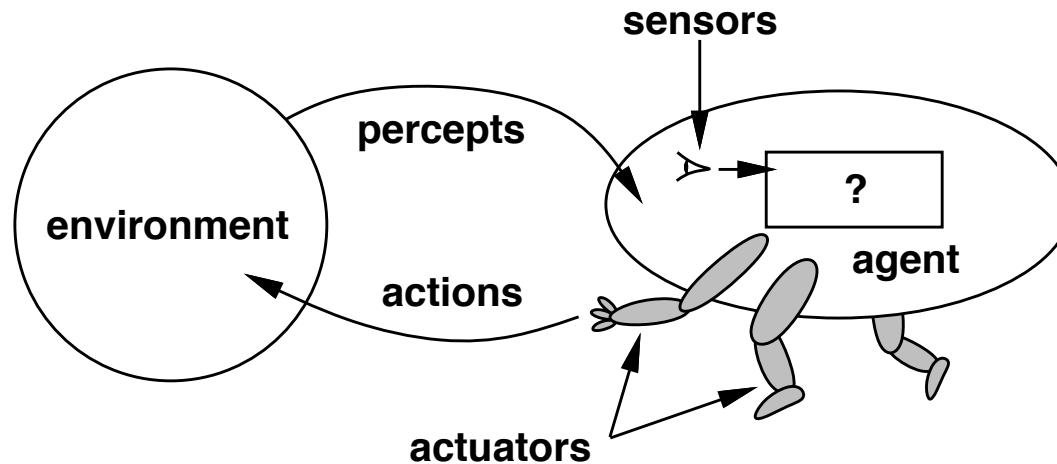


INTELLIGENT AGENTS

CHAPTER 2

Agents and environments



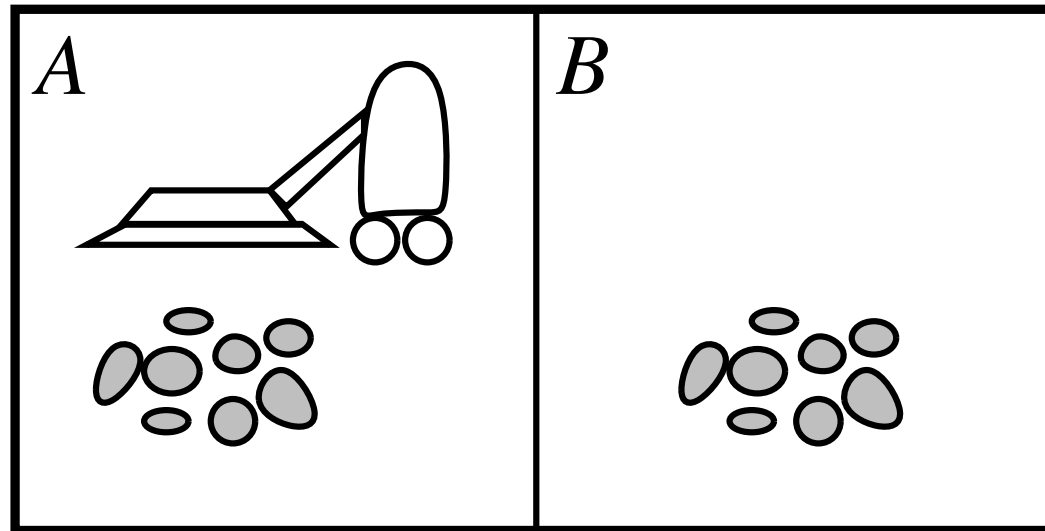
Agents include humans, robots, softbots, thermostats, etc.

The agent function maps from percept histories to actions:

$$f : \mathcal{P}^* \rightarrow \mathcal{A}$$

The agent program runs on the physical architecture to produce f

Vacuum-cleaner world



Percepts: location and contents, e.g., $[A, \textit{Dirty}]$

Actions: *Left*, *Right*, *Suck*, *NoOp*

A vacuum-cleaner agent

Percept sequence	Action
$[A, \textit{Clean}]$	\textit{Right}
$[A, \textit{Dirty}]$	\textit{Suck}
$[B, \textit{Clean}]$	\textit{Left}
$[B, \textit{Dirty}]$	\textit{Suck}
$[A, \textit{Clean}], [A, \textit{Clean}]$	\textit{Right}
$[A, \textit{Clean}], [A, \textit{Dirty}]$	\textit{Suck}
\vdots	\vdots

function REFLEX-VACUUM-AGENT($[location, status]$) **returns** an action

if $status = \textit{Dirty}$ **then return** \textit{Suck}
else if $location = A$ **then return** \textit{Right}
else if $location = B$ **then return** \textit{Left}

What is the **right** function?

Can it be implemented in a small agent program?

Rationality

Fixed **performance measure** evaluates the **environment sequence**

- one point per square cleaned up in time T ?
- one point per clean square per time step, minus one per move?
- penalize for $> k$ dirty squares?

A **rational agent** chooses whichever action maximizes the **expected** value of the performance measure **given the percept sequence to date**

Rational \neq omniscient

- percepts may not supply all relevant information

Rational \neq clairvoyant

- action outcomes may not be as expected

Hence, rational \neq successful

Rational \Rightarrow exploration, learning, autonomy

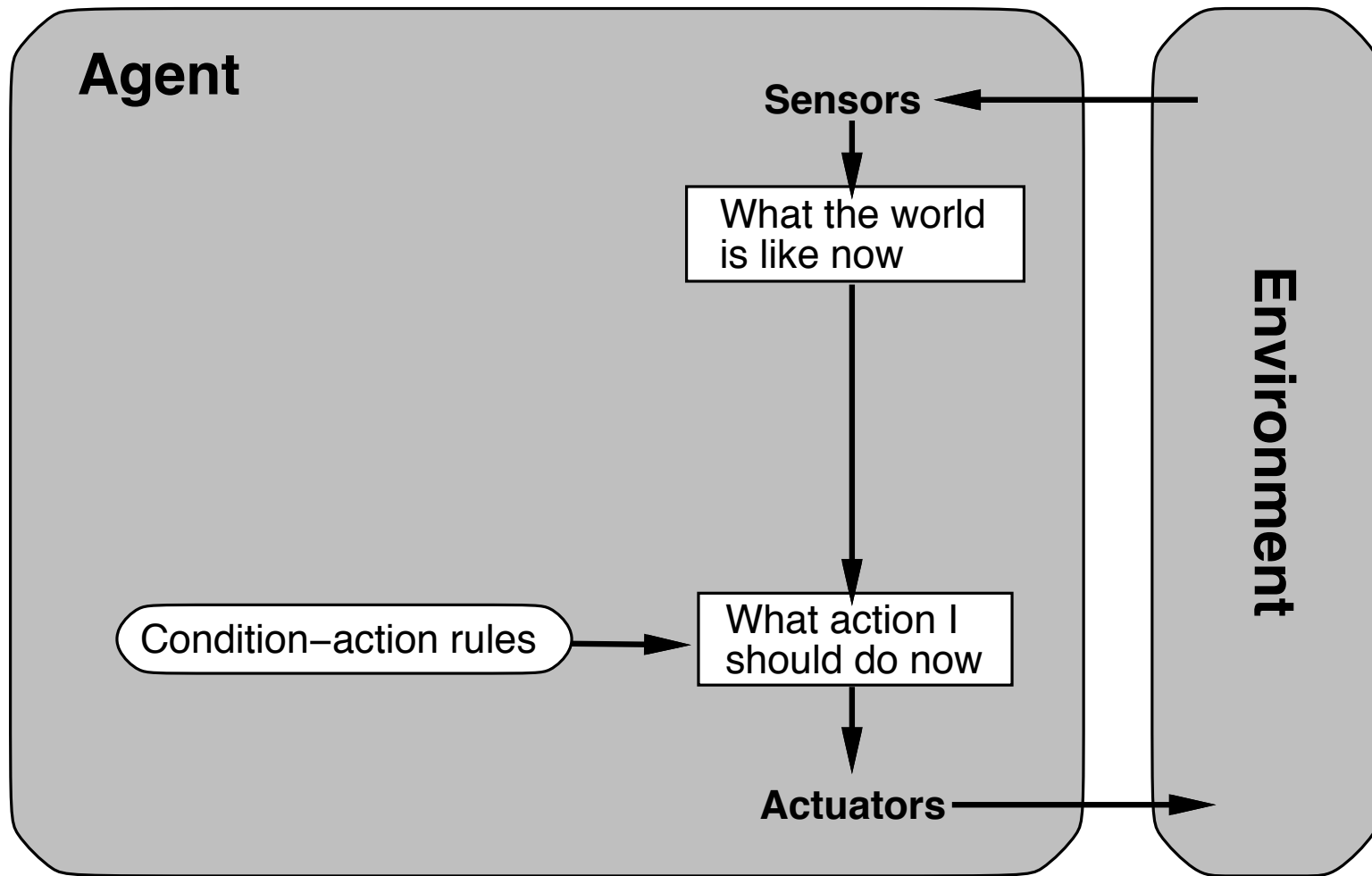
Agent types

Four basic types in order of increasing generality:

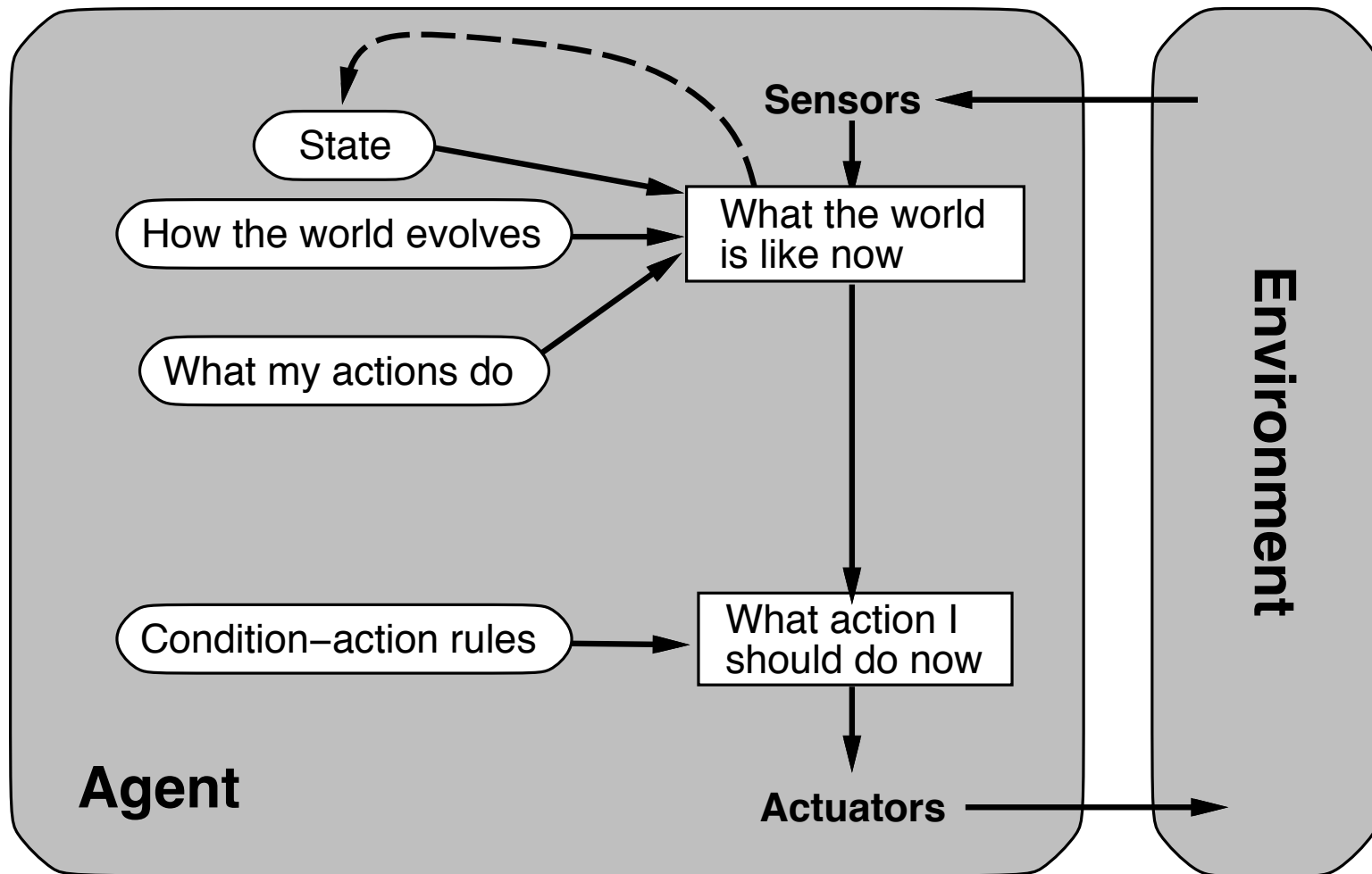
- simple reflex agents
- reflex agents with state
- goal-based agents
- utility-based agents

All these can be turned into learning agents

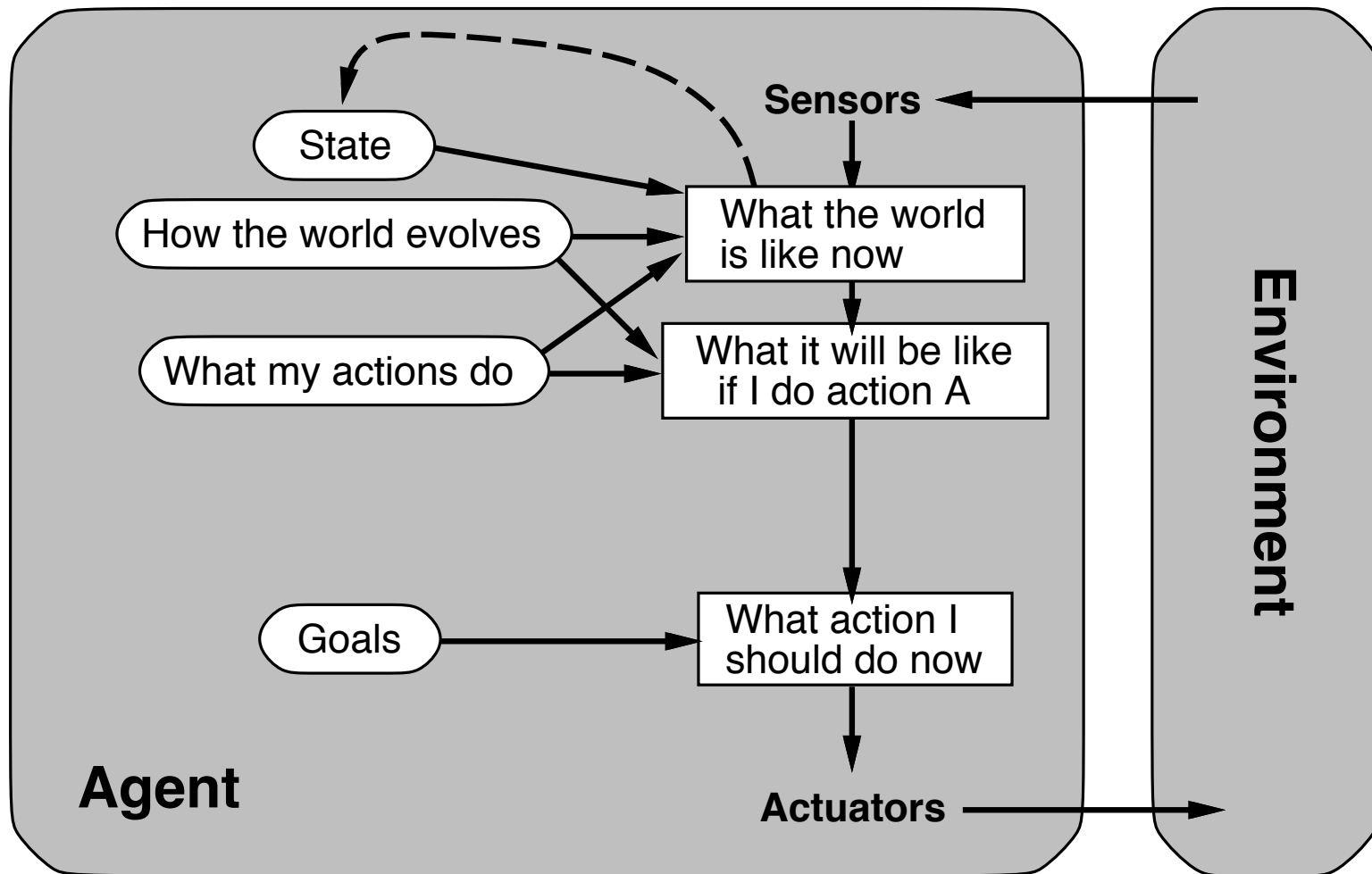
Simple reflex agents



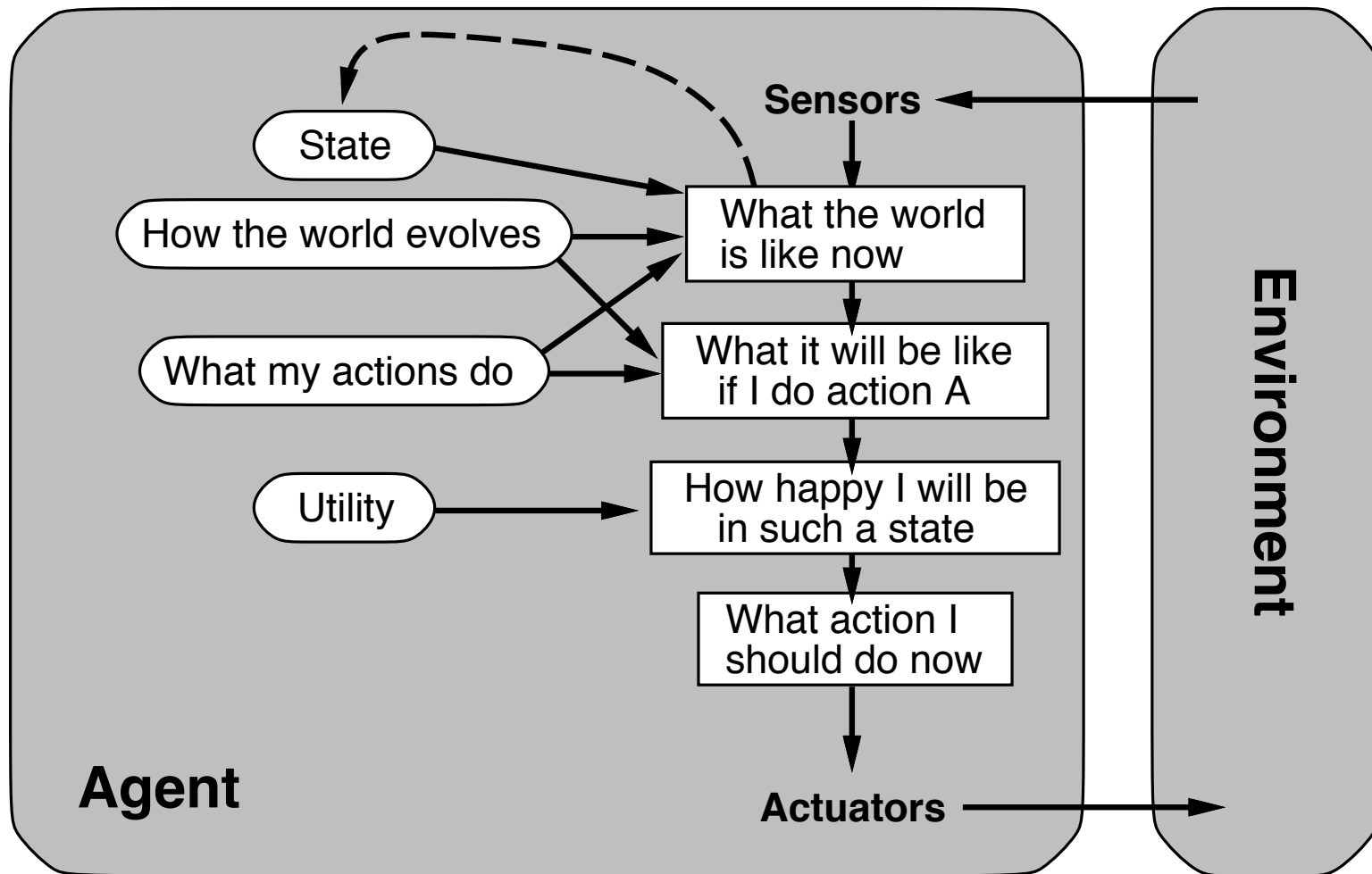
Reflex agents with state



Goal-based agents



Utility-based agents



Learning agents

