

Aufgabe:

Auswahl und Verfolgung von Handlungsoptionen mit dem Ziel der Punktemaximierung.

Possible Approaches:

- ▶ Pure reactive

If something happened, I am going act on it.

- ▶ Behaviour trees + Fuzzy Logic

Leaf nodes used as action to change state of the robot.

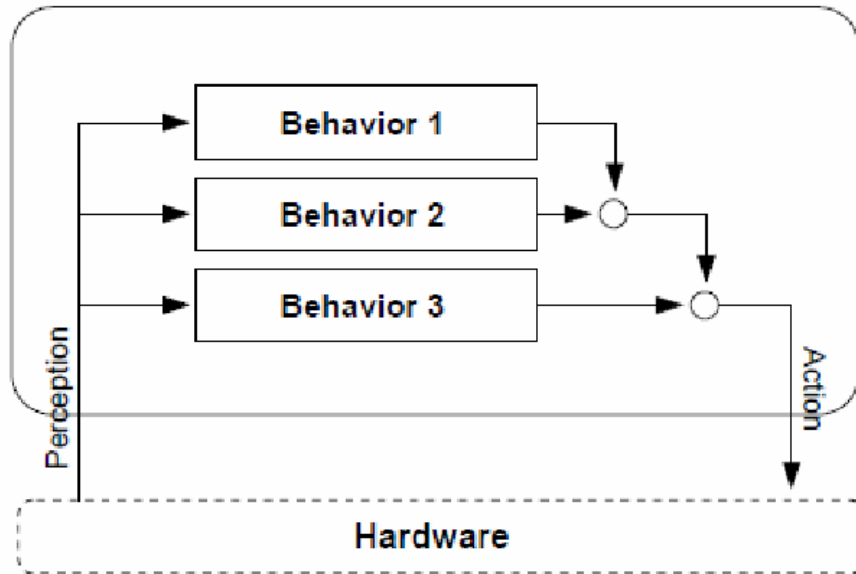
Non-leaf node are used to move within the tree.¹¹

- ▶ BDI

Define Belief, Desire and Intention. Provide a plan library.

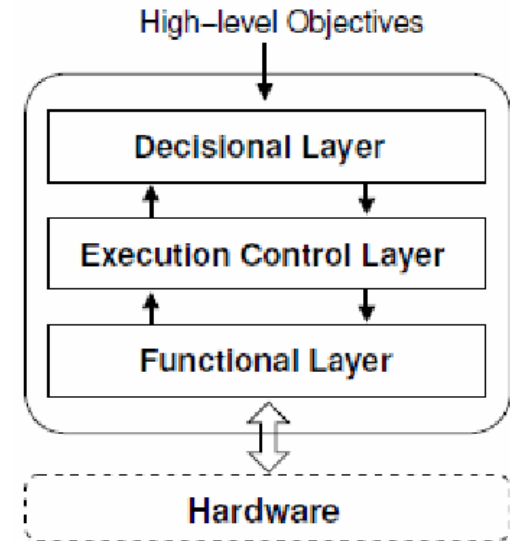
RT REASONING ARCHITEKTURANSÄTZE

Subsumption type architecture



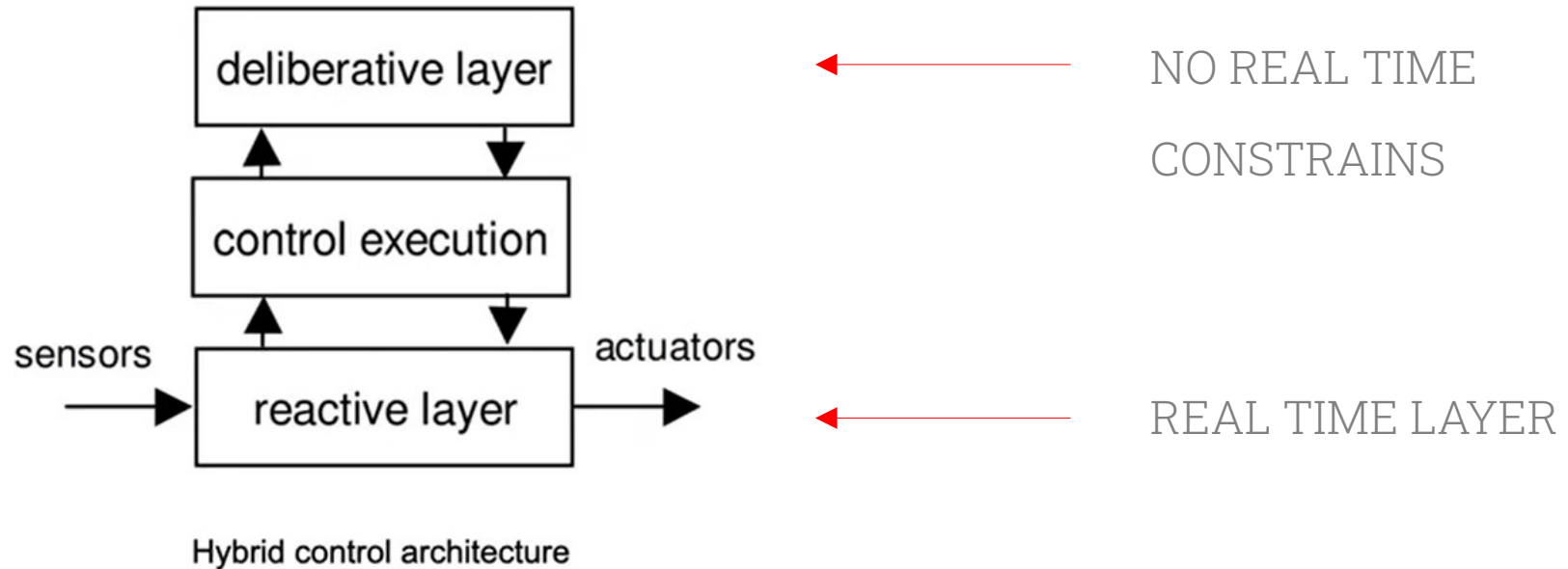
AKTUELLER STAND - NEXTAGENT

'Three Layer' type architecture



3 TIER CONTROL ARCHITECTURE

KLASSISCHE ECHTZEITANWENDUNG



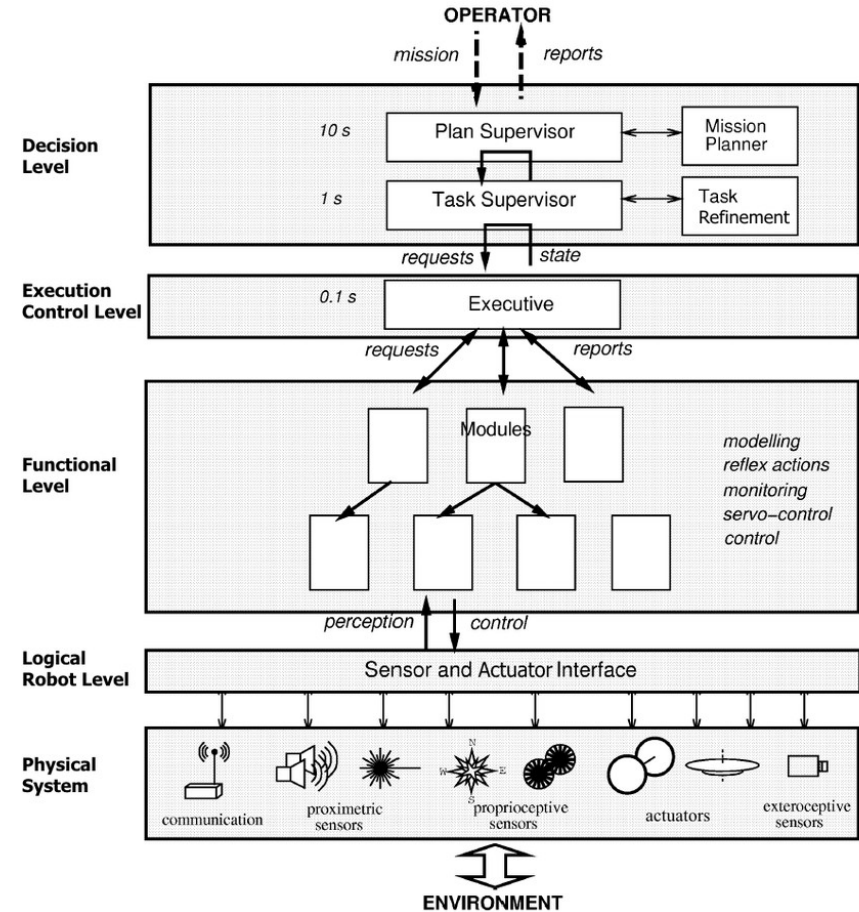
RT BDI:

BEISPIELE:

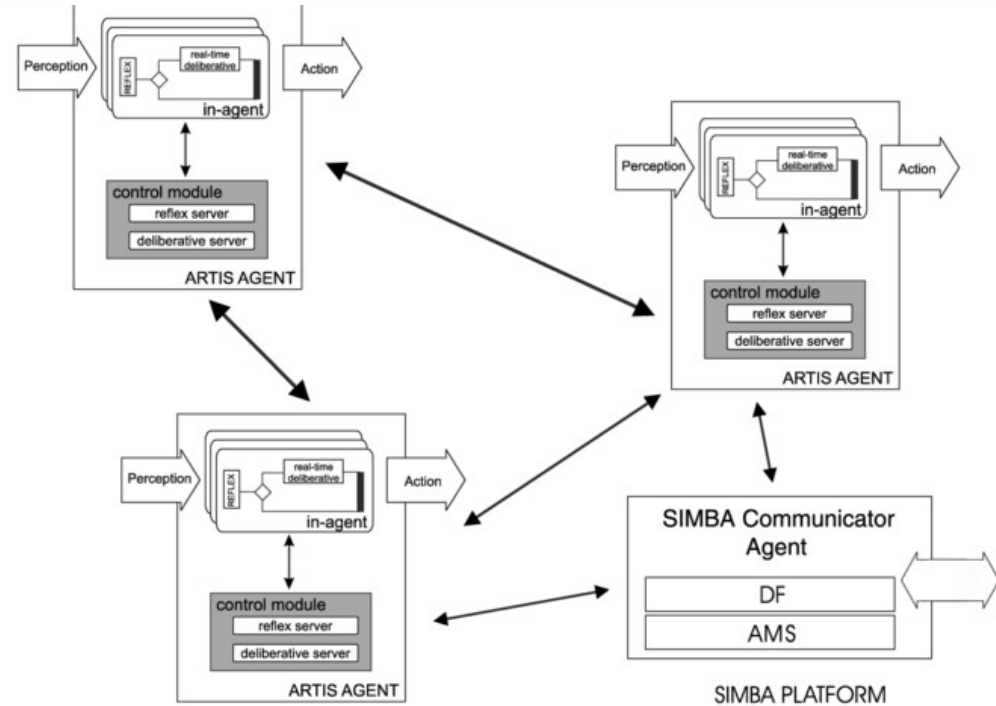
LAAS Architecture (Alami et al., 1998)

SIMBA Architecture (Julian et. al., 2002)

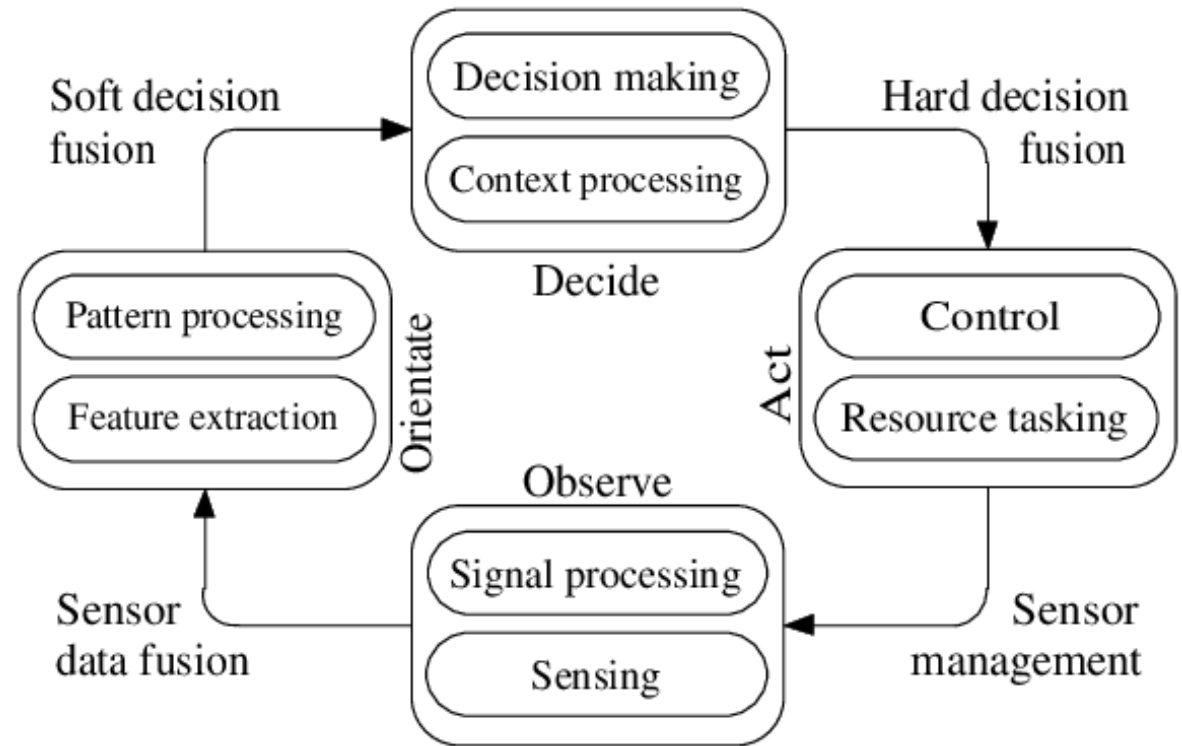
LAAS Architektur



SIMBA platform architecture



The Omnibus model



WICHTIG:

Wir sind nicht wirklich eine Echtzeitanwendung,
profitieren aber von der Trennung in Short Term und
Long Term Evaluation der Handlungsmöglichkeiten.

BDI (Believe, Desire, Intention):

- Belief** Das Wissen über die Welt, der Zustand der Welt.
→ NextPerceptionReader
- Desire** Das Ziel, das erreicht werden soll, der gewünschte Endzustand.
- Intention** Der Ablauf von Handlungen, die gerade ausgeführt werden,
um den Desire des Agenten zu erreichen.

Ziel ist die Verkürzung der Entscheidungszeit für Aktionen durch
Eliminierung inkonsistenter Wahlmöglichkeiten in Bezug auf die Intention.

BEISPIEL: OASIS (Optimal Aircraft Sequencing using Intelligent Scheduling)

List of agents:

- ▶ SEQUENCER Agent
- ▶ AIRCRAFT Agent
- ▶ WIND MODEL Agent
- ▶ ...

Possible BDI instance in this scenario:

- ▶ Belief = Planes position.
- ▶ Desire = Decrease speed of aircraft.
- ▶ Intention = Adopted plan.

Changes in the environment leads to reassessing intentions.⁸

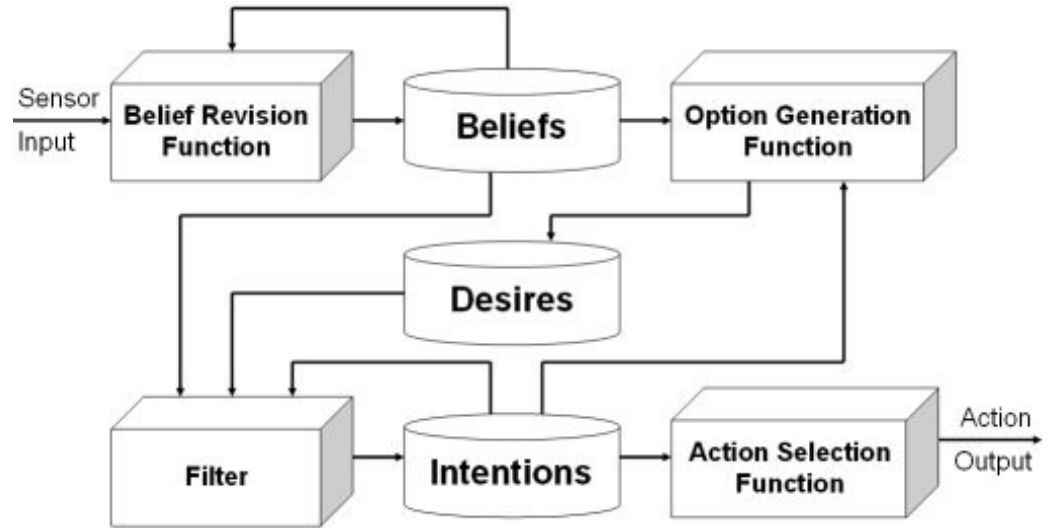
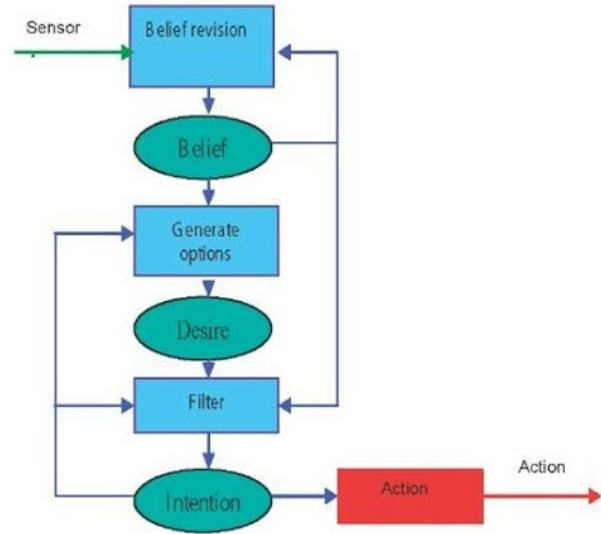
BDI BEISPIEL in C#:

<https://docs.microsoft.com/de-de/archive/msdn-magazine/2019/january/machine-learning-leveraging-the-beliefs-desires-intentions-agent-architecture>

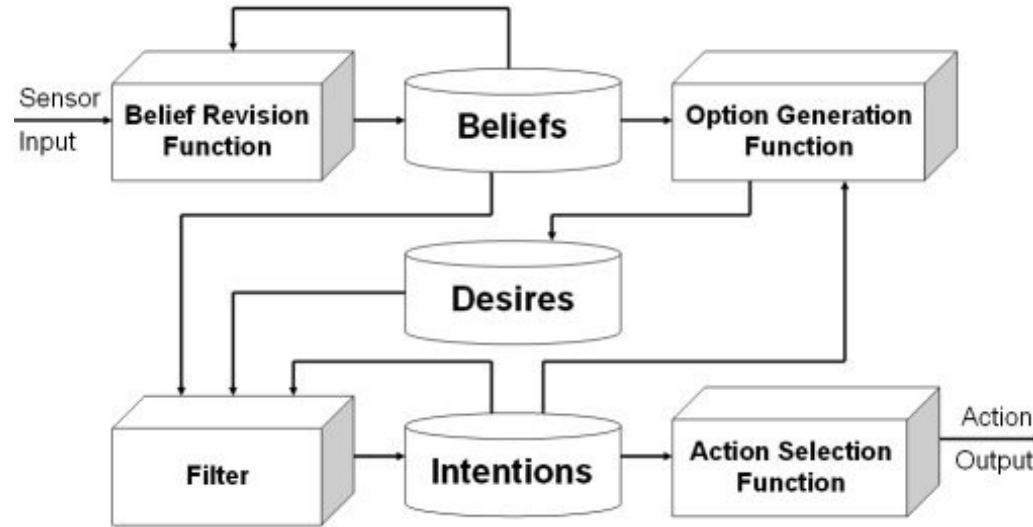
Alternative Implementierung:

<https://github.com/ingridnunes/bdi4jade>

BDI ABLAUF



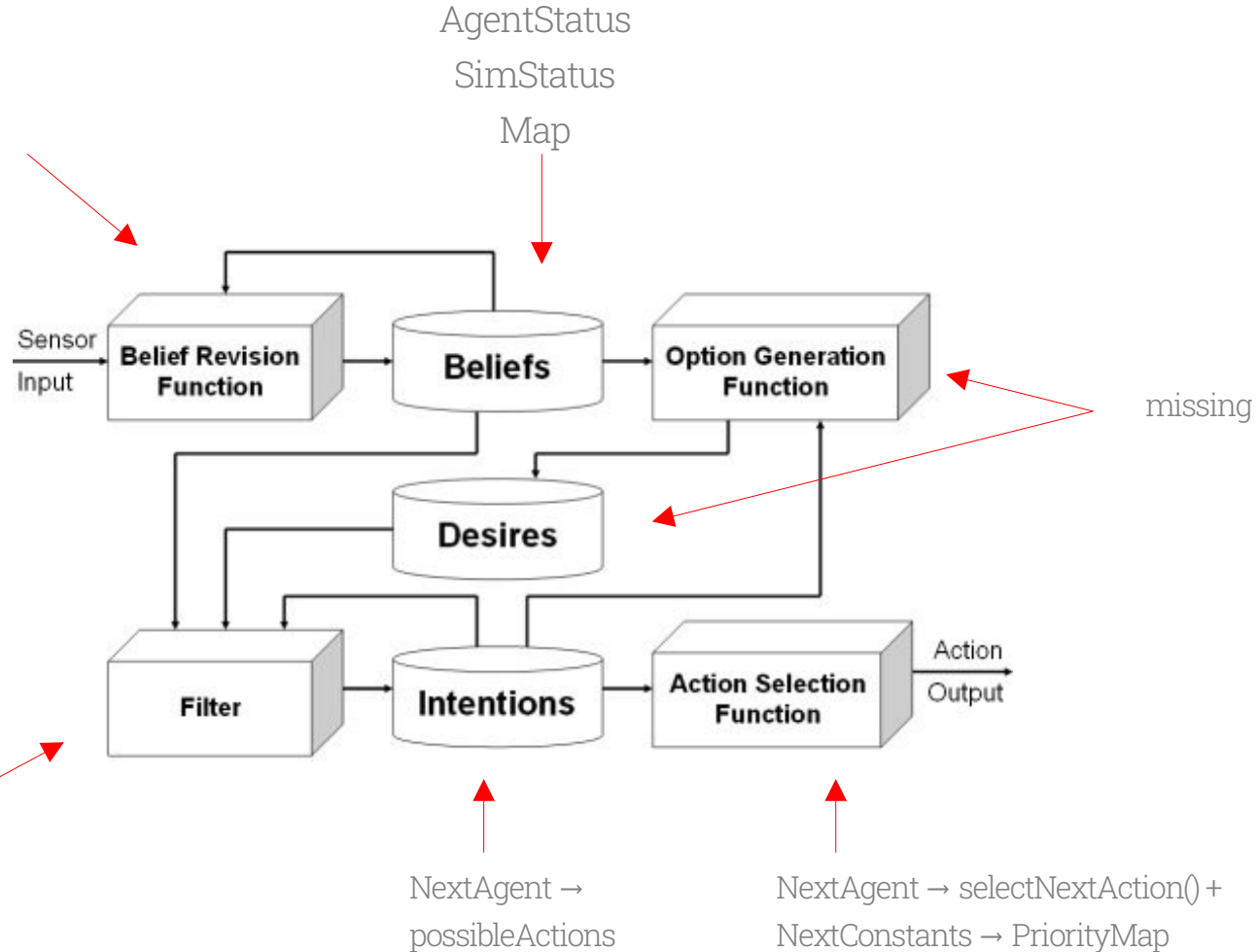
BDI ABLAUF



- 1) a set of current **beliefs**, representing information the agent has about its current environment;
- 2) a **belief revision function**, which takes a perceptual input and the agent's current beliefs, and on the basis of these, determines a new set of beliefs;
- 3) an **option generation function**, (options), which determines the options available to the agent (its desires), on the basis of its current beliefs about its environment and its current intentions;
- 4) a set of current options (**desires**), representing possible courses of actions available to the agent;
- 5) a filter function (**filter**), which represents the agent's deliberation process, and which determines the agent's intentions on the basis of its current beliefs, desires, and intentions;
- 6) a set of current **intentions**, representing the agent's current focus – those states of affairs that it has committed to trying to bring about;
- 7) an **action selection function**, which determines an action to perform on the basis of current intentions.

NEXTAGENT MAPPING

NextPerceptionReader
MapCreationFunctions



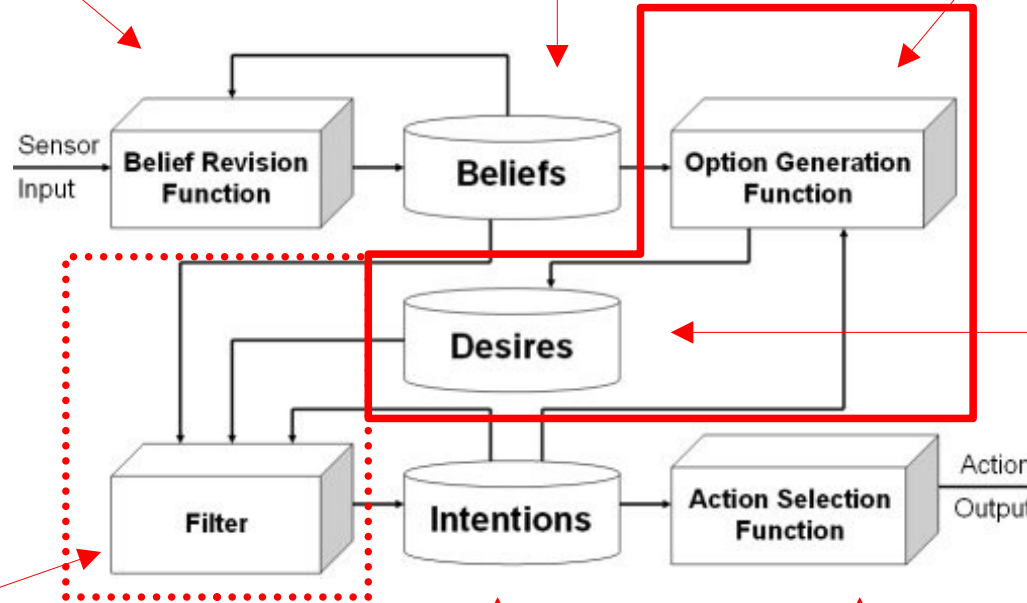
VORSCHLAG

GRUPPE

NextPerceptionReader
MapCreationFunctions

AgentStatus
SimStatus
Map

Konvertiert die
Tasks und Norms in
Handlungsziele



Eine Liste mit
Handlungszielen

generatePossibleActions
as a List of Next Steps*

*(meine Interpretation)

ListOfActionsToFullfill

NextAgent → selectNextAction() or short
term React based on PriorityMap

TODO:

<https://www.youtube.com/watch?v=X6S74JVsFOU>