Good Afternoon, Colleagues

Are there any questions?
Logistics

- Anyone at the job talk?
Logistics

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- Surveys due Thursday
Logistics

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- Surveys due Thursday
- Next week’s readings posted
Proposals

- Overall, very good!
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- I’m going to skip the writing tutorial (for now)
Proposals

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• A few common problems:
Proposals

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  - No clear intro / problem statement
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  – Lots of “what” but very little “how”…
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  – . . . or too much how without identifying the challenges
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  – Not enough to convince me that it will work
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• My comments in black, Mazda’s in blue
• Will be stricter on progress reports
- Will be stricter on progress reports
  - May reflect side forays
• Will be stricter on progress reports
  – May reflect side forrays
  – Be more realistic
• Will be stricter on progress reports
  – May reflect side forrays
  – Be more realistic
  – Be much more specific
Will be stricter on progress reports

- May reflect side forays
- Be more realistic
- Be much more specific
- Have **something** implemented and evaluated
Readings Overview – OASIS

- Concretization of BDI
  - Decision nodes, chance nodes ⇒ beliefs, desires, intentions trees
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- Real time: assume significant changes to state can be determined instantaneously
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  - No constant reevaluation
Readings Overview – OASIS

● Concretization of BDI
  - Decision nodes, chance nodes ⇒ beliefs, desires, intentions trees

● Real time: assume significant changes to state can be determined instantaneously
  - No blind execution
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Implemented in an airport!
Class Discussion

Will Rogers on BDI
General Domain Characteristics

- Non-deterministic (⇒ beliefs)
General Domain Characteristics

- Non-deterministic (⇒ beliefs)
- Action choices (⇒ intentions)
General Domain Characteristics

- Non-deterministic ($\Rightarrow$ beliefs)
- Action choices ($\Rightarrow$ intentions)
- Multiple objectives, possibly incompatible ($\Rightarrow$ desires)
General Domain Characteristics

- Non-deterministic (⇒ beliefs)
- Action choices (⇒ intentions)
- Multiple objectives, possibly incompatible (⇒ desires)
- Environment determines best actions (⇒ desires)
General Domain Characteristics

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- Incomplete information (⇒ beliefs)
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- Dynamic world (⇒ intentions)
General Domain Characteristics

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- Multiple objectives, possibly incompatible (⇒ desires)
- Environment determines best actions (⇒ desires)
- Incomplete information (⇒ beliefs)
- Dynamic world (⇒ intentions)

Can’t just use decision theory
Decision Theory

- Choice nodes: system gets to choose
- Chance nodes: environment selects randomly
Decision Theory

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- Chance nodes: environment selects randomly

Deliberation Functions

- Maximin: aim for a best, worst case
- Expected utility: aim for a best expected case
Decision Theory

- **Choice nodes**: system gets to choose
- **Chance nodes**: environment selects randomly

Deliberation Functions

- **Maximin**: aim for a best, worst case
- **Expected utility**: aim for a best expected case

Example
Air-traffic Management

70–80 agents at a time
Air-traffic Management

70–80 agents at a time

- One agent per aircraft
- Sequencer
- Wind modeller
- Coordinator
- Trajectory checker
Air-traffic Management

70–80 agents at a time

- One agent per aircraft
- Sequencer
- Wind modeller
- Coordinator
- Trajectory checker

Keep schedule until complete or impossible
Beliefs: All possible wind velocities and trajectories
BDI

Beliefs: All possible wind velocities and trajectories

Desires: Pruned to only keep the right ETA
**Beliefs:** All possible wind velocities and trajectories

**Desires:** Pruned to only keep the right ETA

**Intentions:** Pruned further to keep only the best in terms of fuel consumption, etc.
Electric Elves: Human Org. Support

- Proxy agents for meeting scheduling
- Activities within an individual research project
- Meeting planning with participants outside the organization
Challenges

• Adjustable autonomy

• Reliable information access

• Capability matching

• Agent coordination

• Scaling up to continual, reliable usability
Technologies

- Adjustable autonomy motivated by CAP
Technologies

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• MDPs to choose to delay risky decisions
Technologies

- Adjustable autonomy motivated by CAP
- MDPs to choose to delay risky decisions
- Capability characterization language
- Adaptive wrappers for info sources
- Data mining from publication records
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Used continuously for several months
Question

- Are we ready for free flight and automatic proxy agents?