

A Methodology for Designing Self-organizing Systems

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1. ABSTRACT

In existing multi-agent systems, agents are used that perform various, but strictly regulated processes, and their inducing occurs according to a schedule specified by the operator or according to some preset conditions. Such approach leads to a high level of downtime of computing power in solving problems of preparing information and analytical data in a short time, because agents are not universal enough, and their incentive to work is not event-oriented.

The article presents a methodology for group multi-agent problem solving. Group autonomous problem solving is possible only if there is autonomous group management and, in particular, the possibility of self-organization, i.e. changing of structural units within a group and changing of its behavior depending on the actual state of the external environment.

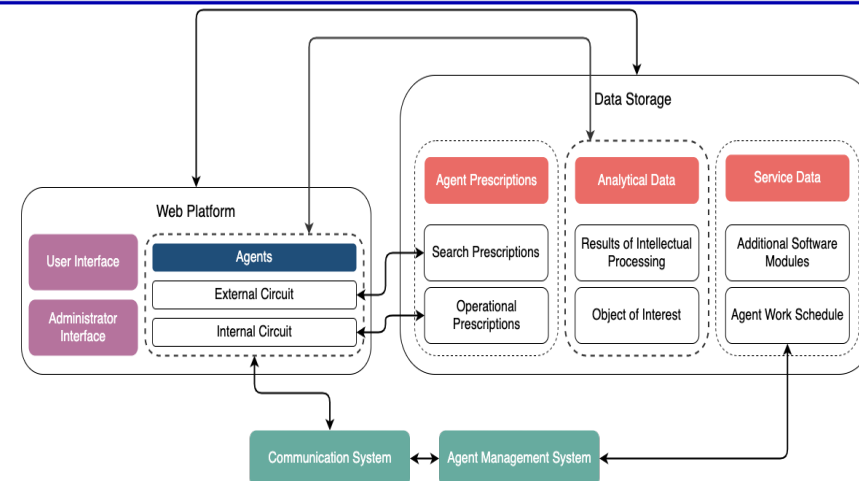
The practical solution to self-organization problems in agent systems seems to be the most important direction for increasing their intellectual characteristics and the areas of their practical use.

2. INTRODUCTION

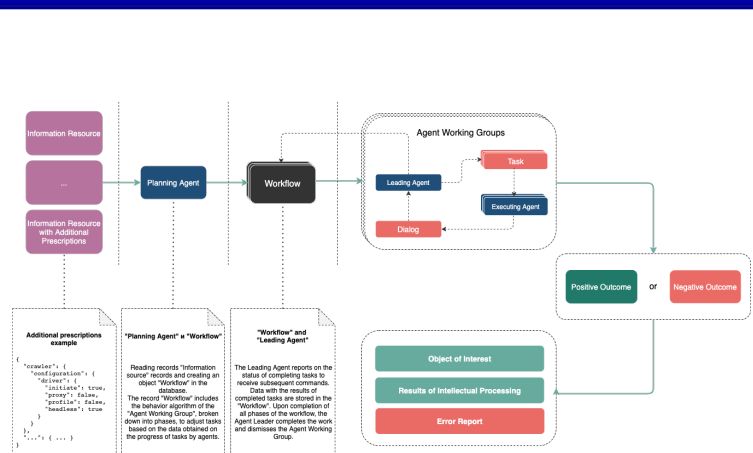
The main characteristics of multi-agent systems include:

- More than one agent.
- The ability of communication and interaction between agents.
- Identification of agents within the MAC.
- Separate intellectual component of each agent.
- General rules for the interaction of MAS with the external environment for all agents.
- Adaptability and responsiveness to the external environment, which is dynamic.

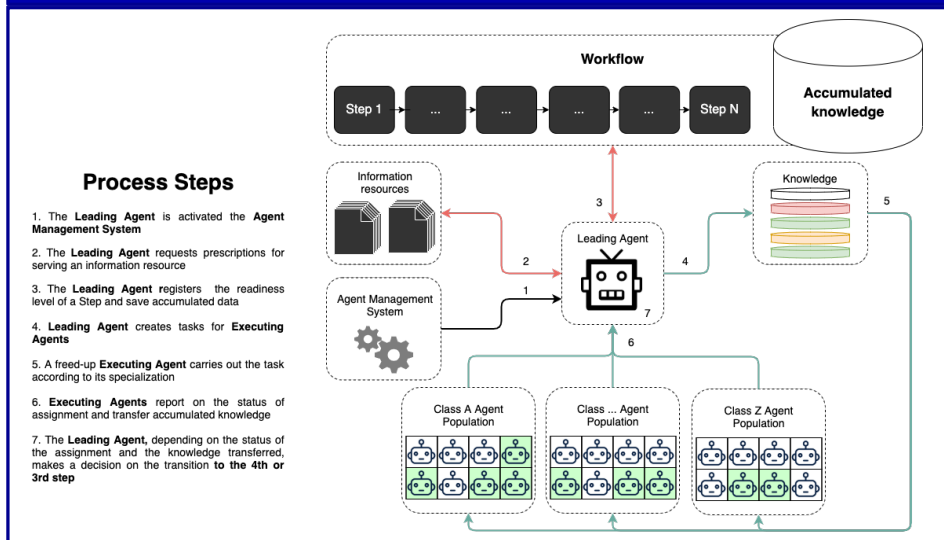
3. MULTI-AGENT SYSTEM ARCHITECTURE



4. A FUNCTIONAL MODEL OF AGENT SELF-ORGANIZATION IN MAS



5. A SCHEMA OF AGENT SELF-ORGANIZATION PROCESS DURING THE WORKFLOW



6. CONCLUSIONS

The methodology proposed by the authors to build self-organizing agent systems can be used to solve problems in various fields of Computer Science. Including solving problems of analysis of plain text, problems in the field of the Internet of things, problems of traffic estimation in computer networks, problems of assessing the popularity of data. etc.

The proposed methodology is basic for constructing various agents and providing them with an intelligent component.