice users and 7 experienced users) to a follow-up study to take an insight into their preferences of feedback elements when making widget downloading decisions. The interview participants were given one movie ticket as an incentive.

The semi-structured interview comprised of three steps. Users were asked to:

1. interact with our research prototype, i.e., a prototype widget sharing website (detailed design of the research prototype is described in Section 4);
2. answer the same online questionnaire for the second time; and
3. think aloud on which feedback elements are important to their widget download decision-making.

When interacting with the prototype, users were asked to finish a set of predetermined tasks: browsing the website, searching widgets and downloading three widgets. Each interview was assigned one researcher as an observer of user behaviours. Users' interactions with the prototype were recorded by a screen recording software<sup>2</sup> and notes were taken by the observer. After gaining experience in using online widget sharing services, users were asked to go through the online questionnaire for the second time and the changes of the answers were recorded in the online survey system for further analysis. The third part of the follow-up study was think aloud. Think aloud is a form of observation where the user is asked to talk through what she is doing as she is being observed, e.g., describing what he believes is happening, why he takes an action what he is trying to do [4]. Based on the interactions with the prototype and the answers to the questionnaire, users were asked questions concerning their preferences to the feedback elements and which feedback elements were considered important to their widget download decision-making. Each interview lasted for about 30 minutes.

## 4 Research Prototype

During the interviews, users were presented with a prototype widget sharing website, on which they were asked to complete specific scenarios.

The front page of the site lists five top widgets when sorted by the highest number of downloads, highest ratings, and most recently updated. The user can choose to study a specific widget or widget developer in detail, or to browse all widgets in the category, which opens the search result page (see Figure 1). The search result page presents a summary of all widgets, with an option to sort the list, and to examine either a widget or its developer in more detail.

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<sup>1</sup>For examples, Nokia OviStore, Apple AppStore and Android Market.

<sup>2</sup><http://camstudio.org/>











WIDGETS							Search: photo sharing
News & Info	Entertainment	Photo & Video	Music & Audio	Utilities	Social Networks	Business	Personalization
Widgets > Search results							
Name	Category	Developer	Updated	Downloads	Rating	Security	
 Facebook Media Uploader	Photo & Video	facebook	4 months ago	649	★ ★ ★ ★ ★ (216)	✓	
 Twitter Media Sharing Plug-in	Photo & Video	Pixelpipe	9 months ago	584	★ ★ ★ ★ ★ (194)	✓	
 Daily Photo	Photo & Video	Flickr	8 months ago	531	★ ★ ★ ★ ★ (177)	✓	
 Blogger Upload & Post Plug-in	Photo & Video	Pixelpipe	6 months ago	452	★ ★ ★ ★ ★ (149)	⚠	
 yfrog Media Sharing Plug-in	Photo & Video	Pixelpipe	3 months ago	429	★ ★ ★ ★ ★ (143)	✓	
 Sharing plug-in to TinyPic	Photo & Video	Pixelpipe	12 months ago	413	★ ★ ★ ★ ★ (137)	✓	
 Sharing plug-in to Photobucket	Photo & Video	Pixelpipe	3 weeks ago	276	★ ★ ★ ★ ★ (92)	✓	
 fizwoz Mobile	Photo & Video	fizwoz, inc	2 months ago	245	★ ★ ★ ★ ★ (81)	⚠	
 FTP Upload Sharing Plug-in	Photo & Video	Pixelpipe	13 months ago	112	★ ★ ★ ★ ★ (37)	⚠	
 LiveCast Mobile All In One	Photo & Video	LiveCast	2 days ago	65	★ ★ ★ ★ ★ (21)	✗	
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Figure 1: Screenshot of search results of photo sharing widgets from the research prototype.

Widget details (see Figure 2) include its name, picture, description, developer, average rating and number of ratings given, number of downloads, time of last update, security status, and textual user reviews with times, reviewer names and the rating given with the review. Most ratings have no accompanying reviews. For each developer, a logo, homepage and a list of developed widgets is shown.

The widget's security status is shown on a three-step scale: red indicates that security-relevant bugs have been reported on the widget, while yellow indicates the existence of more minor bugs that are not security-relevant. Green means that there are no bug reports or that they have all been resolved.)

Developer profile (Figure 3) includes developer's name, logo, description and a list of widgets contributed by the corresponding developer.

## 5 Results and Discussion

The three-month user study collected 131 responses to the online questionnaire, in which 87 were full responses. Among the 87 full responses, 26 were from females and 61 from males. In terms of previous experience in using mobile widget sharing communities (e.g., Nokia OviStore, Apple AppStore and Android Market), 35 out of 87 full responses were from novice users, and 52 participants had previous experience in using mobile widget sharing communities. In terms of previous experience in downloading widgets from any mobile widget sharing communities, such as Nokia OviStore, Apple AppStore and Android Market, 8 out of the 52 experienced mobile



Figure 2: Screenshot of a widget view from the research prototype.

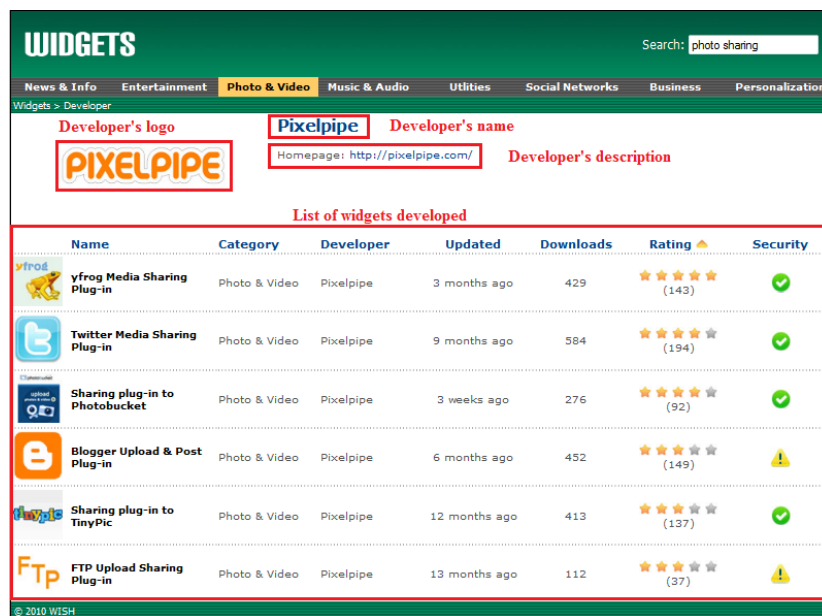


Figure 3: Screenshot of a developer view from the research prototype.



widget sharing service users had not downloaded any widgets so far, and 44 out of the 52 were experienced widget users. Among the 10 participants to the follow-up study, seven of them were experienced users and the other three were novice users. The most important feedback elements that affect users' download decision-making including:

- Widget description, with 35.3% users voted as the most important element for them to evaluate a new widget;
- Overall ratings represented in a 5-star scale, where the number of ratings are taken into consideration but not as important as the visual information, i.e., 5 stars; and
- Review, which is mentioned by most (71.4%) of the experienced users in the interviews as "the most important information I refer to when selecting widgets to download" and textual information, such as text quality and text length, affected their decision most.

Security information (i.e., the traffic light in the prototype) was considered important especially in the widget search phase. In other words, when users were given a list of similar widgets as search results, they tended to select those widgets with green sign or yellow sign. However, the way of presenting security information needs to be improved to enhance the usability of the feedback system. When security information is given as one of the feedback elements to widgets, the meanings of security signs must be given in a detailed and explicit way to avoid misunderstandings.

Developer information is not as important as we assumed, as the importance of widget "developer" is unclear. Results showed that developer's information was found useful, except that users slightly tend to avoid downloading widgets from renowned untrustworthy developers. During the interviews, it was mentioned many times that only the quality of widgets (judged based on feedback information) that affect users' download decision-making. However, if price issue was taken into account in widget sharing services, developers' reputation would have influence on users' decision-making. In this case, it becomes similar to the transactions done in some C2C websites, such as eBay or Huuto.net.

The way of presenting negative feedback information must be considered carefully. The study results show a strong tendency of believing negative feedback. Low overall rating and lack of reviews had strong impact on experienced users' decision-making, whereas lack of description has stronger negative impact on novice users. One way to moderate the impact of negative feedback information is to have humans (e.g., web managers) involved to screen out false reports.

## **6 Discussion and Conclusions**

The study had a number of limitations. First of all, as we adopted an exploratory approach, the results provide limited insights into the factors that influence customers' preferences and actual decisions. In terms of participants, our sample mainly consisted of young students that limits the coverage of widget users. Also the experimental setup limits the study. As we limited the number of widgets provided in the research prototype, users were not provided with enough candidates to be chosen from. This makes it difficult to draw strong conclusions about individual feedback elements, and more research is needed to investigate the individual feedback elements.

Our results have implications to interface design as well as the analysis of feedback systems. In terms of interface design, our results suggest that novice users and experienced users have different ways of processing feedback information. This implies that feedback systems should consider different kinds of users. More specifically, the system should provide quick and accurate overviews of information, while at the same time provide the opportunity to evaluate additional information.

The analysis of individual feedback elements indicated that even individual feedback elements are able to support customer decision making, and to increase customers' confidence. The quality of information was more influential than the amount of information. This result is especially encouraging regarding feedback systems for devices with limited screen estate. Our results supported the use of (customer-generated) reviews and visual information (such as 5-star scale for overall ratings). The role of rating statistics was also found overall positive, but more research is needed to understand the role of ratings and how to provide summaries that are not prone to misinterpretations.

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## References

- [1] S. Ba and P. A. Pavlou. Evidence of the effect of trust building technology in electronic markets: price premiums and buyer behavior. *MIS Quarterly*, 26(3):243–268, 2002.
- [2] A. Basso, D. Goldberg, S. Greenspan, and D. M. Weimer. First impressions: emotional and cognitive factors underlying judgments of trust e-commerce. In *Proceedings 3rd ACM Conference on Electronic Commerce (EC)*, pages 137–143. ACM, 2001.
- [3] R. Bhattacharya, T. M. Devinney, and M. M. Pillutla. Formal model of trust based on outcomes. *Academy of Management Review*, 23(3):459–472, 1998.
- [4] A. Dix, J. Finlay, G. D. Abowd, and R. Beale. *Human-Computer Interaction*. Prentice Hall, 3rd edition, 2004.
- [5] N. Donthu and A. Garcia. The internet shopper. *JAR*, 39:52–58, 1999.
- [6] D. Gambetta, editor. *Trust: Making and Breaking Cooperative Relations*. Department of Sociology, University of Oxford, 2000.
- [7] S. Grabner-Kräuter and E. A. Kaluscha. Empirical research in on-line trust: a review and critical assessment. *International Journal on Human-Computer Studies*, 58:783–812, 2003.

- [8] U. Gretzel, K. H. Yoo, and M. Purifoy. Online Travel Review Study - Role & Impact of Online Travel Reviews. <http://www.tripadvisor.com/pdfs/OnlineTravelReviewReport.pdf>, February 2007. [Retrieved: 2008-10-06].
- [9] D. Houser and J. Wooders. Reputation in auctions: Theory, and evidence from eBay. *Journal of Economics & Management Strategy*, 15(2):353–369, 2006.
- [10] S. L. Jarvenpaa, N. Tractinsky, and M. Vitale. Consumer trust in an Internet store. *Information Technology and Management*, 1(1-2):45–71, 2000.
- [11] W. B. G. Jarvis and R. E. Petty. The need to evaluate. *Journal of Personality and Social Psychology*, 70(1):172 – 194, 1996.
- [12] S. P. Mantel and F. R. Kardes. The role of direction of comparison, attribute-based processing, and attitude-based processing in consumer preference. *JCR*, 25:335–352, 1999.
- [13] M. I. Melnik and J. Alm. Does a seller’s eCommerce reputation matter? Evidence from eBay auctions. *Journal of Industrial Economics*, 50(3):337–349, 2002.
- [14] J. Riegelsberger, M. A. Sasse, and J. D. McCarthy. Shiny happy people building trust? Photos on e-commerce websites and consumer trust. In *Proceedings of the SIGCHI conference on Human factors in computing systems (CHI’03)*, pages 121–128. ACM, 2003.
- [15] S. S. Srinivasan, R. Anderson, and K. Ponnnavolu. Customer loyalty in e-commerce: an exploration of its antecedents and consequences. *Journal of Retailing*, 78(1):41–50, 2002.
- [16] A. Talwar, R. Jurca, and B. Faltings. Understanding user behavior in online feedback reporting. In *Proceedings of the 8th ACM Conference on Electronic Commerce*, pages 134–142. ACM, 2007.
- [17] K. B. Wright. Researching internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication*, 10(3), 2005.
- [18] J. Yoon, M. Liu, and B. Noble. Random waypoint considered harmful. In *Proceedings of the 22nd Annual Joint Conference of the IEEE Computer and Communications Societies (IEEE Infocom)*, 2003.
- [19] J. Zheng, E. Veinott, N. Bos, J. S. Olson, and G. M. Olson. Trust without touch: jumpstarting long-distance trust with initial social activities. In *Proceedings of the SIGCHI conference on Human factors in computing systems (CHI’02)*, pages 141–146. ACM, 2002.

## A Questionnaire

**Section I** This section of questionnaire collects users' demographic information, e.g., age, gender, residence country and the highest level of education.

**Section II** This section of questionnaire concerns users' previous experience of widget sharing communities.

1. Have you ever visited any mobile widget sharing communities, such as Nokia OviStore, Apple AppStore and/or Android Market?
2. How often do you visit these mobile widget sharing communities?
3. Have you ever downloaded any widgets from any mobile widget sharing communities, such as Nokia OviStore, Apple AppStore and/or Android Market?
4. How often do you download widgets from mobile widget sharing communities?
5. How long have you been using services from the mobile widget sharing communities you have specified?

This part of questionnaire is semi self-administered, that means, the more experience users have in using services from widget sharing communities, the more questions are shown to ask the users to explain their previous experience in details. For example, if a user answers "No" to the first question *Have you ever visited any mobile widget sharing communities, such as Nokia OviStore, Apple AppStore and/or Android Market?*, the other questions are not shown to her and she will be directed to the next section of the questionnaire. If her answer is "Yes", the second and third questions will be asked.

**Section III** This section measures users' personal characteristics of decision-making process, comprising variety-seeking tendency [5], need for evaluation [11] and decision-making style [12]. Some sample statements are:

- **Variety-seeking tendency:** I like new and different styles.
- **Need for evaluation:** I have many more opinions than the average person.
- **Decision-making style:** My decision is usually based on facts rather than on general impressions and feelings.

Users are asked to rate the statements in a five-point Likert scale (i.e., a five-level Likert item: Strongly disagree, Disagree, Neither agree nor disagree, Agree, and Strongly agree) according to their own situation.

**Section IV** This section consists of three sub-sections, i.e., user awareness of widgets reflected by users' search behavior and views on search results, user decision-making on widget download, and user awareness of developers. Each sub-section consists of several questions, such as ranking the feedback information provided in the research prototype (see Figures 1, 2 and 3) according to their importance, and need for more feedback information from different views.

In the user decision-making sub-section, three widget cases with screenshots of widget view were given to the users, who are asked, except the general questions, to

make their decision on whether to download the given widget or not. Users would have an additional question about the reasons why the download decision is negative, if they decided not to download a certain widget.

**Section V** This section measures the importance of positive feedback information and the influences of negative feedback information (see Table 1) on users' decision-making of widget download. Users are asked to rate the statements in a five-point Likert scale (i.e., a five-level Likert item: Not important at all, Not too important, Somewhat important, Very important and Extremely important) according to their own situation.

**Section VI** This section of questionnaire concerns users' previous experience of feedback systems in general, and what are their opinions on the usability of these feedback systems. The questions asked in the questionnaire are:

1. Have you visited any websites that provide feedback information (eBay, TripAdvisor, Epinions, etc.), other than widget sharing websites?
2. Which website(s) have you visited?
3. How do you evaluate the feedback systems used in these websites (e.g., eBay, TripAdvisor and Epinions)? What are good? What needs to be improved?

These questions are placed in the last section of the questionnaire to avoid possible prejudgement of the feedback system provided in the research prototype.

Feedback element	Positive information	Negative information
Description	Detailed description of the widget's functions	Lack of description of the widget's functions
Rating	Good rating (e.g., over 3 for a 5-star rating)	The widget's rating is too low (e.g., below 2 for a 5-star rating)
Developer	Developed by someone or some company that you know well	The widget's developer is unknown or not familiar to me
Security information	Marked as a tested spyware, virus and other malware free	It is reported that the widget may contain some malware
Review	Reviewed by dozens of users, and most of the reviews are positive	No review information is available.
Preview image	Good-looking (e.g., nice user interface design shown in the preview image)	No preview image is available.
Number of downloads	Has been downloaded for hundreds of times or more	The number of downloads in the recent 3 months is less than 10.

Table 1: Sample statements of positive and negative information for different feedback elements.