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

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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

(From Newell, A. & Card, S. K. (1985) "The Prospects for Psychological Science in Human-Computer Interaction," Human-Computer Interaction, 1(3), pp. 209-242.)

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

Design and Design Disciplines

- Simon, H. A. (1996) *The Sciences of the Artificial,* The MIT Press, Cambridge, MA. → the "bible" for the 'Science of Design' Program at NSF

- Schön, D. A. (1983) *The Reflective Practitioner: How Professionals Think in Action,* Basic Books, New York.

- Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., & Angel, S. (1977) *A Pattern Language: Towns, Buildings, Construction,* Oxford University Press, New York.
  → **Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1995) *Design Patterns - Elements of Reusable Object-Oriented Systems,* Addison-Wesley Publishing Company, Inc., Reading, MA.**

- Alexander, C. (1964) *The Synthesis of Form,* Harvard University Press, Cambridge, MA.
  → **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
  - satisfycing

- **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