Conceptual Models:
Core to Good Design

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ABSTRACT

A crucial step in designing a user interface for a software application is to design a coherent, task-focused conceptual model (CM). With a CM, designers design better, developers develop better, and users learn and use better. Unfortunately, this step is often skipped, resulting in incoherent, arbitrary, inconsistent, overly-complex applications that impede design, development, learning, understanding, and use. This course covers what CMs are, how they help, how to develop them, and provides hands-on experience.

CCS CONCEPTS

• **Human-centered computing** → Interaction design → Interaction design process and methods
• **Human-centered computing** → Human-Computer Interaction → HCI design and evaluation methods → user models

KEYWORDS

Conceptual model; software design; user interface; UI; interaction; design process; design methods; design techniques; psychological basis for design methods; task analysis; ontology; information architecture.

BENEFITS

Designing a conceptual model is an important step in designing a user interface – possibly the *most* important step. The conceptual model is the *ontology* of an application: how it carves the task-domain into concepts – objects, operations, attributes, relationships – and how concepts are related. The goal is to devise a conceptual model based on the users' *task domain*, rather than on the underlying technology. Many UI designers, software developers, and development managers don't understand this: they jump straight to sketching and prototyping user interfaces, often resulting in applications that are incoherent, arbitrary, overly-complex, and that require users to understand concepts that are irrelevant to their tasks.

INTENDED AUDIENCE

This course is intended for software designers and developers of all levels of experience. Others who might benefit: Software Q/A engineers, usability testers, and development managers.

PREREQUISITES

Some experience designing UIs would be helpful.

CONTENT

This course covers:

- What conceptual models are.
- How they improve software design and development.
- How UIs based on conceptual models provide a better fit with human learning and cognition.
- Perils and pitfalls of not designing a conceptual model.
- Object/operations analysis (part of designing a conceptual model).
- An example conceptual model for a specific application.

PRACTICAL WORK

Hands-on whole-classroom and small-group exercises designing conceptual models for simple applications.

AGENDA

Part 1 (80 min)

- The Role of Conceptual Models (CMs) in Using and Designing Tools (15 min)
- Conceptual Model Basics (20 min)
- Benefits and Bloopers (15 min)
- Notation for Representing CMs (5 min)
- CMs' Place in Development Process (5 min)
- Whole-class exercise: Object/Action Analysis of a Simple Application (20 min)

Part 2 (80 min)

- Small group exercise: Object/Action Analysis of a second Simple Application (40 min)
- Discussion of Exercise Results (35 min)
- Summary, Wrap-Up, Evaluations (5 min)

INSTRUCTOR BACKGROUND

Jeff Johnson is a Professor in the Computer Science Department of the University of San Francisco. After earning B.A. and Ph.D. degrees from Yale and Stanford, he worked at Cromemco, Xerox, US West, Hewlett-Packard Labs, and Sun Microsystems. In 1990, he co-chaired the first Participatory Design conference, PDC'90. He serves on the SIGCHI U.S. Public Policy Committee. He has also taught at Stanford University and Mills College, and in 2006 and 2013 he taught HCI as an Erskine Fellow at the University of Canterbury in New Zealand. He is a member of the ACM SIGCHI Academy and a SIGCHI Lifetime Achievement in Practice Awardee. He has authored or co-authored many articles and chapters on Human-Computer Interaction, as well as the books *GUI Bloopers*, *Web Bloopers*, *GUI Bloopers 2.0*, *Designing with the Mind in Mind*, *Conceptual Models* (coauthored with Austin Henderson), *Designing with the Mind in Mind, 2nd edition,* and *Designing UIs for an Aging Population* (with Kate Finn).

RESOURCES

[1] Johnson, J. (2013) "Conceptual Models in a Nutshell", Boxes and Arrows (blog), Jan 22, 2013:
http://boxesandarrows.com/conceptual-models-in-a-nutshell

[2] Johnson, J. and Henderson, D.A. (2002), "Conceptual Models: Begin by Designing What to Design", *Interactions*, Jan-Feb 2002.

[3] Johnson, J. and Henderson, D.A. (2011), *Conceptual Models: Core to Good Design*, Morgan & Claypool Publishers.