MINNELLI – Experiences with an Interactive Information Kiosk for Casual Users

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The multimedia system MINNELLI offers bank customers information about retail services in an attractive and easy-to-use way. The information kiosk was developed in an iterative process. Evaluating user acceptance of the system and studying the quality of human-computer interaction with a combination of methods (usability testing, interviews, observations, analysis of log files) provided valuable insight to improve on the design of its user interface.

1 Introduction

MINNELLI provides comprehensive information about the bank's retail services (Figure 1). The multimedia prototype was developed at UBILAB, the Information Technology Laboratory of the Union Bank of Switzerland (UBS) in cooperation with an external multimedia producer (MacGuffin Software Ltd.) during 1991–94 [Ans94].

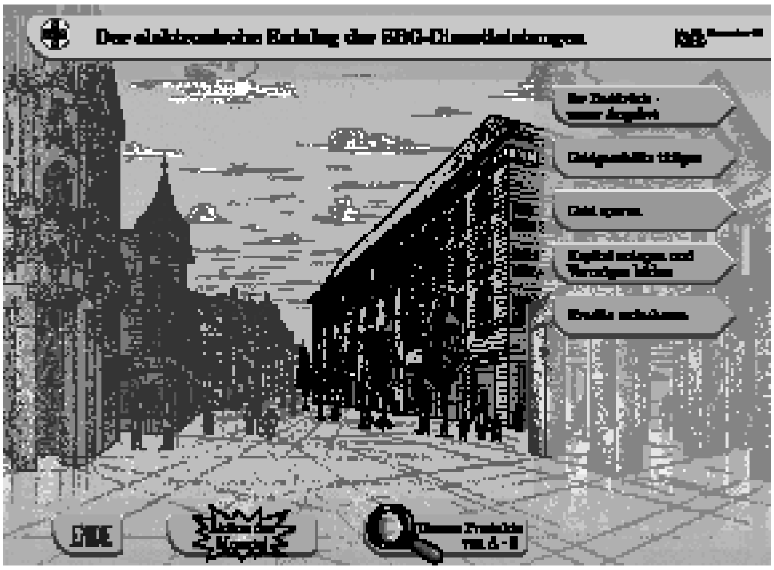


Figure 1. General overview

Since MINNELLI is geared toward casual users who cannot be trained in how to use the system, it must attract them and keep their interest alive. In other words, it must not only be informative but fun to use. The successful development of such a system depends on the collaboration of experts in the fields of HCI, graphic design, script writing, filming, music and, of course, subject matter (banking in the case of MINNELLI). The system's content and functionality should further make repeated use worthwhile. MINNELLI's user interface had to be perfected in a series of usability tests and field studies until it could be handled by casual users without any training, assistance or on-line help functionality.

2 Description of the MINNELLI System

MINNELLI is an electronic catalogue which presents the bank's financial services in an intuitive way. Products are described on information boards (Figure 2). Whenever possible the text is supplemented with pictures or photographs of the product itself or corresponding forms.

Figure 2. Information board about mortgages

Short films (animated cartoons) present individual services dynamically in order to spell out their benefits more graphically and to visualise processes such as filling in a form or explaining financial concepts like investment funds (Figure 3). The use of animations rather than live video has the major advantage that products like credit cards or forms can be depicted on an unrealistic scale, thus making understanding easier.

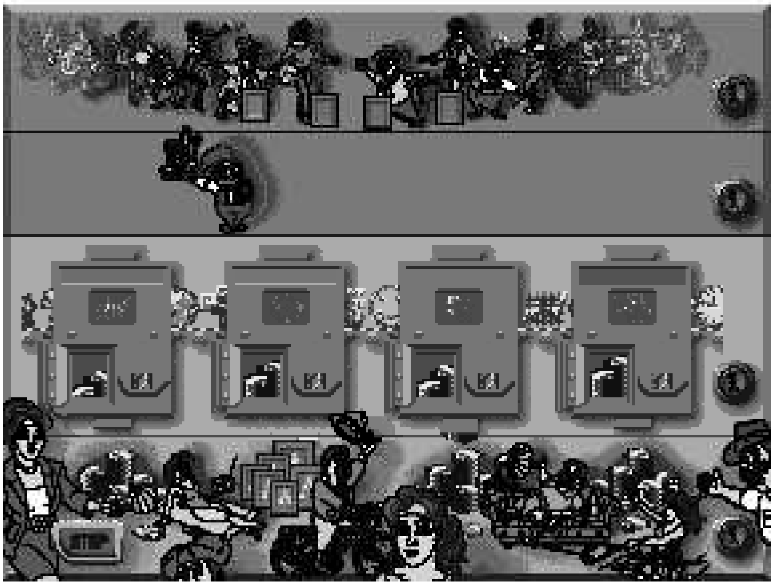


Figure 3. Animated cartoon: visualises the basic idea of investment funds

Elements like fun cartoons (Figure 4), a savings quiz, a pearl searching game and hidden gags are included to tempt users to explore all parts of the catalogue and to use it repeatedly. The fun elements also help customer advisors to establish a positive rapport with the customer when MINNELLI is used as a sales support tool.

Figure 4. Fun cartoon

MINNELLI further exploits the potential of the electronic medium's interactivity with the help of simulations (Figure 5). Customers get transparent information about the service with respect to their individual situations by simply moving sliders up and down. This enables customers to play with different investment strategies or – as shown in Figure 5 – to find out whether they can afford to buy a house. The simulation is carried out in real time and with immediate feedback.

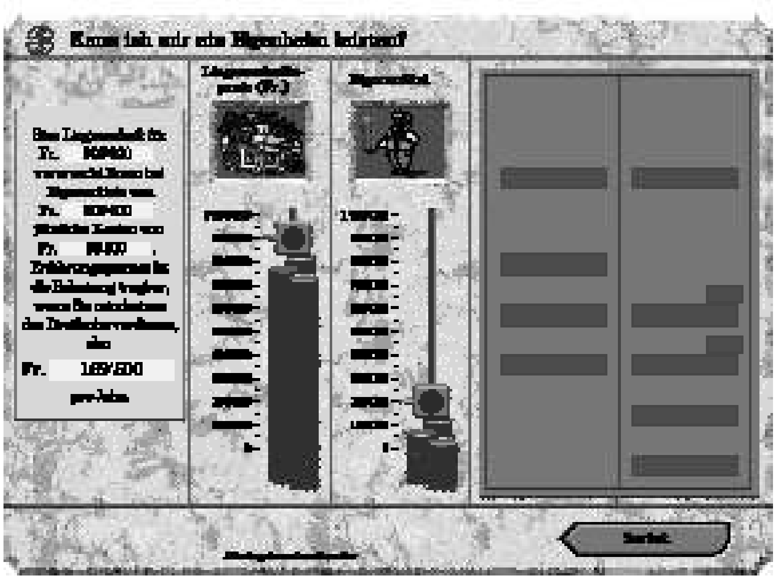
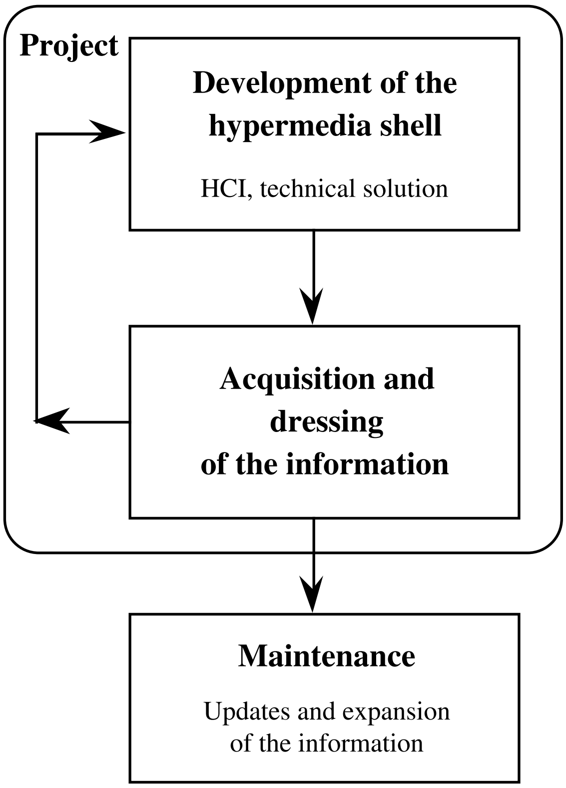


Figure 5. Interactive simulation on mortgage loans

Customers handle the system with the help of three metaphors: by touching signposts they move through the catalogue, pressing on buttons lets them start films or open simulations, and with sliders they operate the parameters of the simulations.

3 Design and Development of MINNELLI

Project management emphasised on an evolutionary and cyclic approach to development and on user participation. It was generally based on the work of [Boe88], [Flo89], [Bis92] and [Pom93]. The project differentiated between the development of the hypermedia shell and the information acquisition and dressing (Figure 6). The user interface model is largely based on the User Software Engineering (USE) methodology described by [Was85].



Creative development process of HCI specialists, artists and technical staff: Iterations of conceptual design, interactive design and visual design [Sch92] result in a prototype that serves as a shell for the information kiosk. Users are involved for usability testing.

The main work of information preparation (structuring of information, composing text, etc.) has to be done by experts in the field. The artists implement the ideas in cooperation with the HCI specialists. Further usability tests serve to improve the user interface.

Experts in the field in cooperation with the artists support the information base. Technical staff maintains the shell.

Figure 6. Hypermedia development model used in the MINNELLI project

Stage One: Development of the Hypermedia Shell

At the beginning only 4-5 persons were involved in the MINNELLI project. This proved to be very efficient. A small, ‘jelled’ team [DeM87] worked on the hypermedia shell, iterating across the three design levels mentioned in figure 6 [Sch92]. After half a year a first prototype was built, tested by users and placed as pilot in one branch of the bank.

Stage Two: Acquisition and Dressing of the Information

Early in the summer of 1992 MINNELLI was ready to be introduced to experts in the field within the bank. Representatives from various UBS branches reacted enthusiastically to the prototype and wanted to know when they could buy it. The developers were overwhelmed by this reception and found it very difficult to convince the bankers that what they were seeing was still only a prototype and by no means a finished product. Consequently, an intensive collaboration with representatives from seven branches chosen as pilot locations was established.

Project guidance still lay with the HCI team in UBILAB, but conceptual work now took place in regular monthly workshops with the experts in the field. The experiences in the MINNELLI project clearly show that experts in the field who know little about hypertext and hypermedia can become creative and competent team members if they can start out from a prototype in their own field of expertise. The HCI group and the multimedia producer attempted to implement ideas generated in the workshops as quickly as possible, thus showing the bankers that they were taken seriously and that their ideas were taken up and actually helped to improve the information kiosk.

In this second project stage multiple feedback loops and observations of customers actually using MINNELLI in the seven pilot locations brought about important shifts in the emphasis of the catalogue's use which would not have happened with only small scale testing under laboratory conditions.

4 Evaluation of User Acceptance

While usability testing during the design process has become an established practice, systematic evaluation of user acceptance of software after shipping is rarely done. In the special case of hypermedia information kiosks this is particularly important and difficult. It is important because the system has to attract its users by itself, and because only satisfied users will reuse and propagate the system. It is difficult because users of point of information (POI) systems cannot be identified and do not buy anything which would generate measurable figures like sales or turnover. Nevertheless, research in different areas (e.g. software engineering or cognitive science) has proposed several methods to measure user satisfaction ([Bae87] pp. 135-137), [Bai83], [San84], [Shn86], [Cha86]. Similar to TV commercials, POI systems address the public. Therefore, marketing and market research methods can be adapted to evaluate user acceptance of information kiosks [Kot91], ([Boo92] pp. 130-132).

The following methods allow information providers to evaluate user acceptance of their system:

- usability testing,
- observing users,
- interviewing sales staff,
- obtaining user feedback with interviews or surveys,
- group discussions,
- analysis of log files,
- correlation between use of the information kiosk and sales.

The remainder of this section describes the methods. In the next section their respective results in the MINNELLI project are presented.

Usability Testing

Usability testing is a well-known method to improve software in its design and development stage [Mag89]. During these tests potential users are closely observed, while they try to solve a given set of tasks with the help of the system [Gom90]. Expensive and high quality experiments can be done in well equipped usability testing labs [Nie94]. At the other end of the scale [Tog92] presents user testing 'on the cheap' with just a pencil and a piece of paper.

Observing Users

Observing people in their natural surroundings can be done by video recording or by direct observation on location. Both may be unobtrusive if the observer is hidden.

Interviewing Sales Staff

Employees working near an information kiosk can give valuable feedback. This information is often an important indication what to test by other methods like user interviews or log file evaluation.

Obtaining User Feedback

User opinion can be obtained by interviews and surveys. Verbal interviews can be done by telephone or personally. They can be standardised (the interviewer must keep exactly to the given question), structured (the questionnaire serves as a guideline) or free (the interviewer is free what to ask). Surveys contain written feedback of the users on printed forms or on-line. Figure 7 provides an overview with a comparison between the written survey, the telephone interview and the personal interview. For details about creating a questionnaire the reader is referred to [Shn86] and [Kot91].

inquiry method characteristics	written survey	telephone interview	personal interview
costs	inexpensive	not very expensive	quite expensive
sample	5 - 25 % response rate; not representative	adequate sample could be difficult to obtain	interviewers can select the sample
questions	only simple questions	simple questions; only limited multiple choice questions; no figures	everything is possible; high quality may be achieved
error due to external impact	uncontrollable impact of external factors	small impact of the interviewer; perfect control	high impact of the interviewer; restricted control

Figure 7. Characteristics of different inquiry methods (adapted from [Küh86])

Group Discussions

This method is proposed by Ben Shneiderman ([Shn86], p. 407). After individual interviews have been evaluated, group discussions are valuable to ascertain the universality of this results.

Analysis of Log Files

Computer-based systems are able to keep a time-stamped record of user interaction, which, for example, allows the analysis of patterns of usage [Nel94], number of users and duration of sessions. This method provides objective data about a system's use. However, since users of information kiosks cannot be identified, qualitative statements are difficult to make.

Correlation between Use of the Information Kiosk and Sales Figures

This method tries to connect the information about a product provided by a POI system with the actual sales figures for the product. In order to pay for the costs of a POI system, the act of gathering information must translate into the actual purchase of products. To measure this connection any other factors with possible influences on sales (e.g. special promotions or other new equipment) should ideally be eliminated. Only in such a controlled situation can changes in sales figures be attributed to the POI system with a high probability.

Alternatively, customers buying a product can be asked (or just observed) whether they have used the information system and whether it had any influence on their decision to buy the product.

5 Evaluation Results & Key Experiences in the Design of the MINNELLI User Interface

As pointed out in section 3, the MINNELLI project made intensive use of usability testing during the early project phases. However, since users of an information kiosk normally do not aim to solve a specific task, later usability tests had to be supplemented by observing actual users: One key insight was gained with respect to the help functionality. In the first prototype a cartoon character explained all the features of the system in a three minute film. Observations and usability testing revealed that users cannot manage this meta-information, i.e. they did not realise that they were on a meta-level where the elements that were being explained were not active themselves. Additionally the help film proved to be far too long. The problem was solved by excluding an on-line help altogether and improving the design of the interface elements (buttons, sliders, signposts) and the navigation structure instead.

30 customer advisors were interviewed on MINNELLI. While user acceptance was generally described as being good, many of the interviewees pointed out that customers seldom used the system spontaneously. This can be explained to a large extent by the fact that bank customers in Switzerland do not yet expect to find innovative self-service equipment in a bank. The staff suggested that the introduction of an electronic catalogue should ideally be accompanied by a sales promotion. Unfortunately, this was not possible for the research prototype. In general, the answers of the customer advisors to questions which allowed direct comparison to customer interviews corresponded closely to those given by the customers. Interviewing the bank's sales staff gives some information about MINNELLI's direct return on investment: only 5 out of 30 customer advisors reported that they had observed people buying a bank product after using MINNELLI.

A sample of 195 users and 547 non-users were interviewed over the period of one week, to test the following hypotheses:

User acceptance:

H1: 90% of the customers are able to use the system without any problems.

H2: It is easier for customers to use MINNELLI than to go to the desk to ask for information.

H3: The system is used by a wide range of customers.

Knowledge transfer:

H4: Users draw new information from the information kiosk.

H5: More than 60% of the users make repeated use of MINNELLI.

Business utility:

H6: Customers buy bank products after using MINNELLI.

H7: The electronic catalogue reduces the time needed for providing advice to customers.

Image of the bank:

H8: MINNELLI has a positive effect on the bank's image.

While the hypotheses H1, H3, H7 and H8 were confirmed by the customer interviews, the other four had to be rejected (H2, H4, H5 and H6) [Ste94].

The MINNELLI prototype was tested for 13 months. 20'000 sessions with 1.5 billion entries were recorded. The analysis of these log files helped to detect weaknesses in the user interface [Ans93]: A typical design error concerned (unplanned) hidden functionality. In the early versions of MINNELLI films could be stopped by touching anywhere on the screen. The log files revealed that films were often interrupted and then in many cases restarted immediately. Observations showed that users often touched the screen accidentally thus terminating a film inadvertently. Consequently this hidden function was eliminated by introducing a red "Stop" button. Any remaining hidden functionality is now deliberately restricted to fun elements.

Figure 8. Start button

Since information kiosks have to attract their users with the help of eye-catchers, the first MINNELLI prototype contained an animated trailer with music. A cartoon character invited people to simply touch the screen in order to learn more about the bank's services. Sales personnel reported back to the development team that many people merely watched the film but did not react by touching the screen. Further investigation showed that customers thought they were watching a video, in spite of the voice telling them to touch the screen. The system proved to be too active by itself and prevented less adventurous people from taking the crucial step from passive watching to active exploration. This was in fact the central hurdle in the system's usage, as the great majority of users had no trouble at all handling MINNELLI after they had mastered the first click. The problem was solved as follows: the music in the trailer was cut out altogether and MINNELLI now attracts potential users with a large blinking green button in the centre of the screen and the words "Please touch this start button" (cf. Figure 8). Anyone who looks at the system now is immediately aware that they have to take the initiative. While it was difficult for customers to judge what the consequences of interrupting the trailer would be, the functionality of the start button is grasped intuitively. The decision to alter the eye-catcher proved right, since it led to a marked increase in user sessions.

6 Conclusion

Based on the experience of the MINNELLI project a model that supports the successful development of hypermedia information systems has been described. In essence it provides a separation between the evolution of the shell (focus on HCI and technical aspects) and the subsequent generation of the information base (texts, graphics, films etc.). Postponing the involvement of experts in the field until the second stage of the project has two major advantages: during the first stage a small team can efficiently concentrate on the creation of a conceptually sound and technically advanced prototype (shell) without submitting their creativity to the demands of a big committee; later on experts in the field can work much more effectively and creatively if they can start out from a prototype in their own field of expertise.

The evaluation of user acceptance of hypermedia information kiosks is a new field of research. Nevertheless methods from neighbouring fields like software engineering, marketing or cognitive science can be adapted to collect data about user satisfaction, e.g. user observation, interviews, surveys or monitoring.

Experiences from the MINNELLI project serve to demonstrate that using a broad spectrum of evaluation methods together with user centered development results in a user-friendly information kiosk which customers can work with intuitively and easily.

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