User Modeling

- key concerns
  - how to acquire the user model
  - how to represent the user model
  - when to update the user model
  - how to employ the user model

Multiagent Systems G. Weiss 2001

- what is an agent
  - computational entity
  - perceives and acts upon its environment
  - autonomous: behaviour depends at least partially on own experience
  - operates in a variety of environments
  - makes use of problem solving, planning, decision making and learning
  - interacts with other agents
    - goal and task co-ordination
    - question: when and how to interact, with whom

- three main features of agents
  - autonomous: control over behaviour, act without human intervention
  - intelligent: optimize performance, operate flexibly (given the information they have and their capabilities to perceive and act)
  - interacting: may be affected by other agents or humans in pursuing goals, may use shared language, may need to coordinate (cooperative) or maximize individual beneft (self-interested)

Chaib-Draa Overview Paper on Distributed AI

- 3 main areas of concern
  - social abilities: reasoning about other agents
  - organization: degree of cooperation and communication
  - dynamics: global cohesion of group and coordination mechanism

- social abilities
  - reasoning about others
    - plan recognition, user modeling, models of belief
  - assessment of distributed situation
    - what knowledge is relevant (may include joint plans)
    - avoid duplication of effort
    - address conflicting actions
      - centralized strategy: one agent knows all
      - distributed strategy: each agent has view of others; may need to negotiate

- organization
  - degree of cooperation (self-interest vs. cooperation)
    - cooperative distributed problem solving
      - contract nets (smith and davis): agent who needs help announces to group, collects bids, awards problems to best bidder
    - agents with conflicting goals
      - may need mediator to negotiate
      - mechanism design (Kate Larson)
      - example: meeting scheduling, each agent representing its user

- spectrum of communication
  - no communication, just infer plans of others
  - primative communication; fixed signals and interpretations
  - plan and information passing (expensive)
  - information exchange through a black-board
  - message passing (protocols)
  - high level communication (speech acts and inference)

- dynamics
  - cohesion
    - scientific community metaphor
      - proponents: collect evidence for a proposal
      - skeptics: collect evidence against a proposal
      - evaluators: work on most favourable proposals
    - cohesion affected by whether information is relevant, timely or complete

- coordination and negotiation
  - different models of negotiation
    - economic models
    - worrying about lying: game theory
    - negotiation as iterative
    - constraint-directed negotiation