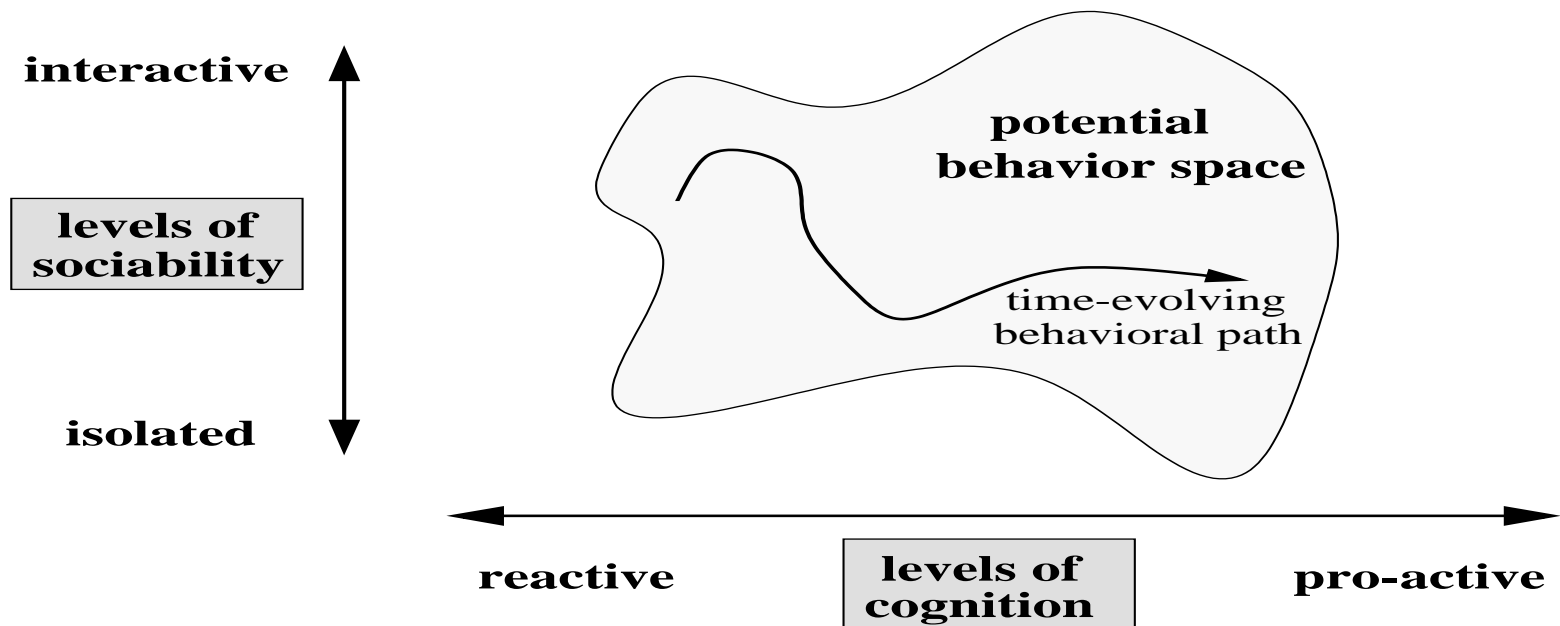


- ▶ Background
- ▶ Intra-Agent Modeling
 - Introduction to Agent Architectures
 - What is an Agent Architecture?
 - Typification of Agent Architectures

What is an Agent Architecture?

- ▶ Architecture =
 - arrangement of data and algorithms
 - + flow of data and control
- ▶ Architectures determine behavioral space:

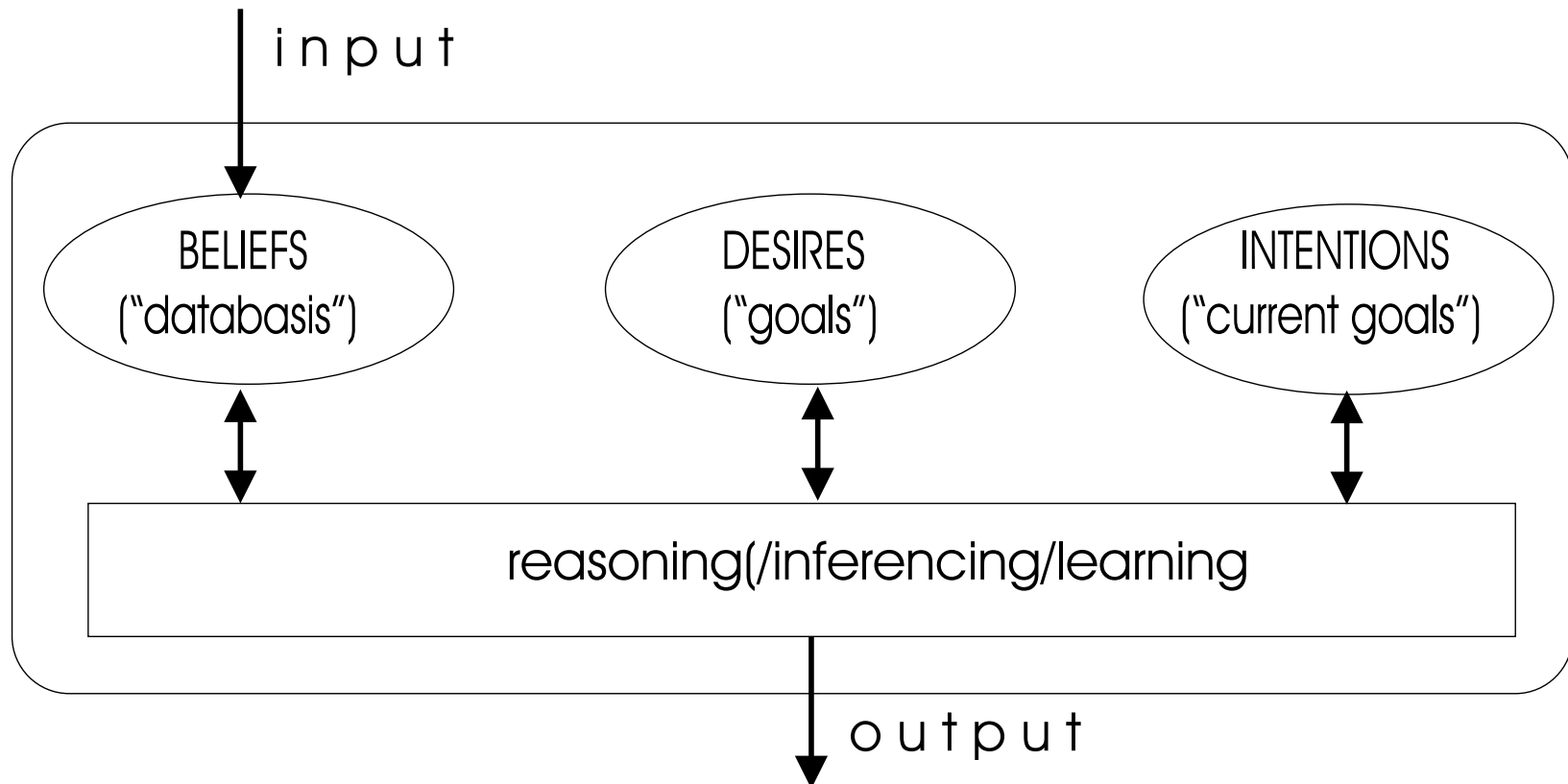


Typification of Agent Architectures

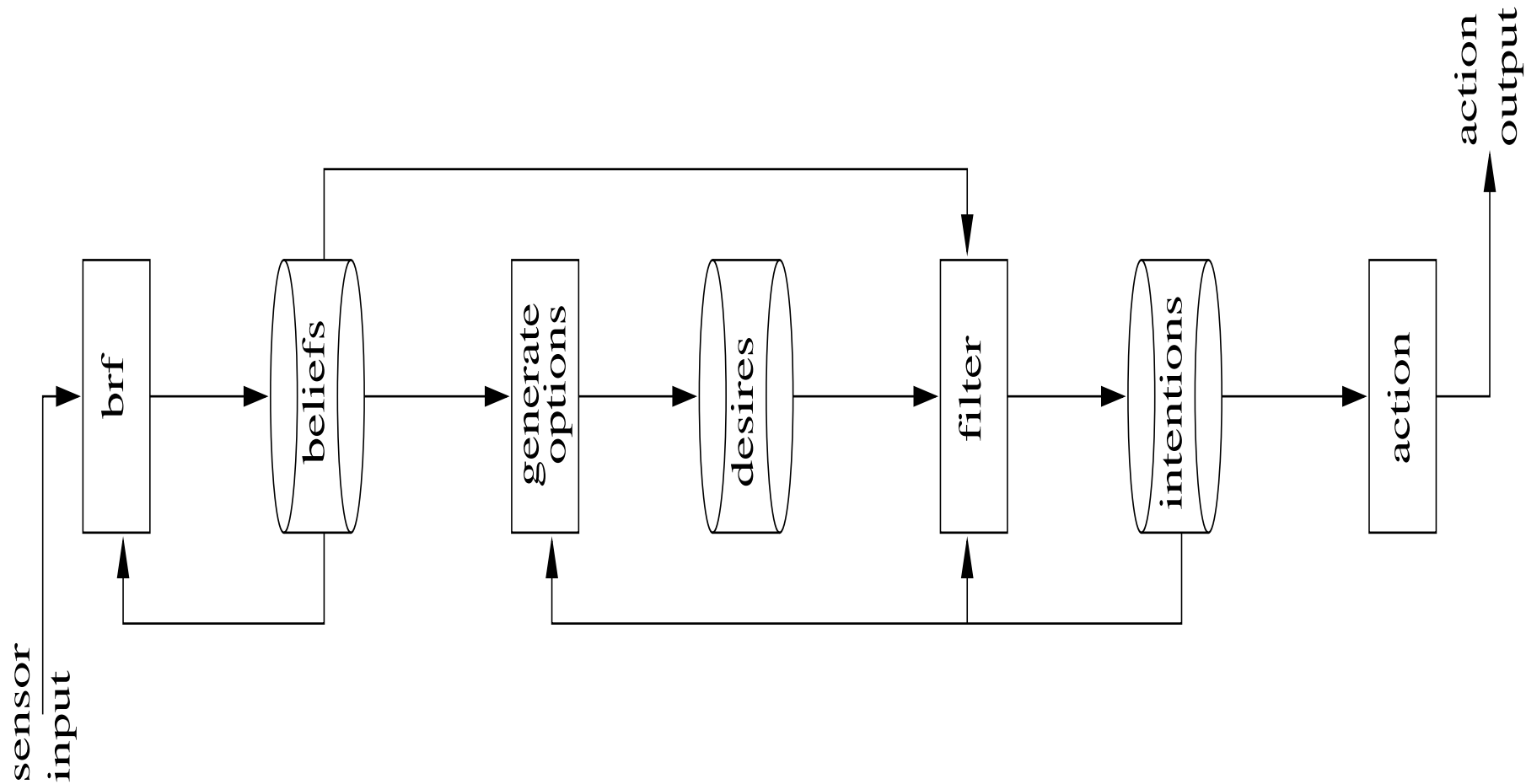
- ▶ Belief-Desire-Intention (BDI) architectures
- ▶ Layered architectures
- ▶ Constraint-oriented architectures
- ▶ Other characterizations:
 - reactive versus deliberative architectures
 - isolated versus social architectures

- ▶ Background
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 - Introduction to Agent Architectures
 - BDI Architectures
 - General Principle
 - PRS
 - IRMA
 - GRATE*
 - COSY

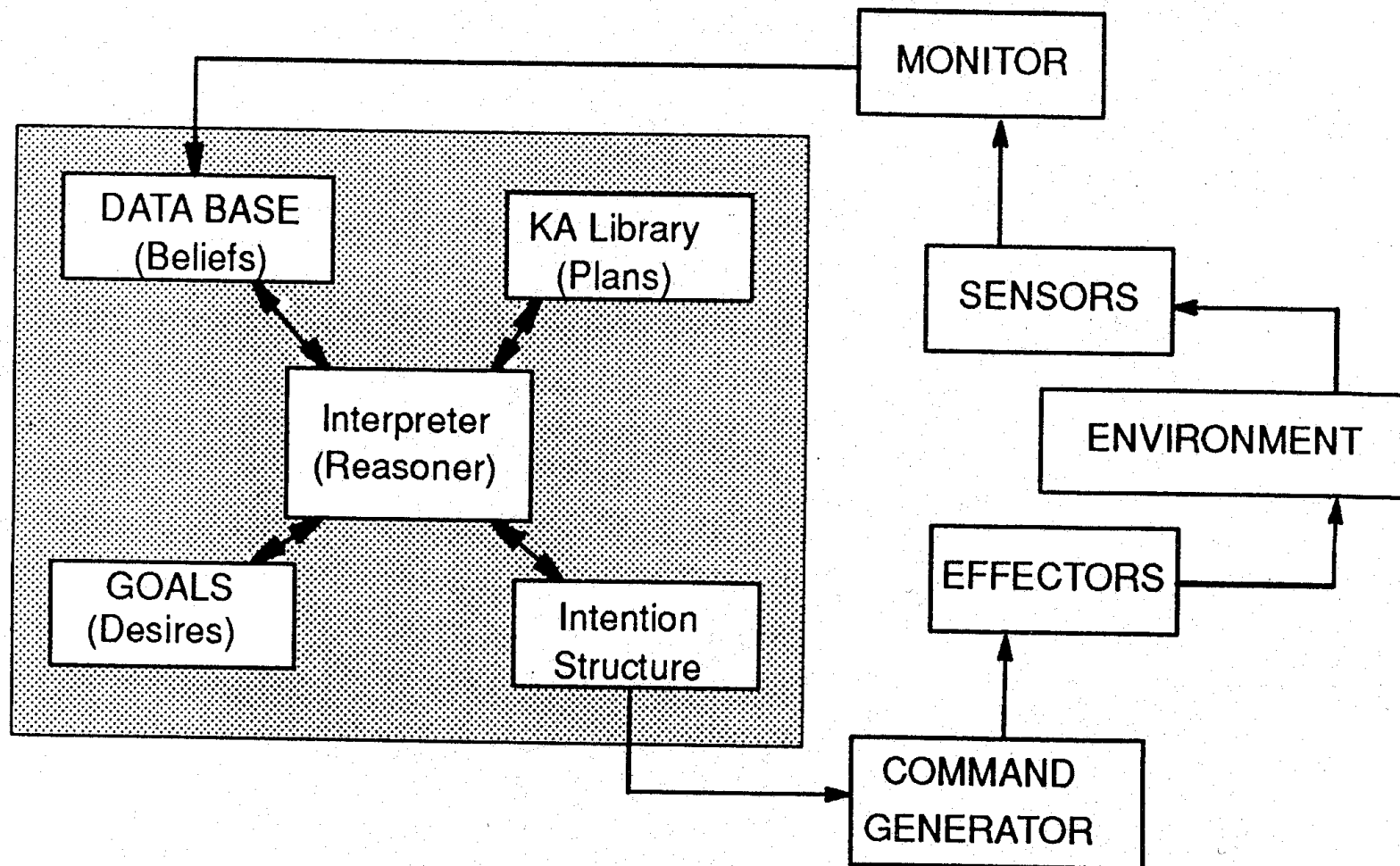
► General structure:



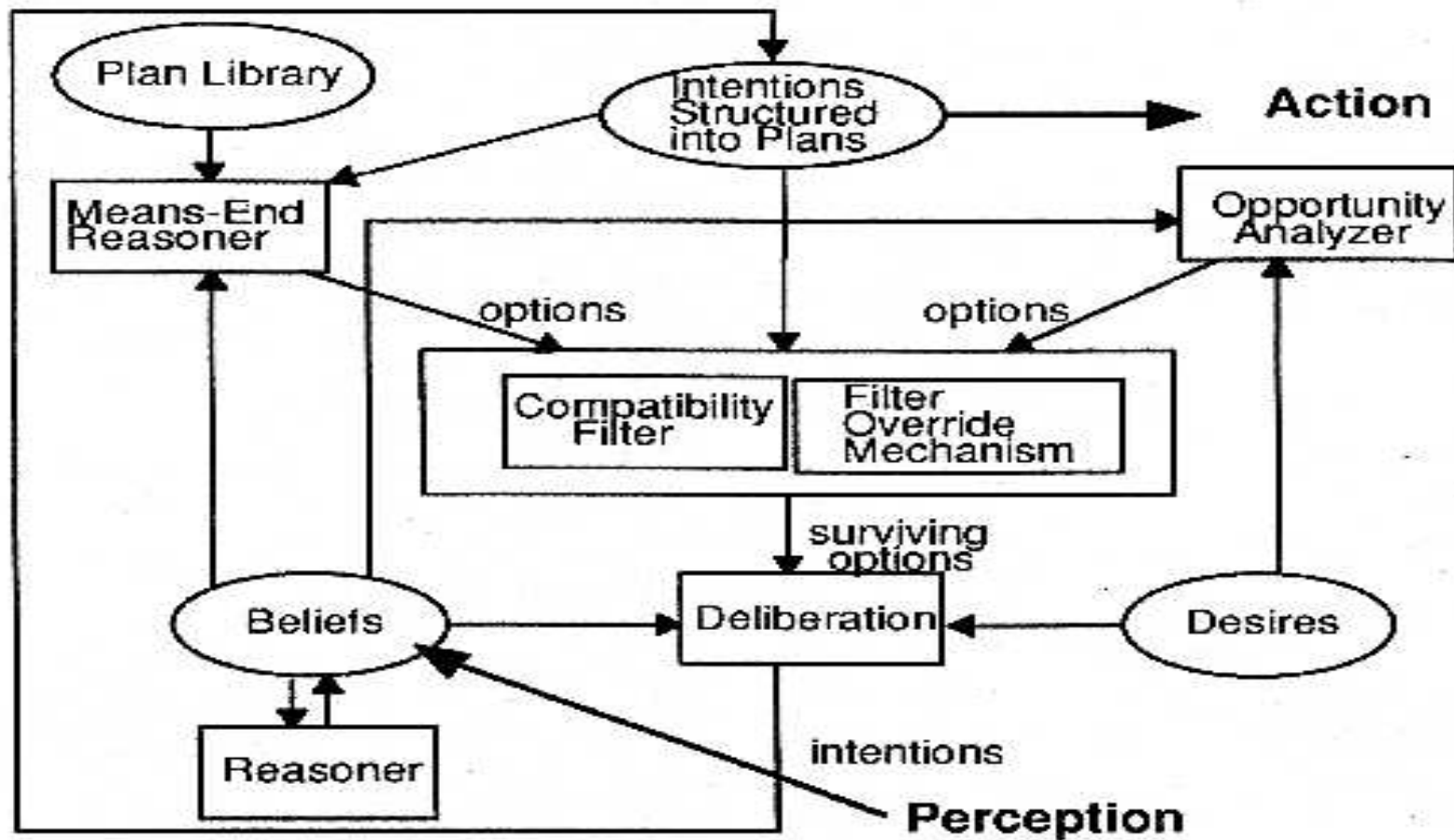
- ▶ General flow of internal data and control (Wooldridge 1999):



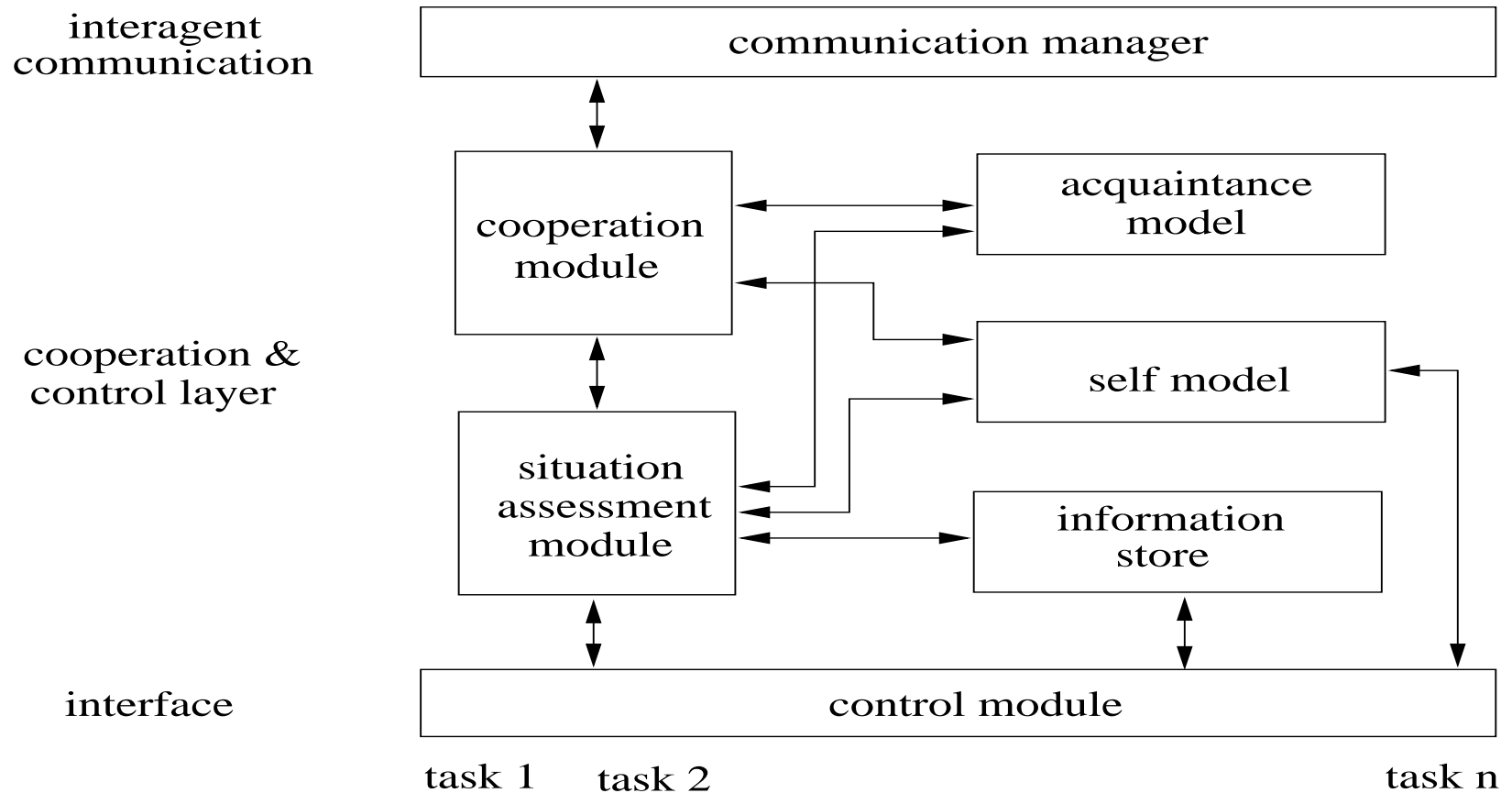
PRS = “Procedural Reasoning System”



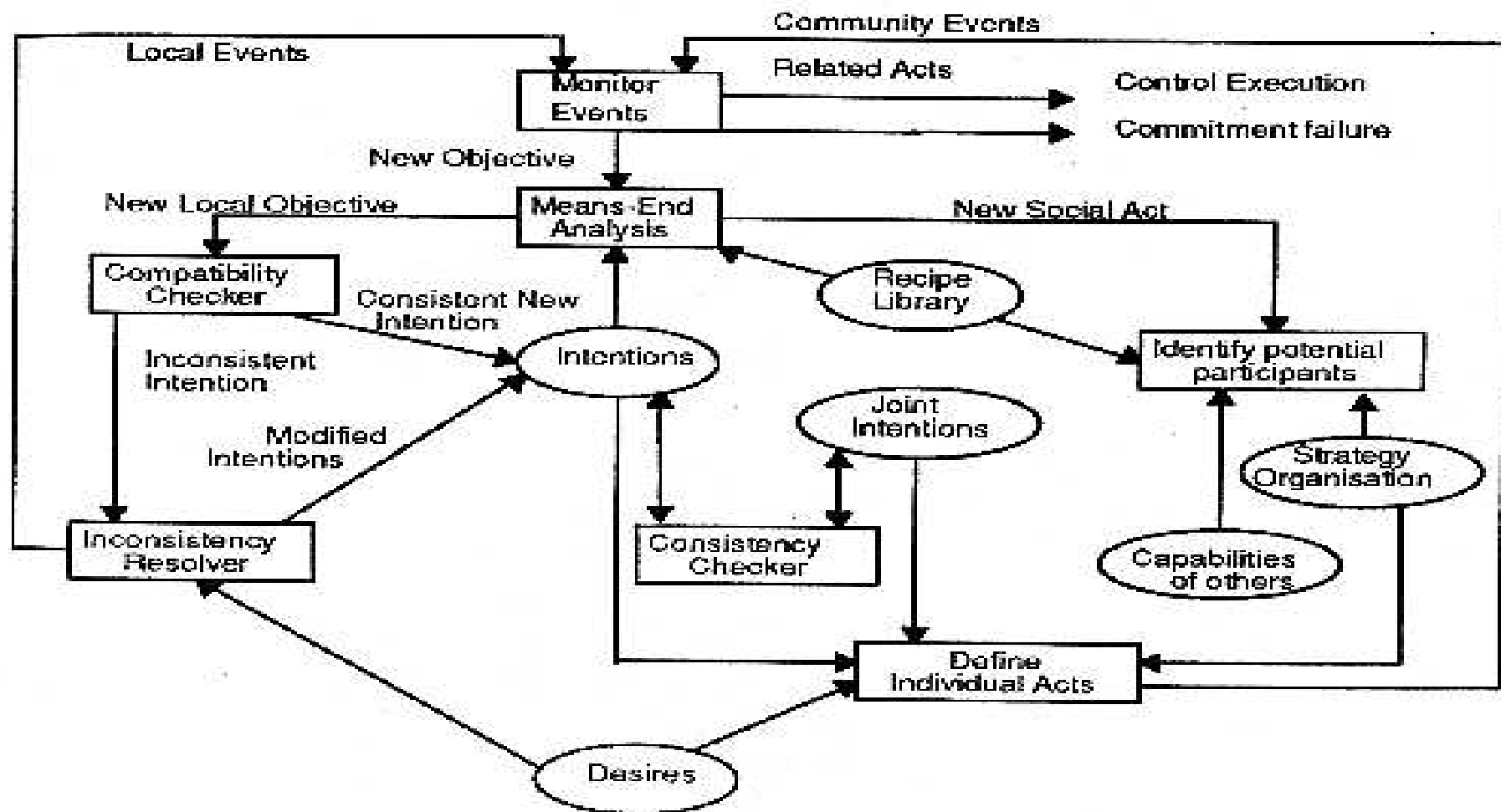
IRMA = “Intelligent Resource-bounded Machine Architecture”



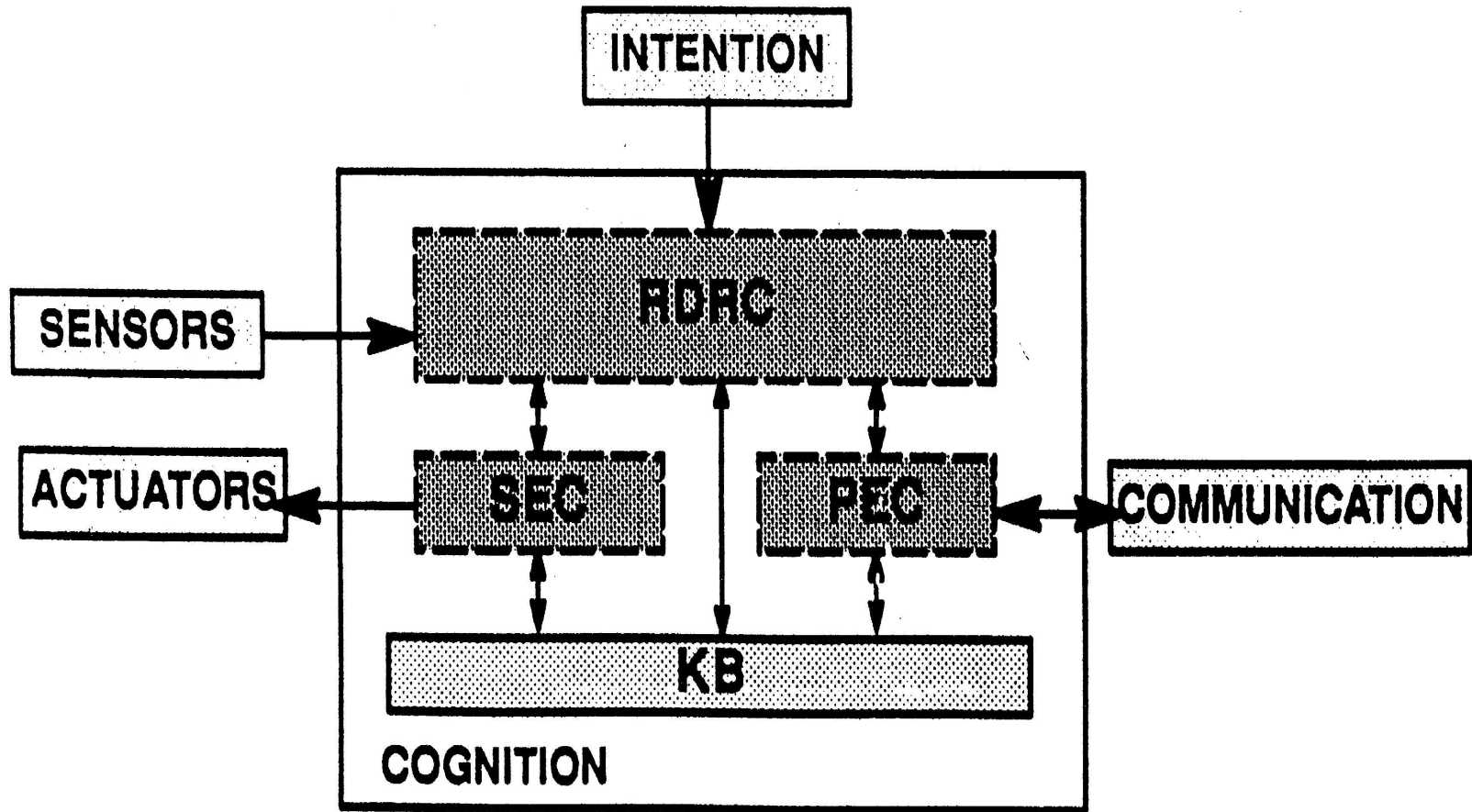
► top-level view:



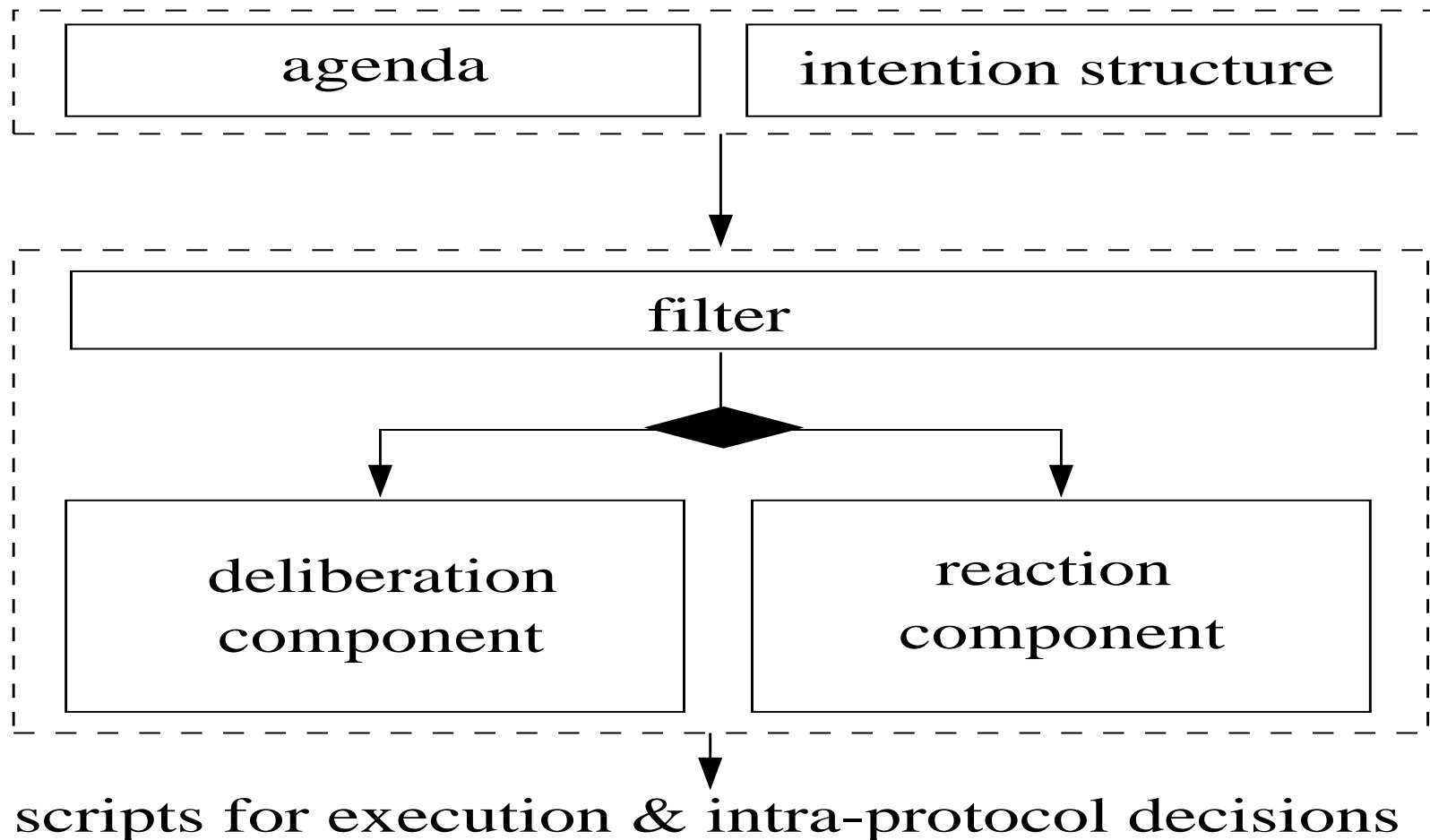
► details:



- ▶ top-level view:

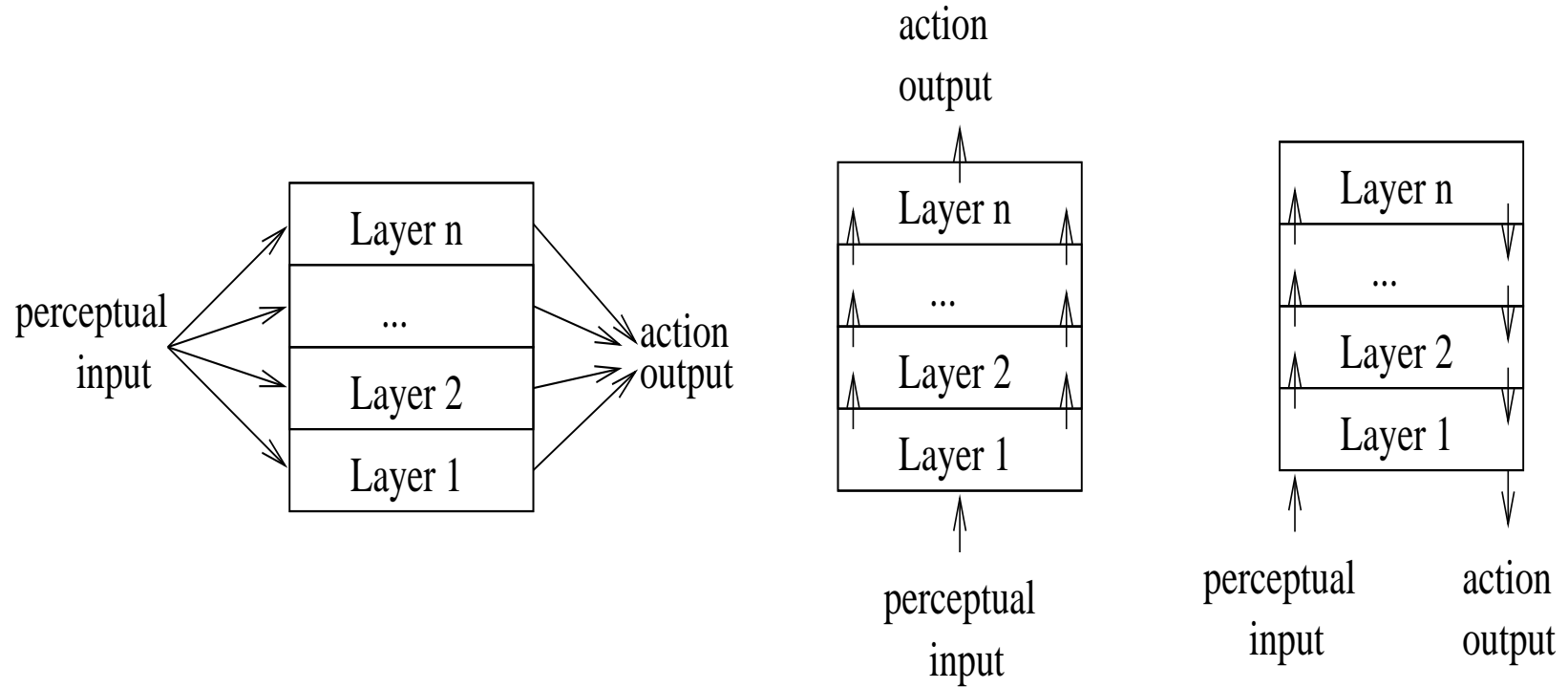


► RDRC in detail:



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 - INTERRAP
 - TouringMachines

Structure and flow of data/control (from Wooldridge 1999)

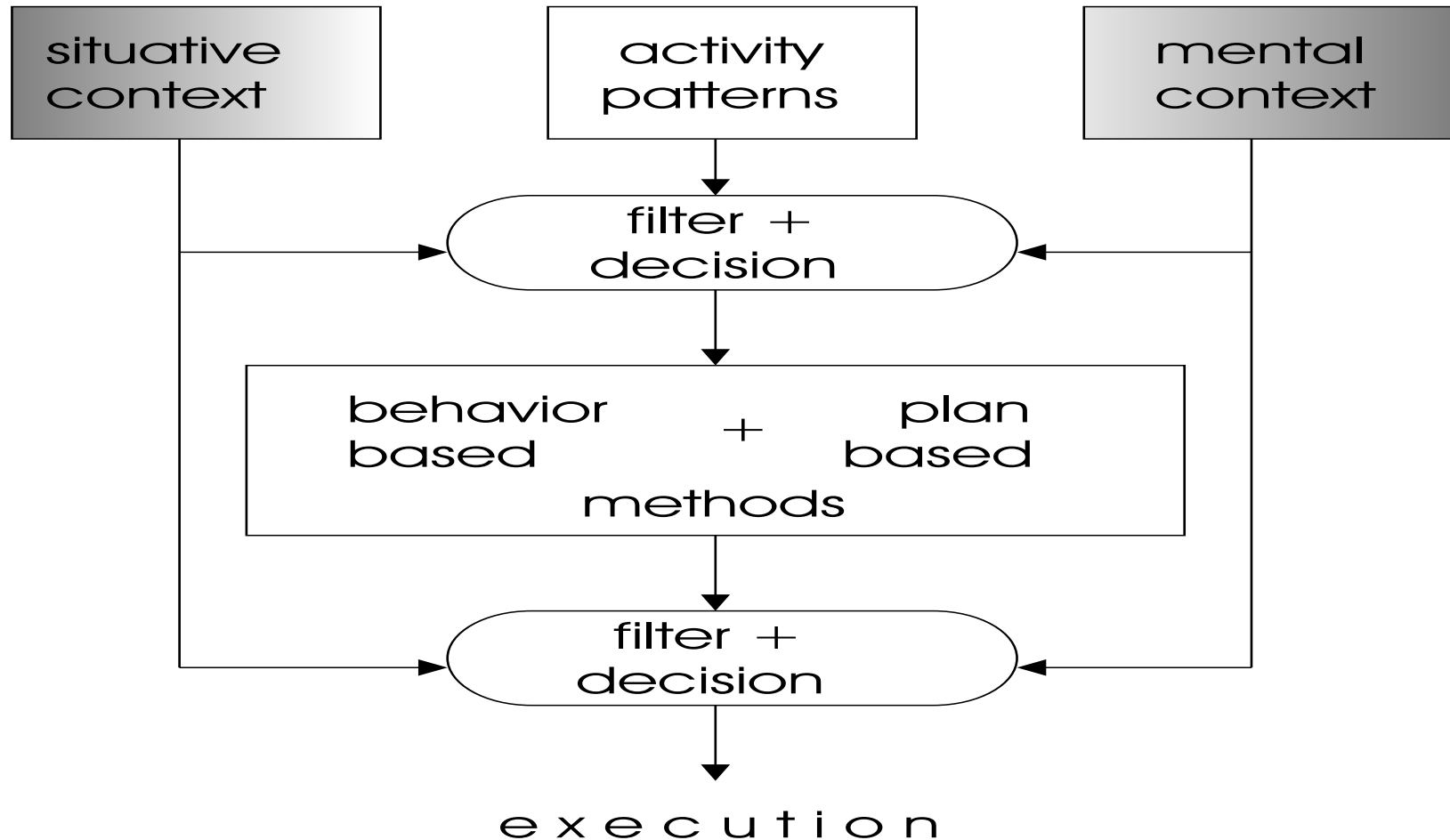


(a) Horizontal layering

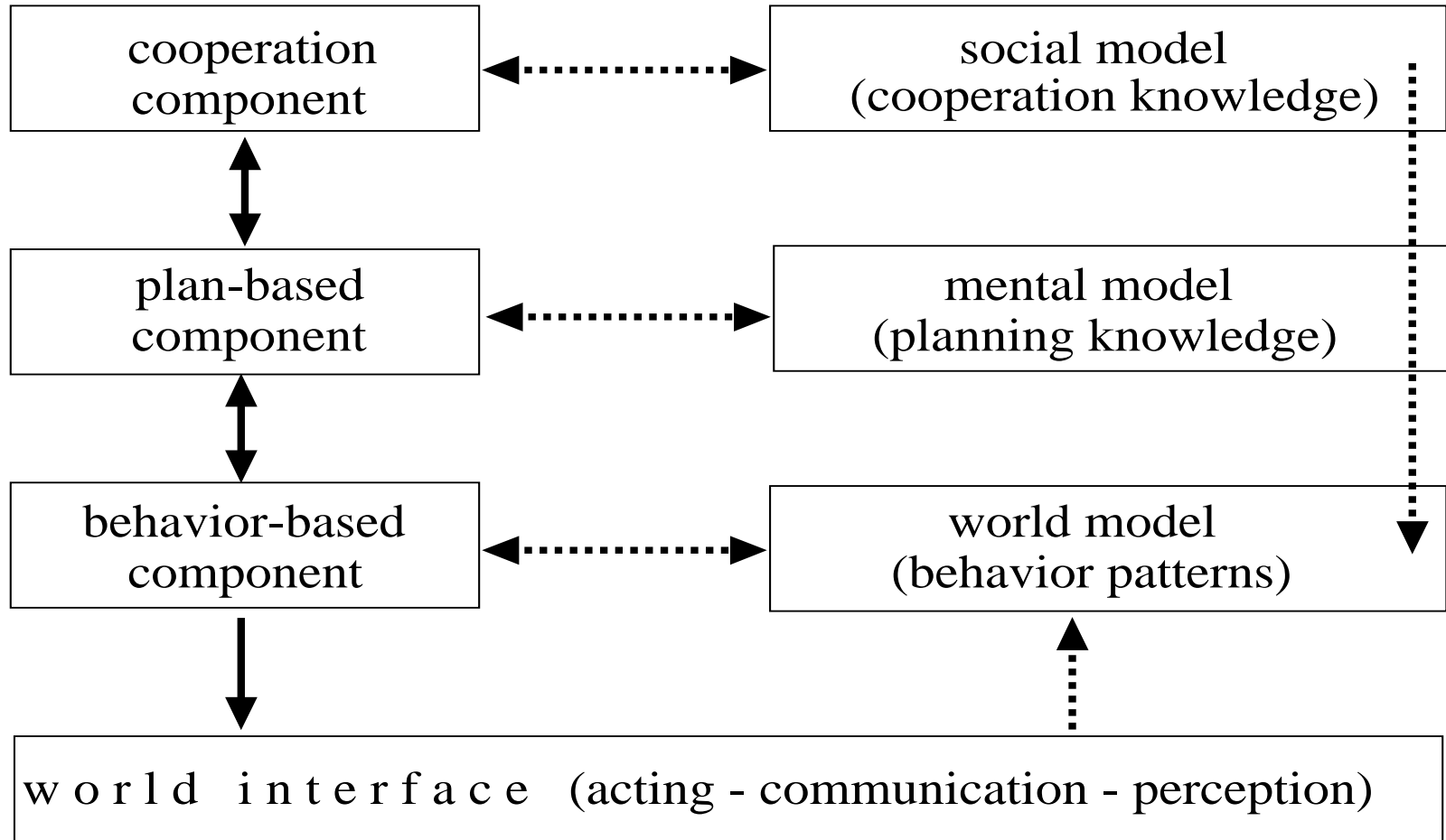
(b) Vertical layering
(One pass control)

(c) Vertical layering
(Two pass control)

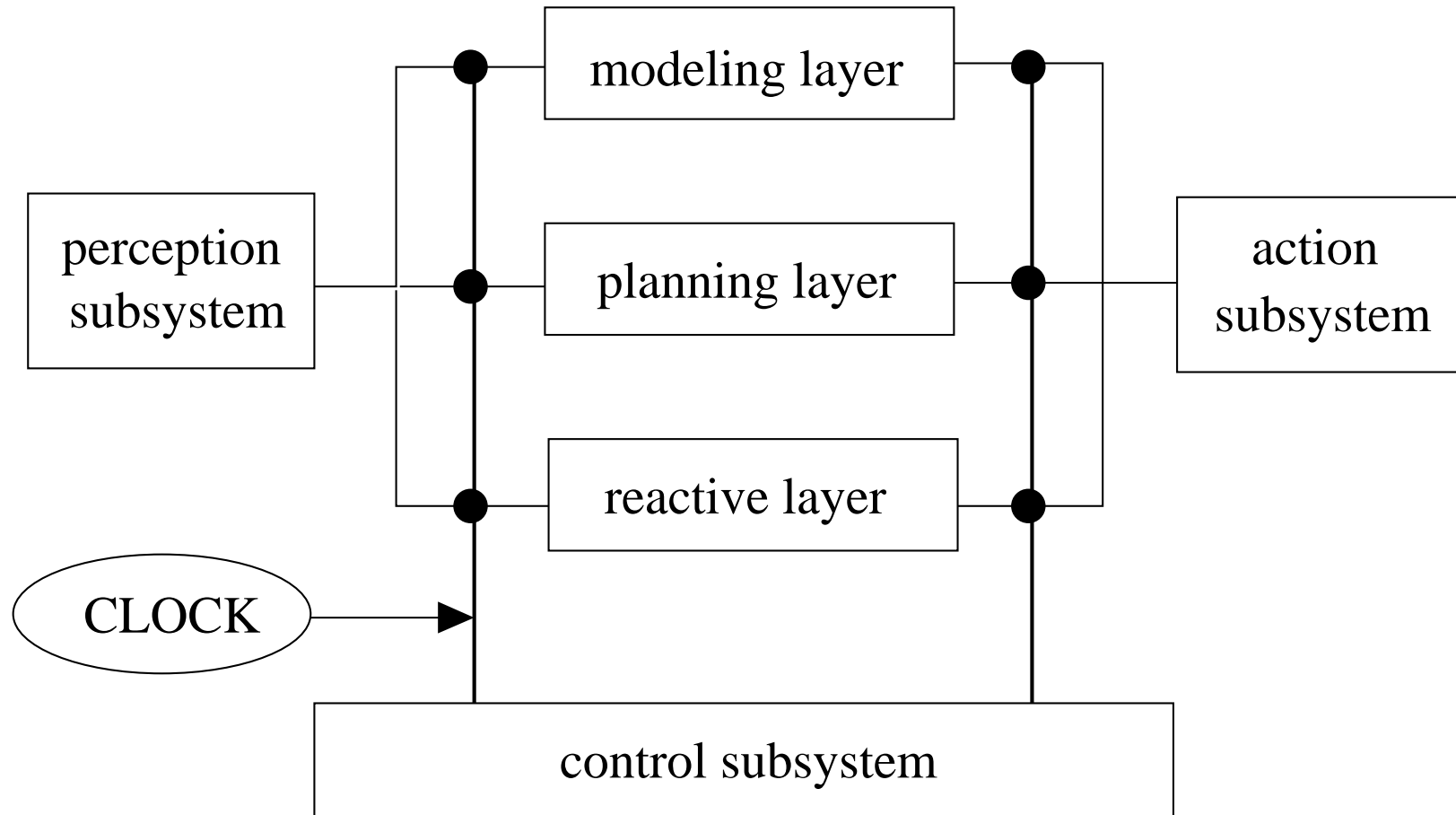
► top-level view:



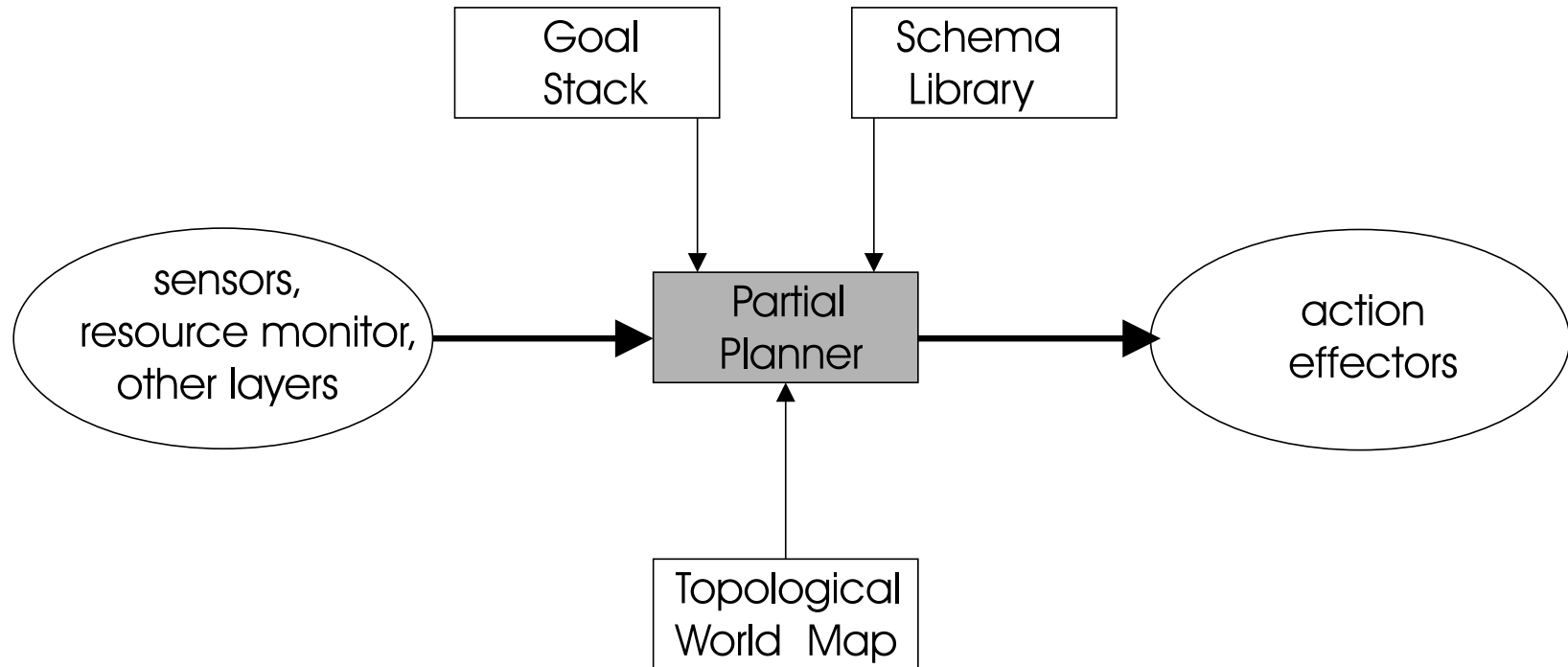
► details:



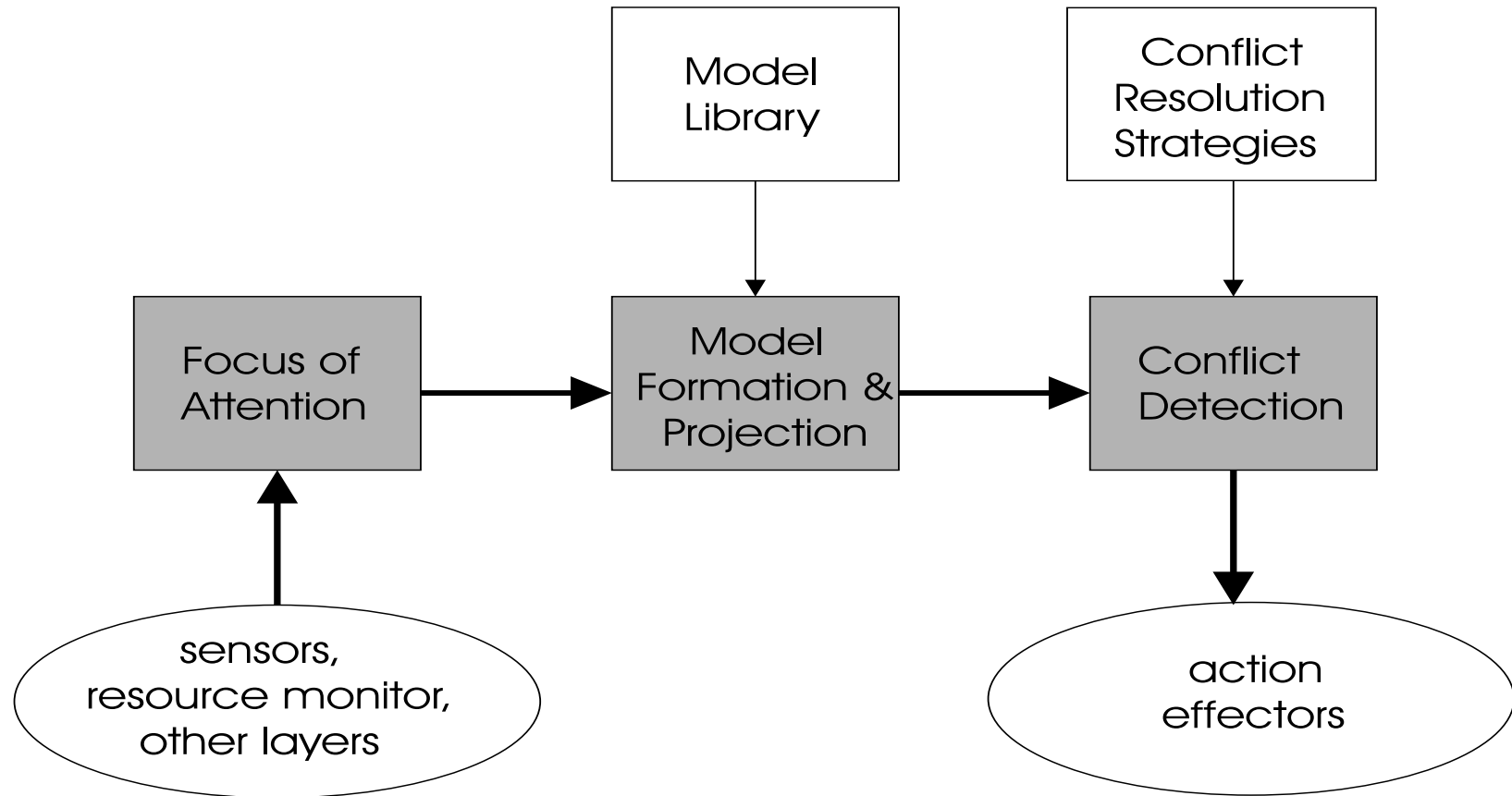
► top-level view:



► details on planning layer:



► details on modeling layer:



- ▶ Background
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 - Constraint-oriented Architectures
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 - CCAF
 - Waffler

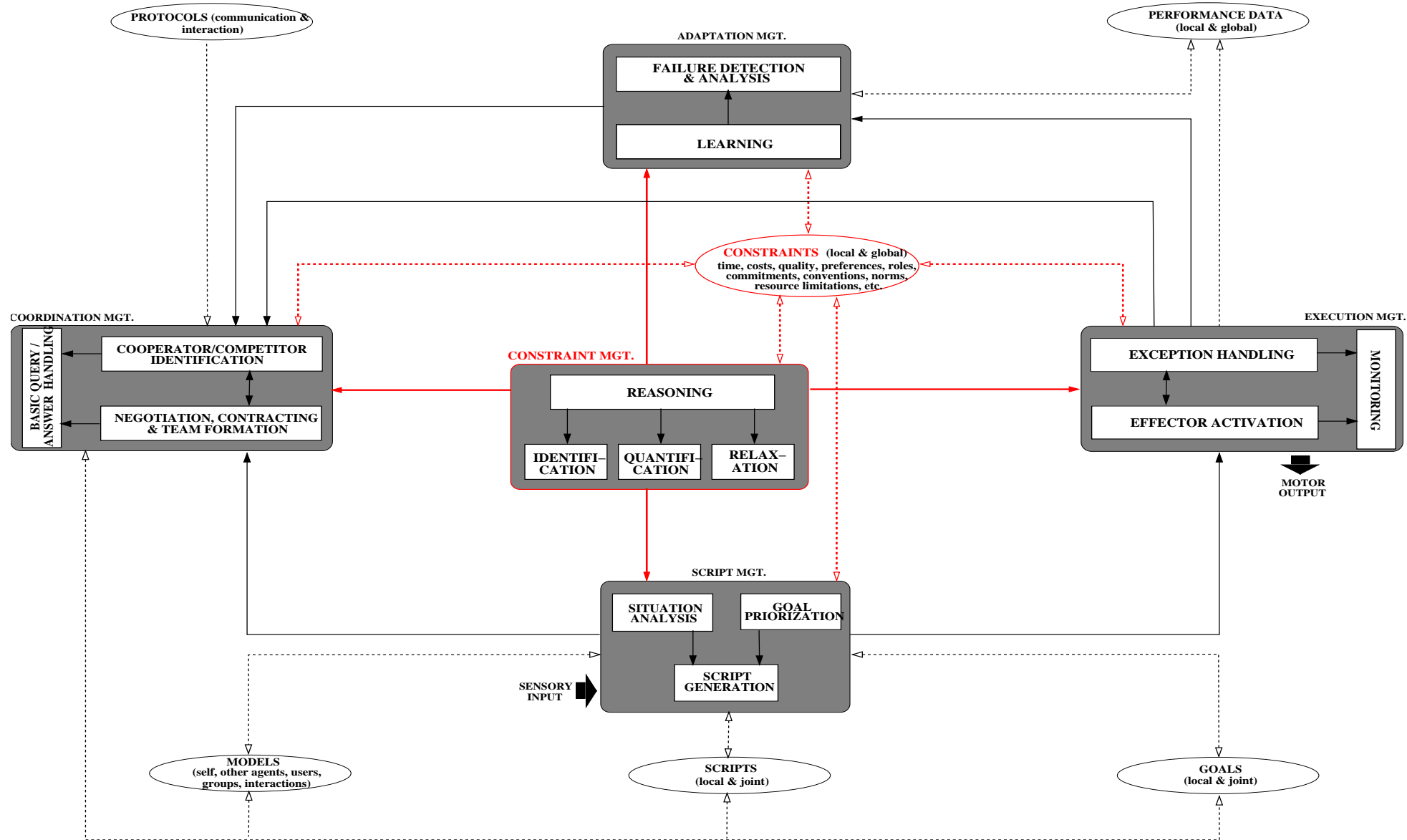
- ▶ constraint = condition under which activity is to be carried out, thus behavior-influencing
- ▶ “constraints everywhere”
 - standard constraints: time, cost, quality
 - others: individual preferences, collective preferences, psychological and social commitments, resource limitations, roles an agent has to play, conventions, ...
- ▶ Key assumption: ability to act flexibly has much to do with flexible handling of constraints
- ▶ usual distinction: soft versus hard constraints
- ▶ particularly challenging: handling constraints in applications that are distributed, dynamic, and/or real-time

CCAF = “Constraint-Centered Architectural Framework”

► Underlying assumptions:

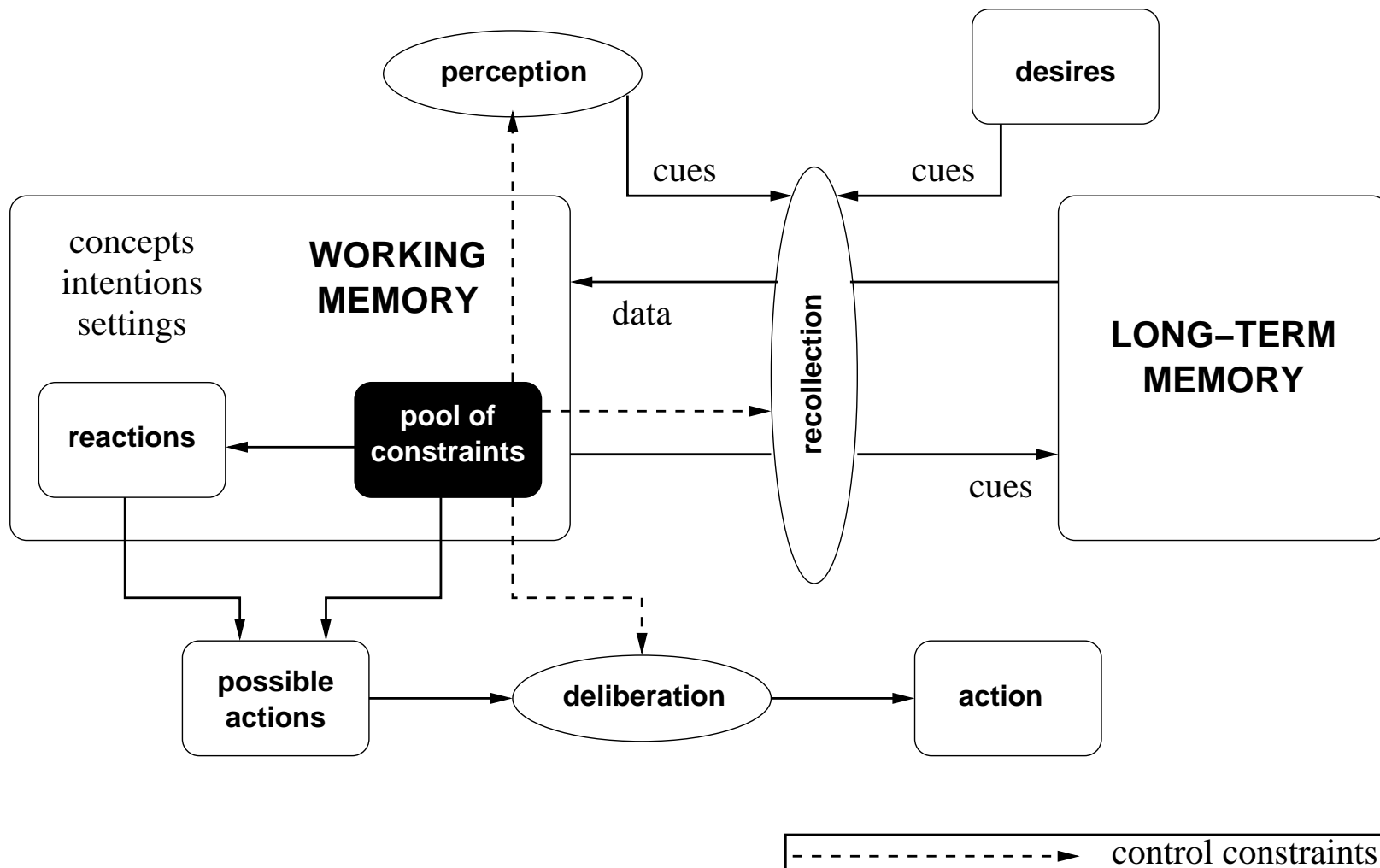
- constraints and all agent-internal activities must be tightly intertwined
- an agent must be able to carry out activities in cooperation with others (shared/delegated), when required by constraints
- communication must be sensitive to constraints
- agents must be able to reason about constraints (quantification of strength, importance, risk of violation)
- constraint handling within an agent to be realized as a centralized process (efficiency)

▶ top-level view:



Waffler: after a colloquialism for improvisation (“waffling”)

► top-level view:



- ▶ the role of constraints in more detail:

