

A New Perspective on UX: The Indirect User Experience

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ABSTRACT

Computer systems are first and foremost designed for single users in traditional desktop situations. The needs of the indirect users, those who are not using the system directly but are yet affected by it, are often overlooked. Based on empirical findings from two usability evaluations in a hospital simulator with physicians and patient actors, this paper discusses how changes in user interface can affect both the user experience of the primary user and that of the indirect user. Finally, it discusses implications for designing for the indirect user

Categories and Subject Descriptors

H.5.2 [User interfaces]: User-centered design,

General Terms

Human Factors

Keywords

User Experience, UX, indirect user experience, CSCW, mobile

INTRODUCTION

Most ICT systems are primarily designed for *primary users*, users who are working independently in traditional desktop situations. User experience, as defined in ISO 9421-210 [1], is first and foremost associated with the primary user: “[It is] *a person's perceptions and responses that result from the use or anticipated use of a product, system or service*”.

The needs of *indirect users*, users who are not using the system directly but yet affected by it, are rarely in the minds of the system designers and developers. This is normally unproblematic for traditional systems designed for single users. However, as collaborative and mobile systems are becoming more common, the use of such systems will have effects on people outside the sphere of the primary user. While most systems have clear roots in the needs of the primary users, there is often little or no focus on the indirect users.

In this paper we seek to define the *indirect user experience*. Further, drawing on usability evaluations of mobile devices used in a realistic hospital setting, we identify in what ways the design of the user interface affect the indirect user in

that setting. We also discuss implications on how the user interface can be designed to accommodate the needs of the indirect user.

BACKGROUND

Traditionally, an end-user is considered as the person who directly interacts with an information system. However, end-users, as defined by Faulkner [2], can be (1) *direct users*, who use the system themselves, (2) *indirect users*, who ask other people to use the system on their behalf, (3) *remote users*, who do not use the system, but depend on the output, or (4) *support users*, who ensure that the system works for others, such as direct users.

We choose to use a simpler and more straightforward end-user categorization. We divide end-users into (1) *direct users* and (2) *indirect users*, where the first category includes primary users and all other stakeholders who directly interact with an information system. The latter includes end-users who are not directly interacting with the system and corresponds to Faulkner's [2] indirect and remote users.

A number of HCI publications refer to a 1997 draft of ISO 9241-11:1998 [3]. This version contained reference to indirect users: “[Satisfaction is] the comfort and acceptability of the work system to its users and *other people affected by its use*”. However, this reference to indirect users was omitted in the final version (see [4] for an example).

METHODS

The empirical grounding for this position paper come from two simulation-based usability evaluations of mobile systems for hospitals [5,6]. Both evaluations were conducted in a simulated hospital environment with multiple users; real physicians and patient actors in the hospital beds.

In the first evaluation, we explored several ways of letting doctors use handheld devices together with bedside mounted patient terminals for viewing x-ray images together with the patient [5].

In the second evaluation we explored interaction techniques for a handheld medication system, one paper based and three mobile patient record systems [6].

In the two evaluations, both the physicians and the patients were interviewed about aspects concerning the user experience of the mobile devices. In this case, the patient is the indirect user.

RESULTS

Below some of the observations from the experiments related to aspects of the user experience for primary and indirect users are presented.

The new technology increased UX for the primary users: Although the physicians in general were confident and comfortable with the paper chart, they preferred using the mobile device. A number of functions and attributes, such as pocket size, error prevention and undo mechanisms, contributed positive to the UX.

Action transparency: When moving patient records from paper-based media to mobile technology we observed that the physicians' actions were less visible for patients, i.e. the indirect user. While it was easy for the patient to see whether the physician was adding, searching or obtaining information with the paper chart, all actions appeared similar with the mobile device. This was considered negative by the patients.

Nonverbal communication: The physical form factor of the paper chart allowed the physician to use it as a channel for nonverbal communication (i.e. signal that the consultation was ending by closing the chart). This was harder with the PDA, and was considered negative by the patients.

Doctor-patient dialogue: The user interface of the mobile device increased legibility and allowed the physicians to undo and prevent medication errors. On the other hand, the user interface had poor information overview and unfamiliar interaction techniques. This required much of the physicians' attention. According to patients, it affected the doctor-patient dialogue and decreased their satisfaction of the consultation.

Negative patient experience: In some of the design solutions of the first evaluation the doctor controlled the patient terminal through the PDA. While this was seen as a major benefit from the perspective of the physicians who could hide information on the PDA and display public information on the PDA, it was perceived as negative from the perspective of the patients. They perceived the PDA as a mystical thing and did not like that things were hidden for them.

Positive patient experience: In other design solutions the physicians controlled the system through the patient terminal. Unintentionally it allowed the patient to control the terminal. For the patient this was perceived as an improvement. For the physicians, however, it became harder to control the system because they had to bend over the patient to use it.

User interface complexity: In some versions of the first evaluation, the controls for changing information content

were present on the patient terminal. The increased complexity of the GUI confused some patients. They rather preferred the versions where these controls were moved onto the PDA.

DISCUSSION

The findings from the evaluations gave new insight related to the user experience.

User experience is relevant for indirect users. The studies demonstrated, not surprisingly, that technology had an impact on the user experience of the physicians, who were the primary users. Further, our observations indicated that the system design also had an impact on the indirect users. The patients had some sort of user experience; they had strong perceptions and responses about the system, although they had not used the systems directly themselves.

Indirect user experience defined

Based on the findings that UX is relevant for indirect users, I attempt to define the indirect user experience based on the ISO 9241-210 definition [1]:

Indirect user experience is defined as *a person's perceptions and responses that result from another user's use of a product, system or service.*

Having defined indirect user experience, we present a further analysis of our findings.

Firstly, the observations showed that even if UX was improved for physicians, it had in some cases negative effects for patients.

Improving the user experience for the primary user can have negative consequences for the indirect user.

Second, we also observed that when the indirect user experience was improved, it sometimes created problems for the physician.

Improving the user experience for the indirect user can have negative consequences for the primary user.

We consequently are faced with tradeoffs between the needs of the primary and indirect users.

Impact of social factors on indirect user experience

As shown, the indirect user experience was influenced by the user interface of the system. However, there may also be other factors affecting the indirect user experience. Firstly, the user experience may differ because they have different roles and interests in the situation. Second, they are in a social context where the indirect user is experiencing (at least) two things; the direct user's interactions with the system, and the direct user's social interactions.

Implications for design

Accommodating the needs of the indirect users is important. In the context of a ward round with a physician

and a number of patients, a positive indirect user experience can have positive effect on the doctor patient dialogue, which is important for the treatment and care of the patients [7]. In the context of business, for example a travel agent serving a traveler, an improved indirect user experience can have positive effect on the customer experience. In business, this often means returning customers and increased revenue [8].

Below we suggest some implications for design based on the findings from the evaluations:

Give system feedback to the indirect user: By increasing the action transparency (i.e. increase visibility of actions) or providing system feedback also to the indirect user, one can increase the indirect user experience.

Support non-verbal communication: Indirect user experience is correlated with the ability of the primary user to communicate with the indirect user. The system can hinder this communication, especially the non-verbal aspects when the system occupies the hands of the primary user. Therefore, the physical form factor of the device needs to afford nonverbal communication.

Use the language of the indirect user: By presenting the information for the primary user in the language of the indirect user, the primary user can be guided to use simpler terms and communicate on the same level as the indirect user (i.e. physicians use terms like “blood sugar level” instead of “glucose”).

Provide a tailored GUI for the indirect user: If feasible and necessary, an additional device/GUI with information tailored for the indirect user should be provided. This will give the indirect users a version of the information where unnecessary complexity is trimmed away.

Implications for software development

Indirect user experience also has some consequences for how we develop software:

Design for the indirect user: Address the needs, and include the perspective of the indirect user into requirements. This can ensure positive user experiences for indirect users.

Evaluate with the indirect user: Indirect users should be present when the system is evaluated, and their opinions should be collected.

CONCLUSION

When designing information systems that have effects on people beside the primary user, the designer and requirements engineer must address the need of all types of end-users. This includes the needs of the *indirect user*, and implies that one has to design for the *indirect user experience*. Sometimes this implies that the designers deal with conflicting needs between the direct and indirect users.

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