User Interface Evaluation Methods for Internet Banking Web Sites: A Review, Evaluation and Case Study

David Wenham

School of Informatics
City University, London, EC1V 0HB
d.w@totalise.co.uk

Panayiotis Zaphiris

Centre for HCI Design
City University, London, EC1V 0HB
zaphiri@soi.city.ac.uk

Abstract

The project reviewed twenty-seven available user interface evaluation methods and selected a shortlist of methods, which are appropriate for evaluating mature, post-implementation Internet Banking Web sites. The selected methods were applied to two Internet banking Web sites. Based on the experience and the results of these evaluation exercises, the methods were evaluated for their usefulness. Finally a set of heuristics was developed that can be used when evaluating internet banking web sites.

1   Introduction

There are numerous methods for evaluating user interfaces. Hom (1998) lists over thirty usability methods. More recently, various theorists/researchers have developed or adapted methods to suit the specific characteristics of Web applications (for example, Nielsen's (1999) Web design specific guidelines). In addition, specific classes of application engender specific design issues, which may make some design principles invalid or irrelevant, whilst other areas are neglected. For example, privacy and security issues are key to Internet banking sites, but relatively irrelevant to information browsing portals.

Consequently, the job of selecting relevant methods for evaluating a particular type of interface can be daunting. This project will review the available methods, selecting a subset of the most suitable ones for evaluating Internet banking Web sites. They will then be tried out and evaluated.

A further problem that this project will seek to solve relates to the Heuristic Evaluation method. This is a form of expert review based on generally accepted guidelines for interface design, which tend to be well supported by theory and research. This method is quite popular because it is relatively cheap and easy to apply. Nielsen's (1994) guidelines tend to be presented as the definitive list (for example, Nielsen, 1994 and Brinck et al, 2002), but this is not necessarily the case – there are lots of relevant guidelines available. Nielsen (1999) has created a list of 10 usability guidelines relevant to Web design, although few of these are relevant to Internet banking.

1.1 Literature Review

In the early days of Internet banking, many organisations rushed to provide Internet based services in order to gain competitive advantage. The Internet only online bank Egg was one of the first success stories, whose perceived threat spurred the larger high street banks on to create their own Internet banking services (Goldfinger, 2002). Now, with so many high street retail banks having an online presence – not to mention the online only banks - just providing an Internet banking service will not offer any real advantage over competitors.

Virtual Surveys (2002) note that the satisfaction of users with their Internet banking services is improving. The number of UK customers describing their online bank as 'excellent' rose from 17% to 24% in the year to 1st Quarter 2002. In addition, Petry (2001) noted that the frequency of sign-ons by existing customers is increasing. These figures may indicate that the banks are working to improve usability, thus making their online services more agreeable – or perhaps the existing customer base are just learning their way around any problems. This more pessimistic view would not justify neglecting usability though, because the number of online banking customers is increasing (Petry, 2001), with the greatest Internet banking penetration being achieved in Europe (Goldfinger, 2002). These new users will have to like a site from the start if they are to be retained.

2 Methods and Results

2.1 Introduction

This section describes how each method was applied in this study and the resulting insights into the usefulness of the method provided by it's application. These methods were applied to two UK Internet banking websites (namely: LTSB and HSBC). Descriptions of the methods can be found elsewhere (e.g. Hom, 1998).

2.2 Task Analysis

This method was applied using Heirarchical Task Analysis diagrams, which helped the evaluator to focus on the structure of each task when performed on the system, rather than physical features of the interface. In this way it offered a different view of the system to screen based methods such as Feature Inspection and Heuristic Evaluation, and therefore complements those methods. However, the use of Task Scenarios means that the method tends to focus on common pathways through the system and could miss problems in alternative scenarios, so should really be used in conjunction with a non-scenario based method, such as Heuristic Evaluation.

2.3 Interviews

This study used a small sample – 2 users of each Web site. Presumably as a result of this, few problems were identified in comparison with the other methods. Difficulties were experienced in finding users willing to participate and arranging and performing the interviews. Transcribing and analysing the data was onerous and time consuming. The key advantages of the method are that problems identified by users seem more valid and may differ to those identified through methods that do not involve users. With additional subjects, agreement between users on areas of poor validity would imply some reliability. Other methods could then be used to investigate areas that

users report as having low usability. The costs and benefits of this method should be carefully considered before choosing to use this method.

2.4   Cognitive Walkthrough

This method requires less knowledge of usability guidelines and best practice, because the evaluator is guided by the three questions (does the user know what to do? can they see how to do it? and can they determine if the action they took was right?) towards potential usability problems. Feature Inspection might be more thorough for a usability expert, because the 3 questions could restrict the evaluator's focus – for example, you could miss aspects of the site such as the aesthetic appeal of the interface and how easy it is to escape from places you did not intend to go. Having said that, the Feature Inspection and the Cognitive Walkthrough are restricted to the scenarios you use, so you could easily miss important scenarios using either method.

2.5   Feature Inspection

This study applied the method by documenting each task scenario as a procedure, based on Hom's (1998) theory that features that are troublesome to describe are probably troublesome to use. It was found that this method is not particularly useful if the evaluator does not know what to look for – that is to say, if they are not an expert in interface design usability. There seems little advantage in using this method, over a Heuristic Evaluation, which benefits from taking user interface guidelines into account, and thus points evaluators at the kind of thing they should be looking for. Similarly the Cognitive Walkthrough prompts evaluators to consider the users thought processes as they step through the task, which seems more likely to give rise to the identification of problems.

2.6   Heuristic Evaluation (Incorporating Guideline Checklists)

This study involved developing an Internet Banking specific set of guidelines for use in the Heuristic Evaluation (see Table 1). These were based on Nielsen's (1994) 10 heuristics, some of which were adapted to make them relevant to Internet Banking Web sites.   The list was supplemented and modified with reference to complementary heuristics/guidelines by other researchers and through application of the other methods.

The guidelines tell the evaluator what to look for, so this method is ideal for evaluators who are familiar with the type of system, but who are not usability experts. However, also good for experts, as the guidelines help ensure that most potential types of usability problem are considered. Provides a broad but detailed view of the system, due to the range of guidelines and by not being restricted to specific scenarios. Non-scenario based methods like Heuristic Evaluation might identify some of the problems that could effect the less common scenarios, but on the downside, they might not focus strongly enough on areas needed in the main task scenarios.

2.7   Comparative Analysis

In this study, Comparitive Analysis was used with each method except for the interviews, where the sample would not have allowed meaningful comparisons. Comparitive Analysis did give rise to additional insights, benefitting from the alternative perspectives of the different methods. It seemed most useful for identifying alternative solutions where usability problems were identified. The method is least compatible with Feature Analysis, because the features on one site do not

necessarily have a parallel on the other. This means that a higher level view of features or functional areas must be taken, which limits the potential for a detailed methodical review.

Table 1: Internet Banking Specific Guidelines

No.	Guideline
1.	Make users feel secure
	Users need to feel secure when doing Internet banking. Sites need to be secure, make security measures visible and explain to users how to use sites in the most secure manner, providing appropriate warnings where necessary.
2.	Easy navigation
	Are there adequate site maps, navigation bars, menus and so on, to help users find their way around the site? (Shneiderman, 1998) Are menus broad and shallow? Avoid deep, narrow and hierarchical menu structures that force users to immerse themselves into the depths of the structure (Zaphiris and Mtei, 1997; Larson and Czerwinski, 1998), and thus cannot be easily navigated without practice and route memorisation.
3.	Visibility of system status
	The system should always keep users informed about what is going on, through appropriate feedback within reasonable time (Nielsen, 2002, page 1). The feedback however, must not detract from the perceived or actual security of the Web site.
4.	Match between system and the real world
	The system should speak the user's language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order (Nielsen, 2002, page 1).
5.	"User control and freedom
	Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo". (Nielsen, 2002, page 1).
6.	"Consistency and standards
	Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions" (Nielsen, 2002, page 1) – that is to say, do not just make the site internally consistent, but consistent with the majority of other sites (Nielsen, 1999).
7.	"Error prevention
	Even better than good error messages is a careful design which prevents a problem from occurring in the first place" (Nielsen, 2002, page 1).
8.	"Recognition rather than recall
	Make objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate." (Nielsen, 2002, page 1) For example, provide mouse-over text to explain further where each menu item / link will take you (Nielsen, 1999).
9.	"Flexibility and efficiency of use" (Nielsen, 2002, page 1).
	The interface should be suitable for novices as well as experienced users (Keith Cogdill, 1999). Avoid unnecessary steps towards a user goal, making the process as simple and logical as possible. Convoluted and complex navigation should be avoided, making all parts of the site available from the homepage.
10.	"Aesthetic and minimalist design
	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility. " (Nielsen, 2002, page 1). Textual information should be structured by breaking it into separate meaningful chunks to help users scan and locate the information they are seeking (Lynch & Horton, 1999; Nielsen, 1999).
11.	"Help users recognize, diagnose, and recover from errors
	Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution." (Nielsen, 2002, page 1)

12.	"Help
	Even though it is better if the system can be used without", it may be necessary to provide help. "Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large." (Nielsen, 2002, page 1)

3   Conclusions

All the selected methods were suitable and valuable in assessing the usability of Internet banking Web sites. If you were selecting just one method, then we would recommend Heuristic Evaluation, as it seems likely to identify more problems than the other methods, if conducted with care and with the Internet banking specific Guideline Checklist developed /sourced for this study.

Further to the methods applied in this study, fifteen methods were identified which could be usefully applied to Internet Banking Web sites, where the goals and resources of the evaluation exercise are different to those of this project. These were Focus Groups, Questionnaires, Journalled Sessions, Self Reporting Logs, Screen Snapshots, Formal Usability Inspection, Pluralistic Walkthrough, Consistency Inspection, Standards Inspection, Thinking Aloud Protocol, Question Asking Protocol, Competetive Analysis, Affinity Diagrams, Blind Sorting and Card Sorting (See the full version of this report along with its appendices and Hom, 1998 for descriptions of these methods). Further studies could be done with the aim of using and evaluating these methods on Internet Banking Web sites.

4   References

Brinck, T., Gergle, D & Wood, Scott D. (2002). *Usability for the Web: Designing Web Sites that Work*. San Francisco: Morgan Kaufmann.

Cogdill, K. (1999). MEDLINEplus Interface Evaluation: Final Report. College Park, MD: College of Information Studies, University of Maryland. Cited in Preece et al, 2002.

Goldfinger, C. (2002). Internet Banking Update. Available: http://www.fininter.net/retail %20banking/internet_banking_update.htm

Hom, J.T. (1998). The Usability Methods Toolbox. Available: http://jthom.best.vwh.net/usability/usable.htm [10 Aug 2002]

Larson, K. & Czerwinski, M. (1998). Web page design: Implications of memory, structure and scent for information retrieval. In *Proceedings of CHI*, 1998, 25-32.

Lynch, P.J. & Horton, S. (1999). *Web Style Guide.* London: Yale University Press.

Nielsen, J. (1994a). Heuristic Evaluation. In J. Nielsen and R.L. Mack (eds.) Usability Inspection Methods. New York: John Wiley & Sons.

Nielsen, J. (1999). Top Ten Good Deeds in Interface Design. Available: http://www.useit.com/alertbox/991003.html [10 Aug 2002]

Nielsen, J. (2002). Ten Usability Heuristics. Available: http://www.useit.com/papers/heuristic/heuristic_list.html [25 Nov 2002]

Petry, M. (2001). eBanking: Is it Becoming More Popular? Available: http://www.bankersonline.com/ebanking/gurus_eb1203b.html [3 Nov 2002]

Shneiderman, B. (1998). Relate-Create-Donate: A teaching philosophy for the cyber-generation. *Computers in Education*, 31(1), 25-39.

Virtual Surveys Online Banking Awards (2002). Available: http://www.virtualsurveys.com/news/press_release_5.asp

Zaphiris, P. & Mtei, L. (1997). *Depth Versus Breadth in the Arrangement of Web Links*. Available: http://otal.umd.edu/SHORE/bs04/ [15 Nov 2002]