

## MIT9904-12: Cooperative Computing in Dynamic Environments

Nancy Lynch, Idit Keidar, (MIT) Kiyoshi Kogure, (NTT)



# ntt&mit Project Overview



- Developing models, analysis methods for distributed systems, focusing on cooperative group activities in networks.
- Agent communication, group communication
- Dynamic:
  - Participants come and go, change location.
  - Network topology changes, components fail and recover.
- Implementations complex; hard to build/understand/analyze
- Use formal modeling/analysis methods:
  - I/O automata, pi calculus, knowledge-based methods
  - Extend, combine methods
- IOA language and toolset



## Progress Through June 2001

- IOA language and toolset
  - New parser and semantic checker
  - Translating IOA to Larch shared language (LSL)
  - Using Larch to verify algorithms in IOA
  - Experiments with connecting IOA to Daikon
- Dynamic I/O Automata
  - Mathematical model for IOA and agents
- Building blocks
  - Performance evaluation
  - Modeling reliable multicast



## Research Plan for the Next Six Months

- IOA language and toolset
  - Experiment more with connecting IOA to Daikon and Larch; get more automated help with proofs
- Dynamic I/O Automata
  - Simplify mathematical model
  - Unify DIOA and hybrid, timed, probabilistic I/O automata
- Building blocks
  - Continue performance evaluation of group communication and reliable multicast