SISTEMAS MULTIAGENTES

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Chapter 2: Multiagent systems

SISTEMAS MULTIAGENTES


collaborative
design
civil
agent
interactive
environments
elderly
methods
complex
disagreement
multiagent
library
agent-based
infrastructure
simulations
open-source
partitioning
based
intelligent
agents
behaviors
convex
objects
semantic
draw
systems
editors
health
social
integrating
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animation
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making
problems
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groups
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socially
approach
cheating
j-madem
java
performance
operational
web
strategic
achieving
simulation
decision
skills
characterization
platform
asynchronous
simulating
market-based
crowd
mas
model
review
peer
system
multi-agent
towards
people
semantics
mechanism
rational
framework
control
distributed
virtual
mobility
navigation
urban
planning
simulator

Topics

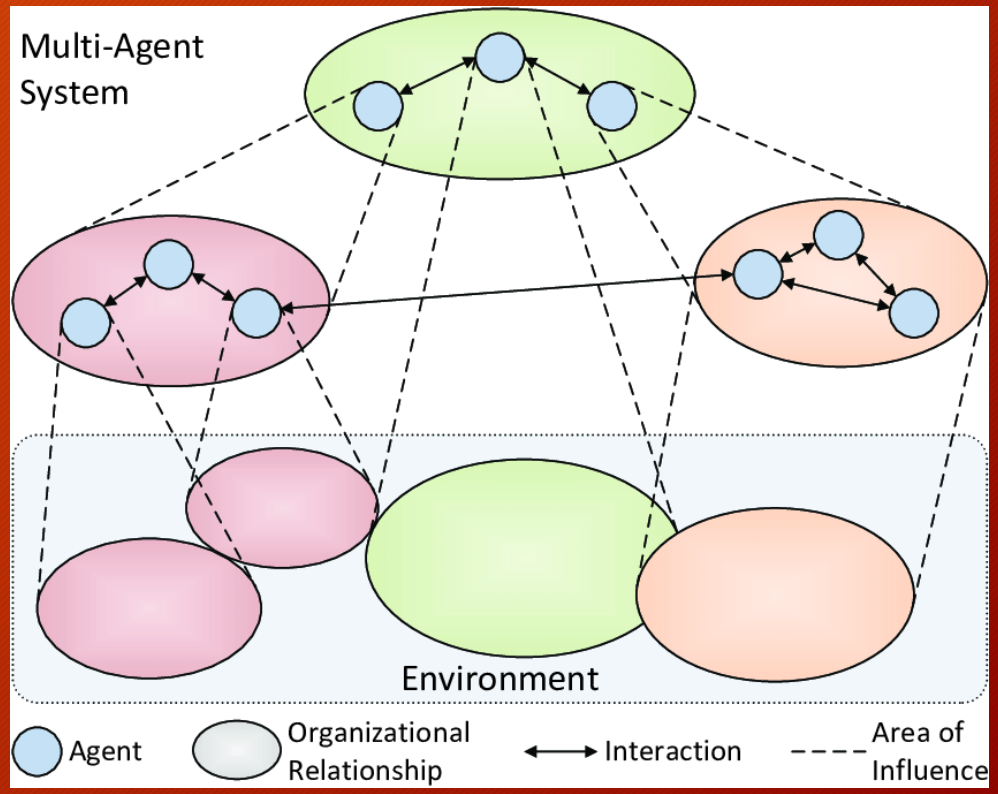
2. SISTEMAS MULTIAGENTES				
1. Introducción 2. Ideas generales de los sistemas multiagentes 3. La interacción en los Sistemas Multiagentes 4. Comunicación 5. Coordinación	4	APRENDIZAJE EN CONTACTO CON EL DOCENTE (ACD)	Exposición de material docente Prueba sobre el capítulo	8 horas 2 horas
		APRENDIZAJE AUTÓNOMO (AA)	Investigación de KIF y KQML	4 horas

Interacción en Sistemas Multiagentes

Capítulo 2: Sistemas Multiagentes

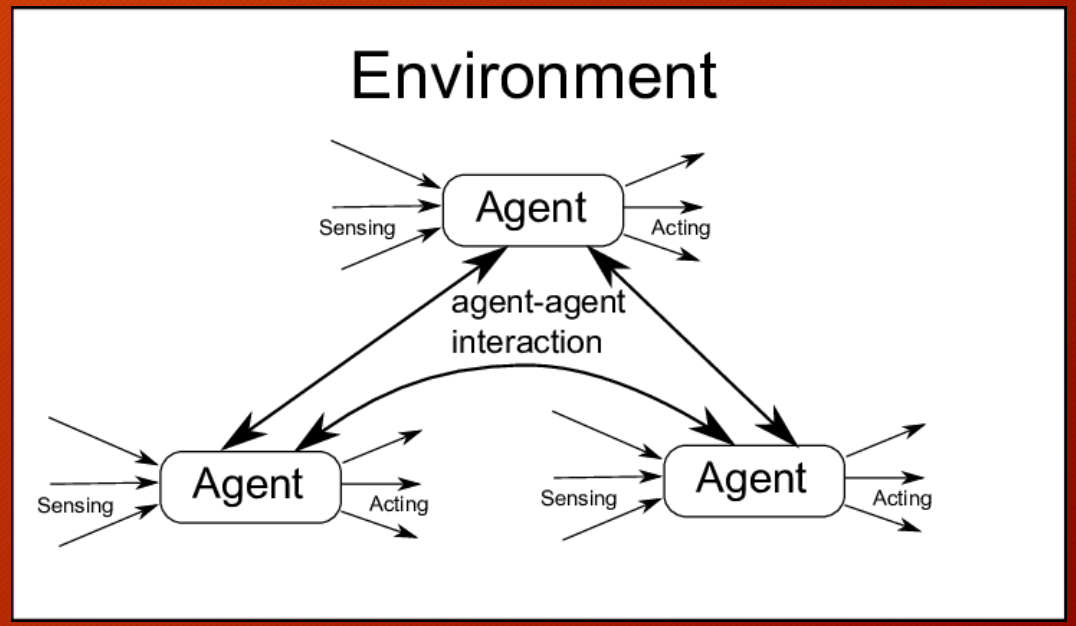
INTRODUCTION

- Interaction in multi-agent systems refers to the dynamic relationships and communications that occur between multiple autonomous agents. These agents can be software programs, robots, humans, or a combination of these entities.
- Multi-agent systems are commonly used in various fields, including artificial intelligence, robotics, economics, social sciences, and more.



The interaction

- Here's a description of the key aspects of interaction in multi-agent systems:
  - **Autonomy**: Each agent in a multi-agent system has a degree of autonomy, which means they can make decisions and take actions independently, based on their own internal state and objectives. Autonomy allows agents to adapt to changing environments and make choices that best serve their goals.
  - **Communication**: Agents in a multi-agent system often need to communicate with each other to exchange information, coordinate actions, and share knowledge. Communication can take various forms, including direct message passing, broadcasting, or signaling through shared resources.



The interaction

- Here's a description of the key aspects of interaction in multi-agent systems:
  - **Cooperation**: Multi-agent systems frequently involve agents working together to achieve common goals. Cooperation may require agents to share resources, coordinate their actions, and engage in collaborative decision-making. Cooperative behavior is essential in applications like multi-robot systems and distributed computing.
  - **Competition**: In some cases, agents may be in competition with one another, vying for limited resources or striving to achieve conflicting objectives. Competition can lead to strategic interactions, where agents must make decisions that take into account the actions and strategies of other agents.

The interaction

- Here's a description of the key aspects of interaction in multi-agent systems:
  - **Coordination**: Effective interaction often depends on coordination mechanisms that help agents synchronize their activities. Coordination can involve negotiation, consensus building, and the development of shared protocols or rules.
  - **Conflict Resolution**: Conflicts may arise when agents have incompatible goals or when there is a lack of resources. Multi-agent systems may incorporate mechanisms for conflict resolution, such as arbitration, negotiation, or the establishment of priorities.

The interaction

- Here's a description of the key aspects of interaction in multi-agent systems:
  - **Emergent Behavior**: Interaction among agents can lead to emergent behavior, where the collective actions of the agents result in patterns or outcomes that were not explicitly programmed or designed. Understanding and managing emergent behavior is a significant challenge in multi-agent systems.
  - **Environment**: Agents typically operate within a shared environment, which may include physical space or a virtual world. The environment provides a context for interaction and may impose constraints on agents' actions.

The interaction

- Here's a description of the key aspects of interaction in multi-agent systems:
  - **Learning and Adaptation**: Many multi-agent systems incorporate learning algorithms that enable agents to adapt to changing conditions and improve their performance over time. Agents can learn from their own experiences or from interactions with other agents.
  - **Scalability**: Multi-agent systems can scale from a small number of agents to very large populations. Managing interactions and ensuring efficient communication become more challenging as the number of agents increases.
  - **Application Domains**: Multi-agent systems are used in various domains, including robotics, traffic management, online marketplaces, and simulation environments. They are employed to model and solve complex problems that involve multiple decision-makers.

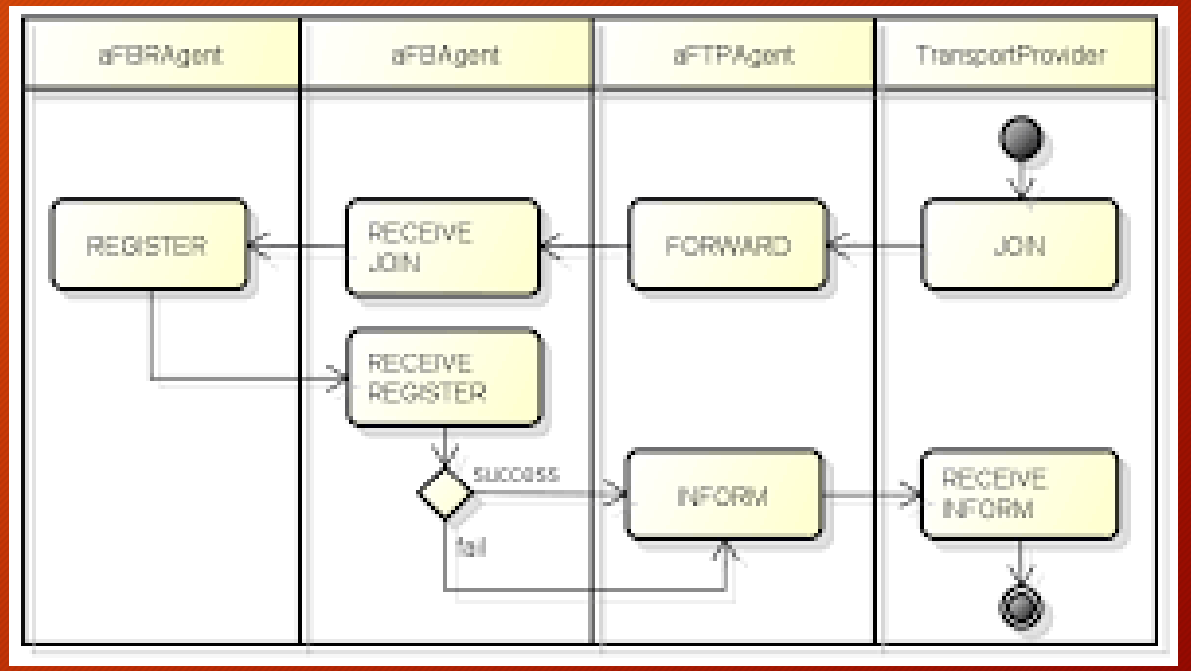
COMMUNICATION IN MULTIAGENT SYSTEMS

Introduction

- Agents are important because they let software components interoperate within modern applications like electronic commerce and information retrieval. Most of these applications assume that components will be added dynamically and that they will be autonomous (serve different users or providers and fulfill different goals) and heterogeneous (be built in different ways).
- Agents must be able to talk to each other to decide what information to retrieve or what physical action to take, such as shutting down an assembly line or avoiding a collision with another robot. The mechanism for this exchange is the agent communication language (ACL).

Agent communication language (ACL)

- An Agent Communication Language is a language with a precisely defined syntax, semantics and pragmatics that is the basis of communication between independently designed and developed agents. ACL standard allows encoding/decoding of information exchange by the agents.



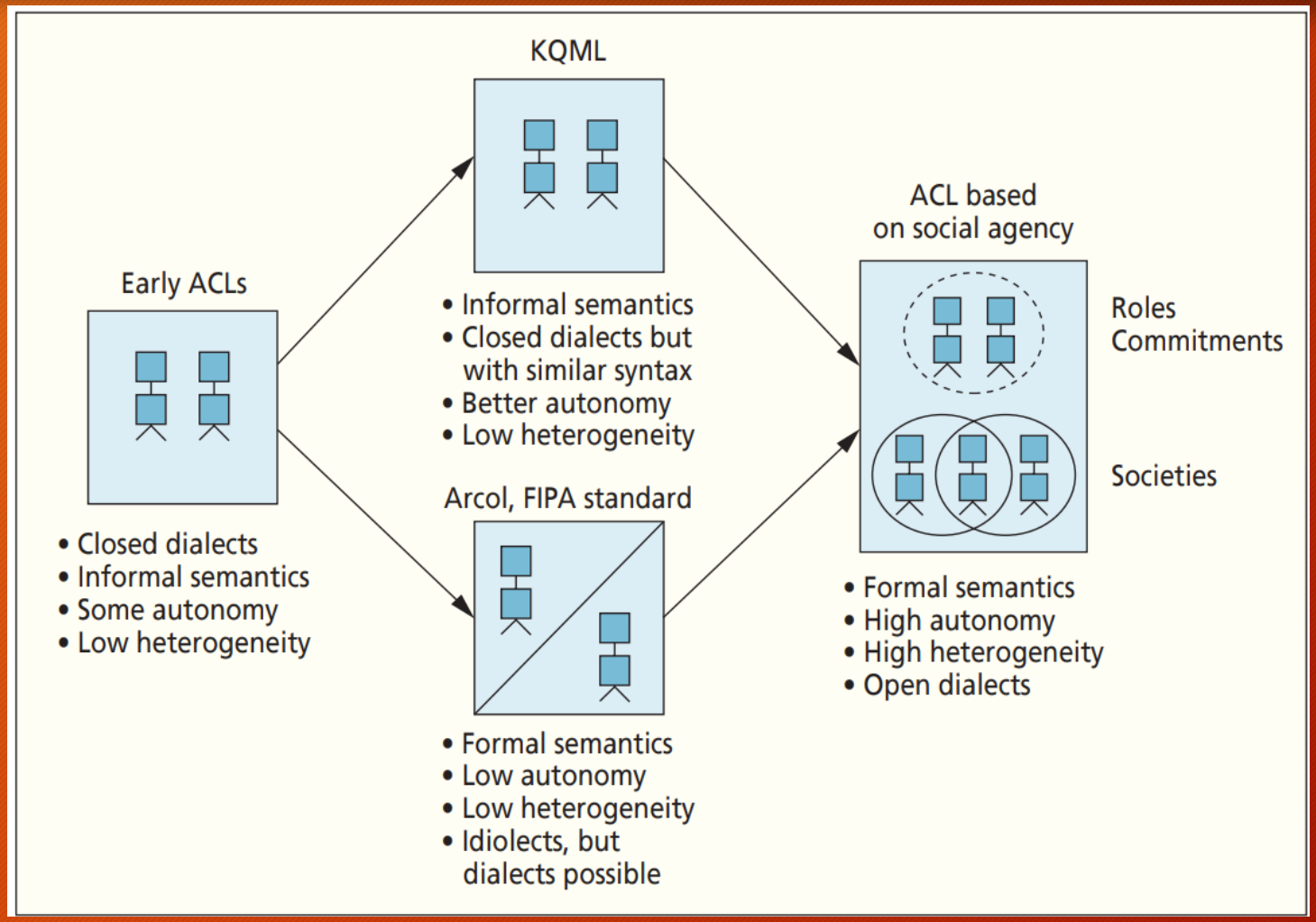
Introduction

- Communication is necessary in order to allow collaboration, negotiation, cooperation, etc., between independent entities. For this purpose, it requires a well-defined, agreed and commonly understood semantics. Therefore, there cannot be any interoperability without standards.
- Agent communication is based on message passing, where agents communicate by formulating and sending individual messages to each other.

Introduction

- A standard is needed to ensure that an ACL complies with a particular protocol: dialects are needed to address the different scenarios that can arise with heterogeneous, autonomous agents.

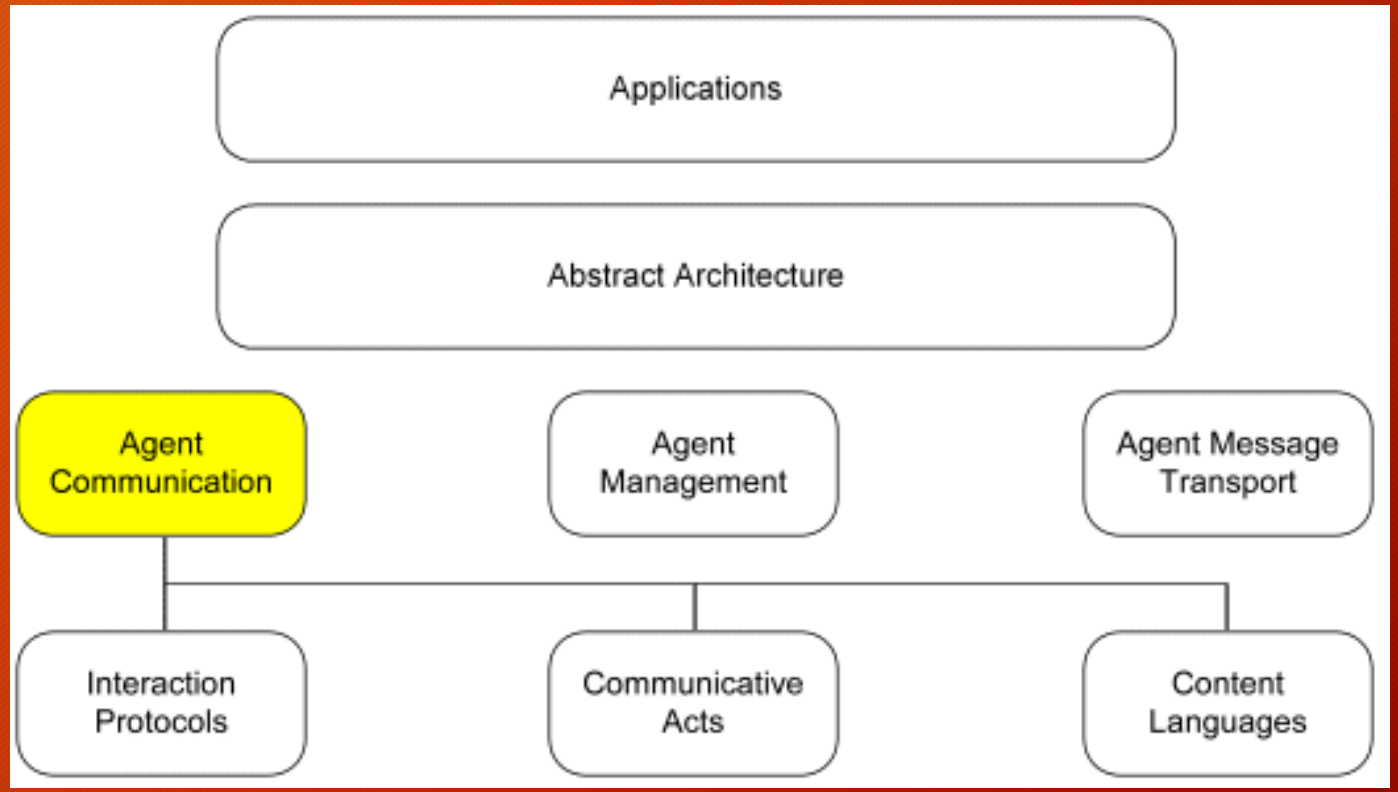
ACL progression since the early days of agents



ACL’s FOR COMMUNICATION

Introduction

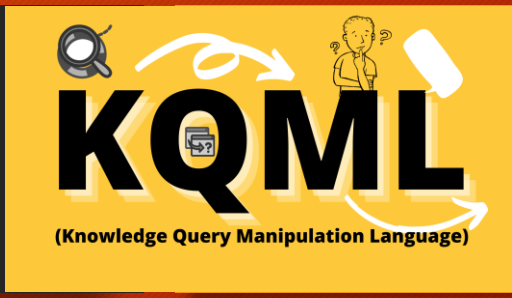
- FIPA Agent Communication specifications deal with Agent Communication Language (ACL) messages, message exchange interaction protocols, speech act theory-based communicative acts and content language representations.



Agent communication language (ACL)

- The Foundation for Intelligent Physical Agents (FIPA) ACL specifies a standard message language by setting out the encoding, semantics and pragmatics of the messages. The standard does not set out a specific mechanism for the internal transportation of messages. Instead, since different agents might run on different platforms and use different networking technologies, FIPA just specifies how transporting and encoding the messages between different remote platforms.
- The syntax of the ACL is very close to the KQML communication language.

KQML



- One of the requirements for software agents to interact and interoperate effectively is a common communication language (social ability property).
- KQML is an agent communication language and a protocol developed by the Knowledge Sharing Effort (KSE) Consortium. It has been developed both as a **message format** and a **message-handling protocol** to support run-time knowledge sharing among agents which may have different content languages.

https://techmoodly.com/education/kqml-knowledge-query-manipulation-language/