

Agora UCS

Ubiquitous Collaborative Space

Pascal Dug nie, Stefano A. Cerri, Philippe Lemoisson, and Abdelkader Gouaich

LIRMM: Universit  Montpellier 2 & CNRS; 161 rue Ada, Montpellier, France

Abstract. AGORA UCS is a new architecture designed for distributed learning as a side effect of communication and collaboration. This architecture aims to achieve (i) ubiquity (time and space independent access by community members); (ii) immanence (full internal control of the destiny of the community) and (iii) multi-modal communication (reinforcing the interactions between the members of the community). The theoretical model underlying AGORA UCS is inspired by an integration of agents and GRID concepts (AGIL). AGORA UCS has been experimented by a dozen of communities, which represent altogether about seventy members. We achieved quite promising results in terms of motivation and collective performances¹.

1 Requirements

Conversation and collaboration is the foundation of human learning. We base our requirements on a learning theory consisting of conversational cycles [9]. This theoretical background led us to draft the essential characteristics of a collaborative environment supporting mutual understanding and joint work: (i) immediate awareness of the life of the community; (ii) ability to maintain a clear and unambiguous internal model of the working environment and ongoing processes during the successive collaboration sessions. These general ideas have grounded the concept of AGORA UCS in order to: (i) allow secure access to services in a terminal independent way; (ii) support ubiquity yet keeping the state of the collaboration independently from the user access location; (iii) dynamically allocate resources for any use of any service within a pool of mutualized and virtualized physical resources.

2 Architecture

The integration of Agents [1,2,3,7] and Grid concepts [5,6] has been extensively modeled in [8]. Figure 1 represents the AGORA UCS architecture which is based on a ternary relation between three concepts. The *VO (Virtual Organisation)*, a concept borrowed from Grid, is a *community of agents* associated with dedicated

¹ As partners from the European ELeGI project (European Learning Grid Infrastructure, IST-002205): Joost Breuker and Marc Eisenstadt are gratefully acknowledged.

resources (the *service container*) and *rights* which specify the level of authorisations of a *VO* member over a given *service*. This conceptual model allows to develop a flexible structure satisfying the self organisation requirement of the communities. In the figure, the inspiring Agent and Grid models are highlighted (AGR: Agent-Group Role [5], OGSA: Open Grid Service Architecture [6]).

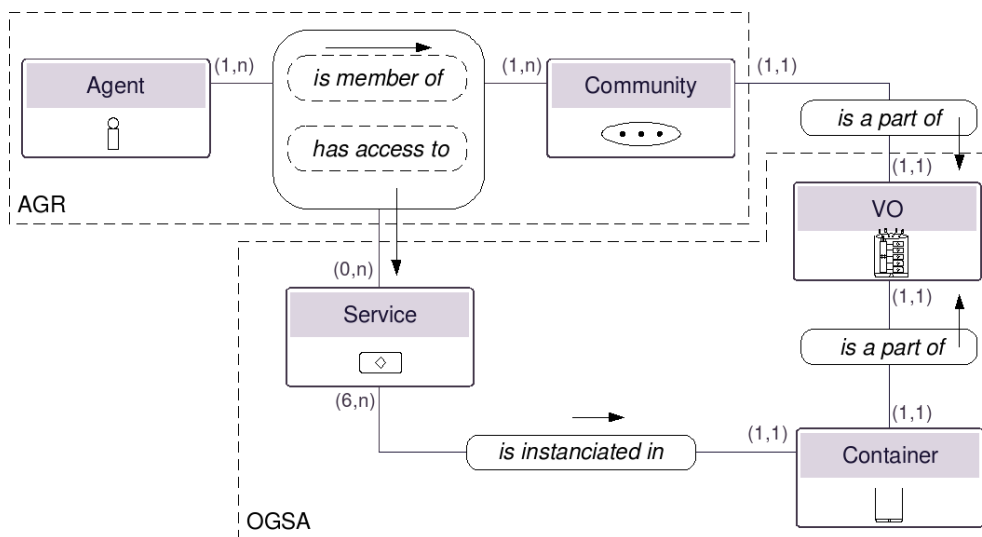


Fig. 1. The AGORA conceptual model

3 Experimentations and results

The experimentations focus both on user behavior as well as system performance to compare subjective and objective results. Most users do not have any skill in computer management. The seamless access to AGORA UCS via a simple web browser as a *thin terminal*, was implied by the requirements. Once created, a *VO* is completely autonomous. Among others, the EnCOre² scenario has provided the most interesting results. AGORA UCS allowed a quick mastering of complex computational tools: unskilled users were at ease in their operations including the delegation of rights [4]. AGORA UCS enabled, for instance, the visual representation of chemistry models at a distance so that attention was put by the users on the semantics of the domain. Since, the behavior could not be foreseen in advance, the flexibility of the AGORA UCS model allowed the community to

² EnCOre: Encyclopédie de Chimie Organique Electronique.
 Demo available at <http://agora.lirmm.fr>

freely organise itself. Various situations of collaboration with reinforced modalities of interaction by using a synchronous communication interface has favored the emergence of collective intelligence. Discussions in real time, combined with visual representations on shared desktops, allowed the actors to increase the effectiveness of the collaboration process. As a conclusion, the acceptance of the technology was extremely high and promising, even if we cannot yet certify that *learning* has indeed occurred as a side effect of enthusiastic collaboration at a distance.

References

1. Stefano A. Cerri. Cognitive environments in the strobe model. In J. Self, editor, *EuroAIED: the European Conference in Artificial Intelligence and Education*, pages 254–260, Lisbon, Portugal, 1996. 1
2. Stefano A. Cerri. Computational mathematics tool kit: architecture’s for dialogues. In G. Gauthier C. Frasson and A. Lesgold, editors, *Intelligent Tutoring Systems, Lecture Notes in Computer Science*, volume 1086, pages 343–352, Montréal, 1996. Springer-Verlag. 1
3. Stefano A. Cerri. Shifting the focus from control to communication: the stream objects environments model of communicating agents, collaboration between human and artificial societies. *Coordination and Agent-Based Distributed Computing, Lecture Note in Artificial Intelligence*, 1624, 1999. 1
4. Pascal Dugénie, Philippe Lemoisson, Clément Jonquet, Monica Crubézy, and Claude Laurenço. The Grid Shared Desktop: a bootstrapping environment for collaboration. In *Advanced Technology for Learning (ATL), Special issue on Collaborative Learning*, volume 3, pages 241–249, 2006. 2
5. Jacques Ferber, Olivier Gutknecht, and Fabien Michel. From agents to organizations: an organizational view of multi-agent systems. In P. Giorgini, J. P. Müller, and J. Odell, editors, *4th International Workshop on Agent-Oriented Software Engineering, AOSE’03*, volume 2935 of *Lecture Notes in Computer Science*, pages 214–230, Melbourne, Australia, July 2003. Springer-Verlag. 1, 2
6. Ian Foster, Nicholas R. Jennings, and Carl Kesselman. Brain meets brawn: why Grid and agents need each other. In *3rd International Joint Conference on Autonomous Agents and Multiagent Systems, AAMAS’04*, volume 1, pages 8–15, New York, NY, USA, July 2004. 1, 2
7. Clement Jonquet and Stefano A. Cerri. The strobe model: dynamic service generation on the grid. *Applied Artificial Intelligence Journal*, 19:967–1013, 2005. 1
8. Clement Jonquet, Pascal Dugénie, and Stefano A. Cerri. Service-Based Integration of Grid and Multi-Agent Systems Models. In R. Kowalczyk, M.N. Huhns, M. Klusch, Z. Maamar, and Q.B. Vo, editors, *International Workshop on Service-Oriented Computing: Agents, Semantics, and Engineering, SOCASE08*, volume 5006 of *Lecture Notes in Computer Science*, pages 56–68, Estoril, Portugal, May 2008. Springer-Verlag. 1
9. Diane Laurillard. A conversational framework for individual learning applied to the learning organisation and the learning society. *Systems Research and Behavioral Science*, 16:113–122, 1999. 1