IMPLEMENTING A DYNAMIC ONTOLOGY MAPPING APPROACH IN MULTIPLATFORM COMMUNICATION MODULE FOR DISTRIBUTED MULTI-AGENT SYSTEM

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ABSTRACT. Communication is the most important feature for meaningful interaction among agents in distributed multi-agent systems. Communication enables agent’s interaction to achieve their goals. Agent communication languages provide a standard in the protocol and language used in the communication, but cannot provide a standard in ontology, because ontology depends on the subject and concept of the communication. This lack of standardization is known as interoperability problem. In order to obtain semantic interoperability, agents need to agree on the basis of different ontologies. In this paper, agent communication layers are proposed to outline the communication among agents, and Multiplatform Communication System (MPCS) architecture is proposed to provide a highly flexible and scalable system. In addition a Dynamic Ontology Mapping System for Agent Communication (DOMAC) is proposed based on different mapping approaches.

Keywords: Agent communication language (ACL), Ontology mapping, Interoperability, KQML, Multi-agent system (MAS), Distributed intelligent system

1. Introduction. The proposed Distributed Multi-Agent System (DMAS) framework [1] provides the basis for an open environment where agents interact with each other to reach their individual or shared goals in evolving environment. To interact in such environment, agents need to overcome many challenges. One of the most important challenges that the agents must overcome is how they must be able to communicate with one another. So the development in agent communication module must be considered in designing the DMAS in order to give agents the ability to have successful cooperation, negotiation, and scheduling among one another. In other words, the communication is the kernel of any MAS; without communication there would not be any interaction among agents. Agent framework is a set of programming tools for constructing agents, and its infrastructure provides regulations that agents must follow to communicate and understand one another, thereby enabling knowledge sharing. Agent infrastructures mostly deal with the communication among agents based on a communication language using common ontological system. Communication is the most important feature for meaningful interaction among agents in multi-agent systems, as it enables agents to interact and share information to perform tasks to achieve their goals. In order to achieve this objective, Agent Communication Languages (ACL) has been proposed based on the speech-act theory. Speech act theory is derived from the linguistic analysis of human communication. It is based on the idea that with language the speaker not only makes statements, but also performs actions [2]. ACL provides a standard in the protocol and language used in the communication, but