Wisdom is not the product of schooling but the lifelong attempt to acquire it. - Albert Einstein

Converging on a "Science of Design" through the Synthesis of Design Methodologies

Chris DiGiano, Gerhard Fischer, Elisa Giaccardi, Kumiyo Nakakoji, Yunwen Ye

CHI’2007 Workshop, April 2007, San Jose

http://swiki.cs.colorado.edu:3232/CHI07Design/3
Design: A **Hot** Topic

- NSF “Science of Design” Program

- Design Perspectives in
  - HCI
  - Software Engineering
  - Business
  - Creative Practices
  - Education

- NSF Program in “Creativity and IT”
# Time Frames in HCI


<table>
<thead>
<tr>
<th>Seconds</th>
<th>Time (common units)</th>
<th>Action</th>
<th>Memory</th>
<th>Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^9$</td>
<td>(decades)</td>
<td>Technology</td>
<td>Culture</td>
<td>Social and Organizational</td>
</tr>
<tr>
<td>$10^8$</td>
<td>(years)</td>
<td>System</td>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>$10^7$</td>
<td>(months)</td>
<td>Design</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>$10^6$</td>
<td>(weeks)</td>
<td>Task</td>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>$10^5$</td>
<td>(days)</td>
<td>Task</td>
<td>Skill</td>
<td>Bounded Rationality</td>
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<tr>
<td>$10^4$</td>
<td>(hours)</td>
<td>Task</td>
<td>Skill</td>
<td></td>
</tr>
<tr>
<td>$10^3$</td>
<td>(ten mins)</td>
<td>Task</td>
<td>LTM</td>
<td></td>
</tr>
<tr>
<td>$10^2$</td>
<td>(minutes)</td>
<td>Task</td>
<td>LTM</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>(ten secs)</td>
<td>Unit task</td>
<td>LTM</td>
<td>Psychological</td>
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<tr>
<td>1</td>
<td>(secs)</td>
<td>Operator</td>
<td>STM</td>
<td></td>
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<tr>
<td>$10^{-1}$</td>
<td>(tenths)</td>
<td>Cycle time</td>
<td>Buffers</td>
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<tr>
<td>$10^{-2}$</td>
<td>(centisecs)</td>
<td>Signal</td>
<td>Integration</td>
<td>Neural And Biochemical</td>
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<tr>
<td>$10^{-3}$</td>
<td>(milliseconds)</td>
<td>Pulse</td>
<td>Summation</td>
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</table>
Design and Design Disciplines


  → self-conscious and unself-conscious cultures of design
Science of Design

- **design = sciences of the artificial** (Simon)
  - natural sciences: how things are
  - design: how things ought to be

- **a different level of discourse** is necessary for design than for the natural sciences
  - ill-defined, wicked problems
  - integration of problem framing and problem solving
  - change and evolution
  - satisficing

- **design is a human activity**

- **design is a collaborative activity** (bounded rationality, distributed cognition)
Design Problems

- **complex** → requiring *social creativity* in which stakeholders from different disciplines have to *collaborate*

- **ill-defined / wicked** → requiring the *integration of problem framing and problem solving*, problems have *no stopping rule*

- **have no (single) answer** → requiring *argumentation support*

- **unique** ("a universe of one") → requiring *learning when no one knows the answer*
Design Methodologies

- professional-based design
- user-centered design
- participatory design
- collaborative design
- design in the creative practices
- meta-design
Brief Introductions (by Organizers)

- Elisa Giaccardi: Creative Practices
- Yunwen Ye: Collaborative Design
- Kumiyo Nakakoji: Design Theory and Practice
- Chris DiGiano: Participatory Design and Learner-centered Design
- Gerhard Fischer: Meta Design