

# The logic of resources and capabilities

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Organizations are social units of agents who are structured and managed to meet a need, or to pursue collective goals. The study of organizations in economics and social science has led to substantial literature, which explains the various forms of organization structure and the relations they bear to the generation of competitive advantage in terms of agency, knowledge, goals, capabilities and inter-agent coordination. As such, organization theory is very amenable to be studied with the logical tools developed in the context of the study of information flow.

However, presently there are not many instances of logical systems specifically designed to describe the internal dynamics of organizations. Furthermore, existing logics aimed at capturing notions of agency and information flow typically lack a comparable proof-theoretic development. More often than not, the hurdles preventing their standard proof-theoretic development are due to the very features which make them capture essential aspects of the real world, such as their not being closed under uniform substitution, or the presence of certain extralinguistic labels and devices encoding key interactions between logical connectives.

In [2], a framework similar in spirit to STIT logics is presented, that aims at achieving an emergent notion of dynamics which is based on a hierarchy of more primitive notions, the most basic of which are agency and agents' capabilities.

With [2] as a starting point, we develop a logic aimed to describe dynamics of organizations, the logic of resources and capabilities [1]. The key feature of this logic lies on the idea that a better grasp on the notion of capabilities can be achieved if we simultaneously can talk about resources. For instance we can compare the capabilities of different agents in terms on their being able to perform a certain task with less resources or we can extend the reasoning over a planning problem in terms of the order of which resources needs to be used to perform a certain task.

The core aspect of this logic is based on *multi-type display-type calculi*, a methodology introduced in [4, 3] motivated by considerations discussed in [8, 6] to provide DEL and PDL with analytic calculi, and further developed in [5, 7, 11, 12, 13, 10], in synergy with algebraic techniques [9]. In the present framework, resources and formulas are represented as terms of different types, each with an independently defined logic, which interact thanks to operators, such as the capability operators in this specific setting, which take arguments of different types (resources and formulas in this specific setting).

The present contribution reports on the technical aspects involved in the logic of resources and capabilities, that is, the analyticity of its axioms, the rules of the proof system, the corresponding semantics, the canonicity of the rules and cut elimination. Finally, some examples will be presented that illustrate what this logic can be used for.

## References

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