

# Ensuring the Usability of Systems That Adapt to Their Users

Proposal for a CHI 2008 Course

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## 1 Timing

### *Duration*

This course requires one 90-minute block. A more thorough treatment of the topic, with more active participation by the participants, could be given in two 90-minute blocks, and in fact some participants in the CHI 2007 course explicitly suggested such a change. Although I would in principle be glad to expand the course in this way, I would be concerned that the longer duration might discourage many participants from attending, since they would have to skip too many other CHI events. As in 2007, I am including in the course notes an unusual amount of supplementary material that helps to compensate for the limited duration.

## 2 Learning Objectives

The course concerns ways of dealing with the usability issues that typically arise in the design of systems that adapt to their users, which may range from adaptive user interfaces to recommender systems in e-commerce. Although some of these usability issues have been discussed in the literature since the 1980s, the most widespread approach to dealing with them is the application of general principles like “put the user in control”. Such principles are of limited use to designers who need to make specific design decisions; their uncritical application can have side effects that outweigh the benefits of adaptation.

After completing the course, participants will be better equipped to make informed design decisions concerning the usability issues associated with adaptivity. They will:

- be familiar with a variety of concrete examples of the forms that the usability issues can take and ways in which they have been dealt with successfully;
- be aware of general design strategies that have been applied in dealing with these issues;
- have some experience in thinking about the tradeoffs that typically arise when these strategies are applied, using a generally applicable theoretical framework.

In addition, participants who go on to make use of the supplementary materials in the course notes will:

- acquire an up-to-date overview of the state of the art in user-adaptive systems, with a focus on those that are deployed or close to deployment;
- learn in the context of their own work how to apply the knowledge conveyed in the course to realistic problems of interest to them.

## 3 Material That Will Be Covered

With reference to a briefly presented concrete example, the characteristic of adaptivity will be defined, so that participants understand why superficially different systems raise similar usability issues: A system is said to be *user-adaptive* if it adapts its behavior to individual users on the basis of processes of user model acquisition and application that involve some form of learning, inference, or decision making.

An brief overview of the typical usability issues will then be given. In the terms used in the instructor’s chapter in the *Human-Computer Interaction Handbook* ([1], [2]), adaptivity can threaten the general usability goals of *predictability and comprehensibility, controllability, unobtrusiveness, privacy, and breadth of experience*. As an advance organizer, a preview of the recommended conceptual framework for thinking about these issues will then be presented: Usability challenges are understood in terms of typical properties of adaptive systems that can threaten the usability goals. *Remedial measures* aim to limit the negative consequences of these properties, while *preventive measures* aim to limit the extent of these properties in the first place.

A sequence of three case studies will then be presented, whose overall goal is to build up a sophisticated understanding of ways of dealing with these usability issues. Each case study will include:

- a demonstration or other concrete presentation of a system that shows participants what specific form the usability issues take and how they have been dealt with in the system’s design;
- a discussion of the preventive or remedial measures that were—or could have been—applied in the design of the system;

- a discussion of tradeoffs involved in the application of these measures;
- a brief summary of the results of one or more relevant studies involving systems like the one used in the case study.

As the participants become more familiar with the concepts introduced, the discussion of the case studies will focus increasingly on the ways in which the best solution to tradeoffs can vary over users and situations and on ways of enabling users to choose the solution that best fits their preferences and situation.

The first two case studies concern two systems that almost all participants are familiar with:

- The recommendation functions of amazon.com raise all of the usability issues to some degree, and the system offers a number of interesting and illustrative solutions
- The SMARTMENUS of Microsoft Office and Windows raise the typical issues concerning adaptive interfaces. A number of empirical studies have focused on this type of adaptive menu. The replacement in Office 2007 of menus with *ribbons* allows us to view this discussion from a new perspective.

The third case study, which has proved useful in previous courses, is the instructor's adaptive web-based system for planning conference attendance ([3]).

#### 4 Assumed Background and Expected Skills of Attendees

The course is directed at practitioners and researchers who are currently involved—or who are likely in the future get involved—in the design of systems that involve some sort of adaptation to the user (even if the adaptation is a relatively minor aspect of the overall system). Previous experience with the issues involved is not presupposed, though participants with relevant experience will be better able to participate actively in discussions. The instructor's experience indicates that even designers and researchers who have been dealing with adaptive systems for a long time can benefit from the conceptual framework and concrete examples presented in the course.

The course is *not* intended for those who would like a lightweight, entertaining introduction to systems that adapt to their users, including a few guidelines for ensuring their usability; or for persons who are interested only in one particular type of user-adaptive system—which may be quite different from those included in the case studies.

#### 5 Justification for a CHI Audience

Only a minority of the systems dealt with by members of the CHI community exhibit any form of adaptation to the user, and in fact many members of the community are skeptical about such systems because of the usability challenges that they raise. On the other hand, as successful examples have shown, there are contexts in which some form of adaptation to the user can yield tangible benefits, provided that the us-

ability challenges are dealt with appropriately. The ability to deal constructively and realistically with these issues is therefore a potentially valuable addition to the skill sets of many designers and researchers.

The instructor's previous tutorials that covered adaptive systems more broadly have typically attracted several dozen attendees at various conference venues, including CHI (cf. Section 9). Focusing on the usability issues seems appropriate for a CHI course, since it will allow this topic to be treated in appropriate depth within a short course that will not make CHI attendees miss many other CHI events.

#### 6 How the Course Will Be Conducted

As is indicated in Section 3, during most of the 90 minutes the instructor will be showing concrete examples, eliciting ideas from participants, and summarizing the points raised with reference to general concepts and principles. Although the brief duration will not allow time for group work or group discussions, the style will be concrete and interactive, ensuring that participants think actively about the systems and issues presented.

#### 7 Schedule

5 minutes: Greeting, brief motivation, and preview of the course.

10 minutes: Presentation of basic concepts with reference to a demonstrated example system (e.g., amazon.com recommendations).

60 minutes: Presentation and discussion of three case studies of increasing complexity and subtlety .

15 minutes: Discussion of questions and examples provided by participants from their own experience.

#### 8 Course Notes

The course notes will include the following materials:

- Organizational material (e.g., schedule, table of contents)
- Printed copies of the course slides
  - In addition to the slides actually shown in the course, these slides will include (a) screen shots of the systems demonstrated live and (b) some textual slides summarizing what the instructor said while demonstrating systems or presenting graphical material.
- Worksheets (cf. the last page from the example course notes at the end of this document) that participants can use for guidance in their own work
  - These worksheets list specific questions that can be asked about particular usability issues along with possible answers to the questions. They will help the participants apply ideas from the course even long after the course.
- Reprint of handbook chapter
  - The latest version of the instructor's chapter *Adaptive Interfaces and Agents* for the *Human-Computer Interaction Handbook* ([2]) includes one section on the topic of this course and also gives an overview of the broader topic of

systems that adapt to their users. The chapter includes about 100 references to (mostly recent) literature.

## 9 History and Modifications for CHI 2008

A very similar course was given by the instructor at CHI 2007. He had given given full- and half-day tutorials on the broader topic of systems that adapt to their users at CHI 2001, CHI 2002, IUI 2001, UM 1999, UM 2003, and AH 2006. (Together with John Riedl and Joseph Konstan, he has also given tutorials on recommender systems at AAAI 2002, IJCAI 2003, AAAI 2004, and IUI 2007.)

The evaluation results for the 2007 course, as well as comments made directly by some of the participants, indicated that, for many of the course participants, the course delivered exactly the intended benefits. But the evaluation comments of some participants showed that they had come to the course with expectations that the course had not been designed to fulfill. Accordingly, my revision strategy is not so much to change the nature of the course itself as to take steps to ensure that it is chosen by (only) those participants who want what the course offers: a deeper-than-usual treatment of its topic, with somewhat more abstraction and generalization than may be typical of CHI courses (cf. the remarks in Section 4 about attendees for whom the course is not intended).

## References

1. Anthony Jameson. Adaptive interfaces and agents. In Julie A. Jacko and Andrew Sears, editors, *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications*, pages 305–330. Erlbaum, Mahwah, NJ, 2003.
2. Anthony Jameson. Adaptive interfaces and agents. In Andrew Sears and Julie A. Jacko, editors, *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies and Emerging Applications*. Erlbaum, Mahwah, NJ, 2nd edition, 2008.
3. Anthony Jameson and Eric Schwarzkopf. Pros and cons of controllability: An empirical study. In Paul De Bra, Peter Brusilovsky, and Ricardo Conejo, editors, *Adaptive Hypermedia and Adaptive Web-Based Systems: Proceedings of AH 2002*, pages 193–202. Springer, Berlin, 2002.