

Doctoral Thesis Defense

Speaker:	Antoine Nongillard
Supervisor:	J. W. Atwood, P. Mathieu
Examining Committee:	J. Bentahar, L. Narayanan, A. El Fallah Segrouchni, B. Moulin
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ABSTRACT

Resource allocation problems have been widely studied according to various scenarios in the literature. In such problems, a set of resources must be allocated to a set of agents, according to their own preferences. Self-organization issues in telecommunication, scheduling problems or supply chain management problems can be modeled using resource allocation problems.

They are usually solved using of centralized techniques, where an omniscient entity determines how to optimally allocate resources. However, these solving techniques are not well-adapted for applications where privacy is required. Moreover, several assumptions made are not always plausible, which may prevent their use in practice especially in the context of agent societies. For instance, dynamic applications require adaptive solving processes, which can handle the evolution of initial data. Such techniques never consider restricted communication possibilities whereas many applications are based on. For instance, in peer-to-peer networks, a peer can only communicate to a small subset of the systems.

In this thesis, we focus on distributed methods to solve resource allocation problems. Initial allocations evolves step by step thanks to local agent negotiations. We seek to provide agent behaviors leading negotiation processes to socially optimal allocations. In this work, resulting resource allocations can be viewed as emergent phenomena. We also identify parameters favoring the negotiation efficiency. We provide the agent behavior to implement when four different social welfare notions are considered. The original method proposed in thesis is adaptive, anytime and can handle any restriction on agent communications.