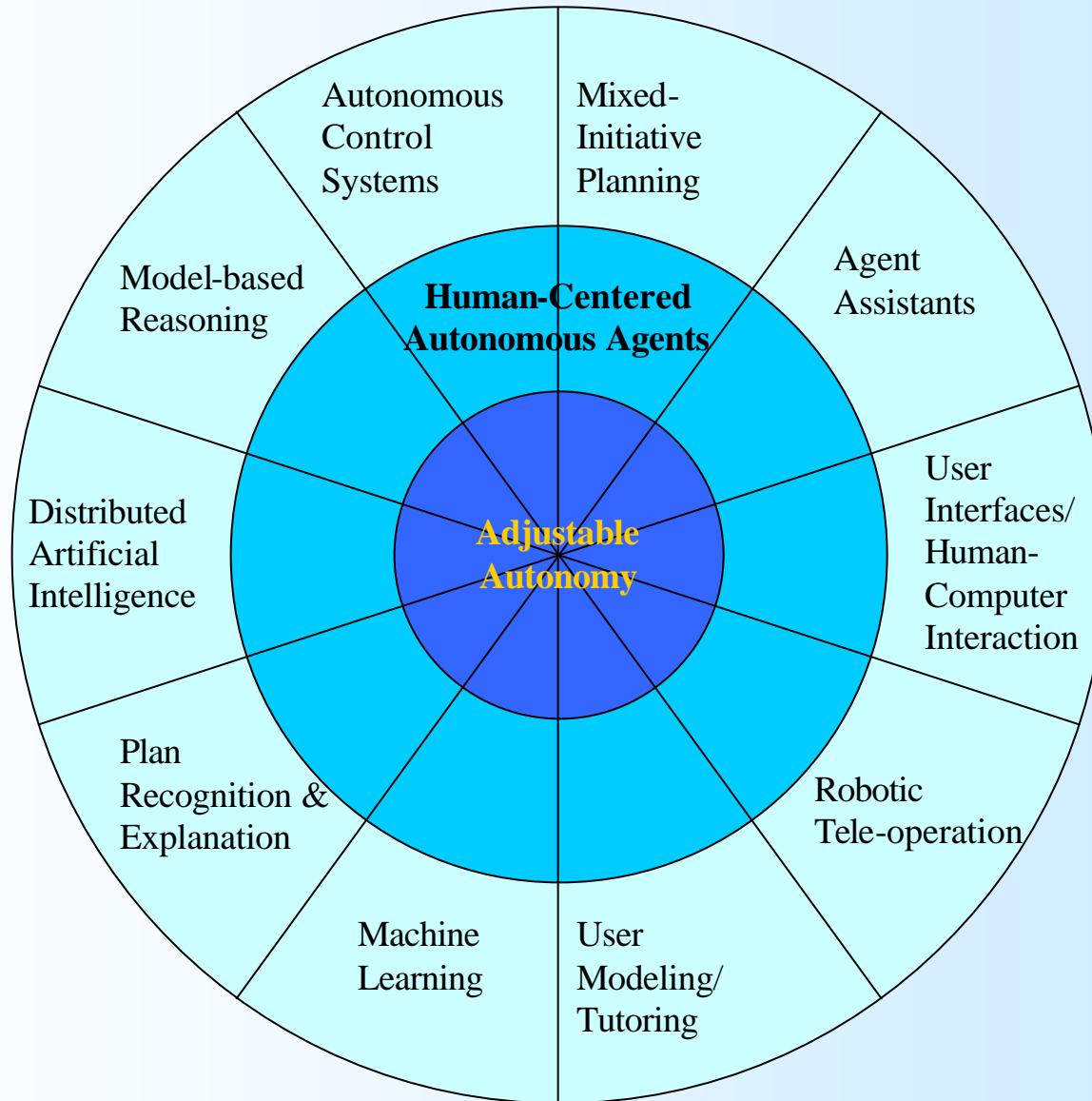


# Related Work



# Autonomous Control Systems

- Brings to table:
  - autonomous control
  - integration of continuous and symbolic
  - task contexts and off-nominal operation
- Lacks:
  - machinery for human interaction
  - explanation facilities
  - history of operations
- Citations
  - Muscettola, et al 1998
  - Bonasso, et al 1997
  - Musliner, et al 1995, Kuo, 1991

# Mixed-Initiative Planning

- Brings to table:
  - mechanisms for human involvement in plan generation
  - language for explaining choices to human
  - look-ahead search of options and consequences
- Lacks
  - execution of plans
- Citations
  - Ferguson, et al 1996
  - Burstein and McDermott, 1996
  - Pollack and Horty, 1999
  - Myers, 1996

# Agent Assistants

- Brings to table:
  - close human/computer interaction
  - studies of how humans and autonomous systems can work together safely
  - continuous sensor reasoning
- Lacks
  - fully autonomous capabilities—doesn't take charge
  - generalizable results—domain specific
- Citations
  - Chambers and Nagel, 1985
  - Decker and Lesser, 1995
  - Jorgensen, 1997

# Human-Computer Interaction

- Brings to table:
  - careful studies of how to present information to humans
  - careful studies of how to make commanding easier and less error-prone
  - simulation tools for modeling work practices
- Lacks
  - autonomous control
- Citations
  - Roth, et al 1997
  - Schreckenghost and Malin, 1991
  - Gould, 1998
  - Clancey, et al 1998
  - Gertz, Stewart, and Khosla, 1993

# Robotic Teleoperation

- Brings to table:
  - continuous control
  - shared control (human and robot each controlling different things)
  - studies in time lags between action and control
  - virtual presence and user interfaces
- Lacks
  - autonomous control
  - history of system decisions
- Citations
  - Sheridan, 1989, 1992
  - Craik, 1947
  - Hayati and Venkataraman, 1989
  - Lee, 1993

# User Modeling/Tutoring

- Brings to table:
  - psychological studies about interacting with humans
  - mechanism for presenting appropriate information to human
  - internal models of expected human behavior
- Lacks:
  - control mechanisms
- Citations
  - Anderson, et al 1989
  - Horvitz, et al 1998

# Machine Learning

- Brings to table:
  - automatic adjustments of control system
  - learning user behaviors and desires
  - adaptations to different humans and situations
- Lacks:
  - verifiable control strategies
  - observability
  - ability to change autonomy level
- Citations
  - Samuel, 1959
  - Holland, 1992
  - Mitchell, 1997
  - Grefenstette, et al 1990



# Plan Recognition and Explanation

- Brings to table:
  - mechanisms for predicting user actions
  - mechanisms for explaining system activities
- Lacks
  - autonomous control facilities
- Citations
  - Huber, et al 1994
  - Kantz and Allen, 1986
  - Canamero, et al 1994
  - Lesh, et al 1999
  - Stein, 1988

# Distributed AI

- Brings to table:
  - reasoning about multiple (including human) agents
  - distributing tasks amongst agents
  - inter-agent communication
  - resource allocation
- Lacks
  - focus on human to understand and command control system
- Citations
  - Durfee, 1999
  - Tambe, et al 1999
  - Weiss (ed), 2000

# Model-based Reasoning

- Brings to table:
  - qualitative reasoning that is intuitive for humans
  - fault diagnosis and recovery
  - explanation
- Lacks
  - autonomous control in real-time and continuous domains
  - human interface and input
- Citations
  - Williams, 1996
  - Kuipers, 1994
  - Jonsson, et al 2000

# Adjustable Autonomy

- Lacks
  - full spectrum of control
  - verification
  - understanding
- Citations
  - Barber, et al 2000
  - Bonasso, et al 1997
  - Dorais, et al 1998
  - Kortenkamp, et al 2000
  - Musliner and Krebsbach, 1999
  - Thurman, et al 1997