

DIARY STUDY ON INTERNET PAYMENT SYSTEMS

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ABSTRACT

This paper presents an ongoing diary study that is part of a research into usage issues of Internet-based payments. This research aims to lead to interaction design knowledge for this class of systems. The paper motivates the diary study, discusses its set-up and presents some early results. These first findings describe problems and also successes of existing payment systems, and observations that can be useful for designing future electronic payment systems.

Keywords

Electronic payment systems, usability, diary.

1. INTRODUCTION

Electronic commerce is a growing phenomenon, but to a large extent its future development is hampered by the lack of appropriate payment systems [1]. Research in Internet-based payments has proposed several technical solutions, a good proportion of which have been put to use. Such payment systems have had limited success and most consumer to business payments over the internet are performed currently via credit cards [2], an admittedly problematic payment medium due to costs, security and trust problems [2],[1].

Internet-based payments is a very sensitive type of user system interaction, since money transactions are involved. Further and above purely technical concerns such as security and reliability, special attention must be paid to *user* concerns such as trust, usability, reputation of technological partners or of banks that introduce the systems, marketing, and the role of government regulations. This paper reports research in user-related factors that may contribute to the limited success of current internet-based payment systems.

Our research takes a user centric standpoint in a topic that can concerns equally marketing research and human-computer interaction. (For a discussion between differences in these two perspectives see

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[7]). An earlier survey [1] of user attitudes towards payment systems revealed no empirically supported evidence for the existence of some problems that seem to preoccupy current research on technological solutions for electronic payments technology. For example, [1] reports that payers did not express much concern about privacy and how their personal details are treated. Also, the ability to make micropayments was not considered important. Understanding the needs and concerns of the user can help avoid solving problems that dwell only in the minds of the researchers. The present study complements the survey of [1] by taking a closer look at the interaction with electronic payment systems and how these are experienced by users. To the best of our knowledge there have been no studies that explore these issues in such detail.

The challenge with researching user behaviour during e-commerce-related activities lies in the sensitive nature of payments and money. When people deal with money in real life, their behaviour could be different from what they do during fictional transactions in a laboratory, when they are asked to work with mock-ups or to stop interaction right before committing to an actual payment. In other words, fictional payment lack ecological validity, so we have chosen to study actual payments by experienced and novice users of Internet-based payment systems through a diary study. Diaries are increasingly popular as a research method in the field of HCI as they offer the possibility to capture user thoughts and experiences in the context of actual system use and throughout the day, close in time to the actual usage [5].

The remaining part of this paper discusses the set-up of the diary study (section 2); some first results (section 3) and what we consider are the implications for designers of payment systems. Section 5 discusses these first results in the context of future research work.

2. SET-UP OF THE DIARY STUDY

Payment systems put equal emphasis on ease-of-use by expert users, so that the system fits the daily life of individuals but also, ease-of-learning by novices, for first-time use (for adoption purposes). To understand the problems confronting both types of users, we set-up a two-part diary study. Filling the diary was intended to last a few weeks but the actual duration depends on the frequency of payments by the subjects who were requested to fill a separate form for each payment or first-time registration.

The diary study investigated the use of four payment systems. These are 'Internet Bankieren' and 'Electronic Banking' (ABN-AMRO), 'Direct Betalen' (Rabobank), and Paypal. The first three systems belong to electronic banking systems from reputable banks. Apart from electronic payments they support many other functions such as investments, savings and other banking products. In such cases participants are familiar or have prior client relations with the banks, which, as we supposed, could have influence on their perception of the payment system.

PayPal is a representative of purely Internet payment systems; it is not a part of a bank or supported by a financial institution. In this way it provides an interesting contrast to the bank-supported systems that should shed light into how trust to the payment system is formed. PayPal users can create payment accounts and use for money transfers and payments at affiliated web sites. The system also provides ability to accept payments from other users or shoppers with credit cards. At this moment there are few alternatives for Paypal among Internet payment systems. So far, it has not been possible to find expert users of PayPal willing to participate in the diary. Thus, we only have diary data for novice users registering with the system.

Prior to the main diary, two pilots were conducted; the results they produced were interesting enough to include in this report.

2.1 Choice of Subjects and Pilots

Participants were chosen by means of poster advertisement. A web page providing an explanation of the study, user profile requirements and examples of forms has been established to support participants' enquiries [9]. Individuals interested to participate were screened so that it would be likely that they would make within a few weeks 5 or more actual payments, e.g., at an Internet shop, for services, or bill payments or other payments to organizations. Payments to parents, friends, or just transfers between accounts are of less interest due to the focus of the research on Business-to-Consumer e-commerce and users were asked not to fill them in the diary forms.

Among the participants there are 4 students of various specialties, 3 educational employees and 1 administrative worker. 5 of them (including students) are representative users of Internet payment systems, using it for all their banking operations. Among those who agreed to participate return rate of questionnaires was about 90%. Participants were awarded payments after they completed the forms and interviews.

Five participants report themselves as experts in online activities, while 3 are at intermediate level. Requirements for Internet experience level are charac-

terised using the definition of the GJU World Wide Web user survey [8]. Four participants have moderate, the other 4 have high computer experience. Computer experience is characterised as in the format described in [4], which is typical for user centred design processes.

2.2 Process and instrumentation

The diary was given to participants in a briefing session where the purpose of the study and the use of the data they would provide were explained to them, and informed consent was obtained. A first interview was conducted, aiming to get general information about the participant, e.g., demographics, experience with the Internet, attitude to payment systems.

The diary consisted of two parts. When the participants had filled the first part of the diary, they had a first debriefing session during which the first results were discussed. The purpose of segmenting the diary in this way was to ensure that if they had misunderstood instructions or if for some reason their responses were not considered informative enough, then they could be advised accordingly.

The diary itself consisted of several sections: instructions, the demographic questions and a separate section where a list of questions were asked about each payment. No pre-filled examples were provided to avoid biasing participants with respect to issues of trust and privacy, where we felt that we might draw their attention to issues that might otherwise not really concern them during actual payment.

Participants were asked to fill in their problems, opinions, observations or expectations in the provided forms. Subsequent items ask participants directly to express their impressions about security, usability, trust and privacy. Some of the questions asked are the following:

- Do you feel there are any risks in using this payment system?
- Were you asked by the payment system to provide any information that was not strictly necessary for payment activity?
- Are you worried that the company or bank that operate your payment system can misuse the information that you provide?
- Do you feel information about you is safe from third parties?
- Do you feel that your money is safe with your payment system or Internet banking system?
- Do you find using authentication (passwords, security questions, calculator) annoying?
- Was interaction with the payment system easy?

- Do any security or privacy measures make it more complicated to use the payment system than you would like?

The average time spent on filling the diaries has (for our informants so far) ranged from 4 to 6 weeks. A debriefing interview was conducted after each of the two parts of the diary had been completed. Both debriefing interviews consisted in going through the diary entries of participants and discussing them employing qualitative interviewing techniques [6], with different types of probing [3] and follow-up techniques were used for data collection at interviews.

3. EARLY RESULTS

At this moment there are about 8 people who have finished the study, while 2 more diaries are pending. So far, users have performed in total about 20 payments or registration procedures with the systems.

Users have reported about 30 problems and 36 successes so far. So far there are about 10 problems or success that were mentioned by more than one user. Most frequently mentioned were positive comments that users trust the bank they use and that banks do not ask too much personal information because they already have client relationships.

Some first results seem to emerge very clearly and are summarised below as problems and positive experiences.

3.1 Problems

Users identified the problems that could be rendered as follows:

Usability

- Users complained about usability especially with regards to the registration process. Security measures reported (long passwords, security questions, 1-hour long registration/installation process, entering multiple security codes) were perceived as excessive and annoying and even prevented 2 participants from completing registration.
- Inconsistency with paper-forms (e.g., different order in filling-in information). One payer could not get used to the electronic payment form after several months of payments.

Trust and Privacy

- 3 users were worried that some people can get access to their personal information of their money (though this does not deter them from using the system). Others felt that their money is safe but personal information is not.
- 1 user did not like to reveal her nationality and email; she felt the questions threaten her privacy.

3.2 Successes and Positive Impressions

Efficiency

- The expert payers found that Internet-based payment of bills, which would normally be paid by post, "saves time and brings convenience".
- Paying exact amounts electronically was considered easier because no change is required.
- Preparing payments in a batch is convenient for users connecting to the Internet via a modem.
- Address book was found convenient for repetitive payments, because it makes "it easier to fill in details of payees".

Effectiveness

- Integrated reporting system allows easy overview for payment activities over long term.
- Scheduled payments are welcomed as giving more control over funds and improve performance.
- Triggering payments by time was considered convenient.

Trust

- Participants trusted the banking payment systems because they trust the bank behind it and its ability to solve problems. 2 participant trusted PayPal very little. The starting position for them was that it is hard to trust it.

Usability

- Use of the hardware security-code calculators for authentication gives a safer feeling and was not experienced as annoying.

4. IMPLICATIONS FOR THE DESIGN OF INTERNET-BASED PAYMENT SYSTEMS

Implications for the design of this class of system were, in some cases, directly recommended by participants. In other cases, we grouped problems reported by the participants into categories and proposed generic solutions for these categories on the basis of practices of existing payment systems or human computer interaction.

For example, the users reported that they are inclined to use the payment systems more freely when they pay on behalf of their employing organisation or company. The conclusion we draw is that fostering trust becomes more important for system supporting personal payments.

With respect to privacy, a hypothesis seems to emerge suggesting that there are levels of *privacy*, which differ by the type of personal information provided by the users. The response to level of privacy could depend on the perceived necessity of the sys-

tem use for them and the context where they could use it. For instance, users of electronic banking systems are likely to trust banks more personal details, because banks already have access to the users' personal data, received during the prior customers relations with the clients. It would be interesting to check what is the optimal level of privacy for new Internet payment systems that are *not* a part of banking systems and do not have trust relationships with users.

Some automatisisation features appreciated:

- Saving uncompleted payments to be completed at a later instance.
- Triggering payments by time or email, SMS message, etc.
- Payment for subscriptions for content or services.
- Group payments to several parties at once.

Personalisation:

- Address books, customised templates, profiling, retaining session information and preferences are helpful for time and efficiency of payments tasks.
- Support for currency conversion and different languages.
- Provide multiple logins, restricted access for employees, family members.
- Duration of payment should be in proportion with the duration of the pre-purchase interaction on the affiliated sites. E.g., a fast purchase should not require a long payment.

Control over payment process and information

- Provide means to easily modify and control personal data, to recover passwords, or alternative authentication (e.g. biometrics, code calculators) systems.
- Provide transactions statement to make control over transition easier, and to help to detect problems. Provide clear and visible feedback on all payment task and actions.
- Provide possibility of error recovery, e.g. load the default configuration or discard all information and easy rollback during the payment.

Long term use

- Avoid changes in logic of interaction on long term
- Avoid frequent changes of user interface

Help

- Provide clear and extensive help on critical questions such as fraud, security, insurance of funds, contact details.
- Minimize reliance on documentation (manuals).

5. CONCLUSIONS

The diary study discussed in this paper has recorded several usage problems and benefits for users, based on their experience of actual payments. This study is concerned more with the actual design details that influence perceived ease of use, privacy, trust and the eventual decision to use the system rather than attitudinal variables affecting consumer behaviour which is something investigated previously in [1]. A range of implications for the design of Internet-based payment systems have been derived that represent hypotheses that we will attempt to validate through a forward engineering case study.

We are preparing an electronic version of the diary to be distributed among Internet payers, with the purpose to find more users of Paypal or other emerging pure Internet payment systems, (that are not internet banking systems as well). Diaries give a view of payments in context and over time. To complement this study an investigation of the cognitive processes involved in payment-system use is planned in a laboratory setting where interaction with payment systems will be analysed step-by-step.

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