

# Dynamic Coalition Formation in Iterative Request For Proposal Environments

Carlos Merida-Campos

## Abstract

Multi-party negotiation of complex goods or task in the real world have been usually driven by a Request For Proposal (RFP) protocol. RFP based systems are those where an entity submits an invitation (a Request For Proposal) for providers of a product or service to bid on the right to supply that product or service. Further, while in the literature RFP is often studied for cases where single agents respond to bids, in the real world the problem is often much more complex - groups or consortia of agents must combine their skills in order to respond effectively to a given Request. In this talk I will present the research conducted on a Multi-Agent based model that explicitly adopts the RFP protocol in such a coalitional setting to study its possibilities in a fully automated scenario. Such an automated competition can be considered as a non one-off event, but rather as a dynamic process in which required tasks change over time, such that providers dynamically change their collaboration serving the current requirements. This depicts a dynamic RFP environment in which collaborations can be thought as coalitions.

Important aspects as dynamic coalitional processes, dynamic requirements, dynamic social networking and conflicting group interests, have been individually considered in the Coalition Formation literature through the analysis of different Multi-Agent models, however, they have not been considered in conjunction for an specific type of model. The research conducted addresses these important dynamic aspects on a coalitional framework of a RFP negotiation protocol, trying to answer the following research questions: how can agents exploit incomplete data over time?, how can agents reuse coalitional structures in large-scale coalition formation systems? and how can agents reuse social structures in large-scale coalition formation systems?. To address these questions, a RFP negotiation model have been studied from different perspectives, including scarcity of information, heterogeneity of capabilities or requirements, different types of social awareness, effect of social topologies and simultaneity of requests. Research on the model demonstrated that negotiation of complex goods in dynamic environments between heterogeneous and self interested providers can be efficiently ruled by a RFP protocol letting providers create joint and competing proposals, and also that dynamic coalition formation can be directly supported by social structures and such structures can be successfully adaptive on contextual changes.