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 blackboard
  - 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