



Multi-Agent Systems

Lecture IV

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Beliefs, Desires and Intentions

- Let us consider these three mental attitudes:
 - **Beliefs**
 - **Desires**
 - **Intents**
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- **Beliefs:** represent environmental characteristics, which are updated accordingly after the perception of each action.



Beliefs, Desires and Intentions

- **Desires:** Store information of; goals, properties and costs associated.

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- **Intentions:** current action plan chosen.
Captures the **deliberative** component of the system.

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Practical Reasoning in a BDI agent

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Practical reasoning in a BDI agent

- **Belief revision function;** takes a perceptual input and the agent's current beliefs, and on the basis of these, determines a new set of beliefs;
- **Beliefs (current)** information about its current environment;
- **Option Generation Function;** determines available options, on the basis of its current beliefs about its environment and its current intentions.

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Practical reasoning in a BDI agent

- **Filter;** (function) agent's deliberation process, determines intentions based on the current **BDIs**;
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- **Set of current** <https://eduassistpro.github.io/> representing possible courses of actions.
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- **Intentions (Set);** agent's current focus
- **Action selection function;** determines an action to perform on the basis of current intentions.



Early Multi-Agent Environments

☐ ABE (Erman et al 1988)

☐ ARCHON (Wittig 1989)

☐ CooperA (Sommaruga

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☐ MACE (Gasser et al 19

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☐ MADE (Wooldridge & O'Hare 1990)

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☐ Agent Factory (O'Hare 1992)

☐ MCS (Doran et al 1991)

☐ GBB (Hayes-Roth et al 1988)



Classes of Commitment Strategies

- Several degrees of commitment may be exhibited by agents.

- Rao and Georgeff i discrete points on this commitment contin

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- ☐ **Blind Commitment**
- ☐ **Single-Minded Commitment**
- ☐ **Open-Minded Commitment**



Blind Commitment

Blind commitment is defined as the adherence to a commitment until such time as the agent believes the commitment has been achieved.

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Single-Minded Commitment

- Single-minded commitment represents a relaxation of blind commitment in that the agent will not drop its commitments unless it believes that they are no longer achievable.
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- The computational overhead of determining whether a given goal is achievable can be considerable.
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- Rao and Georgeff suggest that this can be achieved by permitting belief revision but not goal revision.



Open-Minded Commitment

- Open-minded commitment offers a further relaxation in the willingness to revise its goals and beliefs, regarding commitments that are still compatible with its goals.

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Coordination through Communication...

- Coordination represents the problem or activity of reconciling the actions of the individual agent with those of the **group** or indeed **organisation**.
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- Since agents act from their goals and since agents are frequent **evolant** there **will** inevitably be conflict.
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- Such *interference* can only be reconciled through communication.