

Capability Agreements and Risk

Glenda C.M. Amaral¹, Giancarlo Guizzardi¹, Nicola Guarino², Daniele Porello²,
and Tiago Prince Sales³

¹Free University of Bozen-Bolzano, Bolzano, Italy
glendacarla.mouraamaral@stud-inf.unibz.it
giancarlo.guizzardi@unibz.it

²ISTC-CNR Laboratory for Applied Ontology, Trento, Italy
nicola.guarino@cnr.it, daniele.porello@loa.istc.cnr.it

³University of Trento, Trento, Italy
tiago.princesales@unitn.it

Abstract. In this paper we analyse the ontological nature of capability agreements and discuss the relation between capability delegation, vulnerabilities and risk.

Keywords: capability, vulnerability, risk, ontology

1 Introduction

Since the early 1980s, the proliferation and increasing importance of interfirm alliances have received considerable attention in the strategic management literature [7]. As the study of alliance networks has gained popularity, theoretical analysis of the competitive advantage of organizations participating in alliances have been developed, focusing on resource-centric theories [2]. Nevertheless, research has shown that it is the services that resources provide, not resources themselves, that generate value for the firm [8]. Consequently, ownership or control of resources is not a necessary condition for competitive advantage. In this sense, capability-based theories, which focus on “adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competences toward a changing environment” [9], have taken shape.

Despite the relevance of capabilities to the success of enterprises, little attention has been given to the theoretical analysis of this concept in the context of interfirm alliances. In this paper, we tackle this issue by analyzing the ontological nature of capability agreements, taking into account the broader implications of incorporating external capabilities embedded in the firm's alliance network. To accomplish that, we conduct, in Sections 2 and 3, an ontological analysis of *capability agreements*, under the principles of the Unified Foundational Ontology [4]. As we shall see, our analysis shows an important result: capability agreements expose external dependencies and reveal new vulnerabilities, which may enable the occurrence of risk events. Therefore, we can state that capability agreements imply a relation of duality between capabilities and vulnerabilities: at the same time that it creates a chain of dependencies on capabilities throughout the alliances network, it forms a chain of vulnerabilities, due to the possibility that one or more participant nodes fail to fulfill their commitments. We conclude and present final considerations in Section 4.

2 Capability and Capability Agreement

Azevedo et al [1] define capability as the power to bring about a desired outcome. We use the UFO semantics of *modes* (more specifically, of *dispositions*) defined in Guizzardi [6] to represent capabilities. In UFO, a capability is a specific type of disposition that endows their bearers with the potential of exhibiting some behavior or bringing about a certain effect under certain conditions.

When an alliance is formed, a capability agreement is established, and the participants endow a subset of its capabilities to the alliance with the expectation of generating common benefits. Fig. 1 shows an OntoUML [4] model representing a capability agreement for a single dyadic alliance in which a FOCAL AGENT is endowed with capabilities offered by a PARTNER AGENT. AGENT is a rolemixin [4], since it represents roles played by entities of different kinds, e.g., persons and organizations. In our model, both the FOCAL AGENT and the PARTNER AGENT represent organizations.

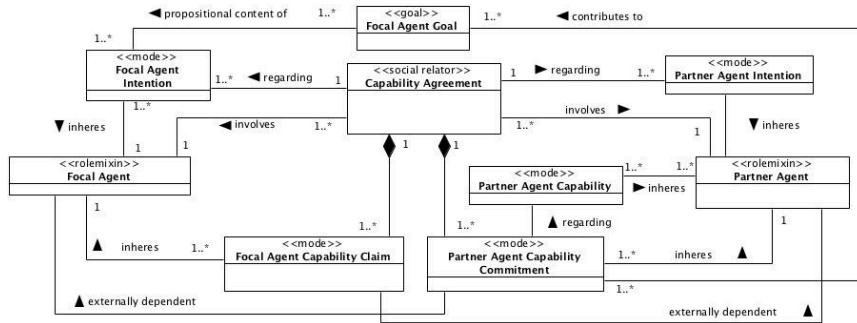


Fig. 1. Capability Agreement.

The CAPABILITY AGREEMENT mediates the relation between the FOCAL AGENT and his partner by being a social relator [5] composed of the PARTNER AGENT's commitments and the FOCAL AGENT's claims with respect to the capabilities offered. Intentions are mental moments [5] that inhere both in the FOCAL AGENT and in the PARTNER AGENT and are tied to the motivation for establishing the agreement. The propositional contents of AGENT's intentions are his goals. By virtue of the capability agreement, the PARTNER AGENT commits to perform actions to achieve the results determined in the agreement. Fig. 2 represents the execution of these actions.

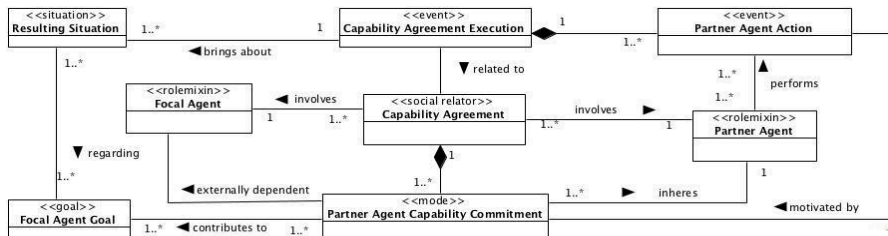


Fig. 2. Capability Agreement Execution

3 Capability Incorporation and Risk

As a result of the capability agreement, the capabilities offered by the PARTNER AGENT are aggregated to the set of capabilities of the FOCAL AGENT, as well as some of the PARTNER AGENT's non-offered capabilities, the latter being derived from opportunities that range beyond the capability agreement immediate scope (for example, an agent may benefit from the partner's reputation, which is not part of the agreement).

The UFO concept of disposition is also applicable for the external capabilities. When an agent delegates to another agent the performance of certain processes that realize a capability, he can still, in a sense, to be considered as having that capability, because he acquires that capability grounded in a relation of delegation [5]. This is related to the idea of what an agent can "socially perform": If A has a commitment from B to execute S, then A (socially) can do S. An object can have dispositions which arise from its parts, or from the network of its delegation relations [5]. In our example, if the FOCAL AGENT has a commitment from the PARTNER AGENT with respect to (w.r.t.) the offered capabilities, then the FOCAL AGENT (socially) has these capabilities.

A further important aspect, related to the motivation behind the establishment of the capability agreement, is the FOCAL AGENT's awareness of his dependence on external agents to satisfy the desire of achieving a certain goal G. With the (social) commitment of the PARTNER AGENT, this desire becomes an intention to G inhering in the FOCAL AGENT. Considering that intentions are self-commitments [3], the FOCAL AGENT becomes more vulnerable and may be exposed to unanticipated risks. We may get until a much higher level of vulnerability if, believing he has the social capability w.r.t. G, the FOCAL AGENT makes a commitment to someone else (e.g. a THIRD AGENT) to employ this social capability to achieve G. In this case his vulnerability is bigger because, if the PARTNER AGENT doesn't fulfill his commitment on G, not only the FOCAL AGENT's self-commitment to G is frustrated but also his social-commitment to G is frustrated. Moreover, if it is true that a commitment without a corresponding capability entails liability then, if the THIRD AGENT decides to exercise his claim towards the FOCAL AGENT w.r.t. G, not only G but other goals of the FOCAL AGENT may be dented (e.g., the FOCAL AGENT might be subject to legal or social sanction from the THIRD AGENT).

We analyze the relation between external capabilities and risk, based on the Common Ontology of Value and Risk (COVER) defined in Sales et al [10]. COVER proposes an ontological analysis of notions such as Risk, Risk Event (Threat Event, Loss Event) and Vulnerability, among others.

When a capability agreement is not successfully executed, because the PARTNER AGENT fails to fulfill its commitments, the RESULTING SITUATION (i.e., the one satisfying the FOCAL AGENT's corresponding goal) may not be obtained, and consequently, the FOCAL AGENT may not be able to achieve his goal. In the worst case, the RESULTING SITUATION is a threatening situation that may trigger a THREAT EVENT, which is the one with the potential of causing a loss. The LOSS EVENT is a RISK EVENT that impacts intentions in a negative way, as it hurts the FOCAL AGENT's intentions of reaching a specific goal. Fig. 3 represents the relation between external capabilities, vulnerabilities and risk.

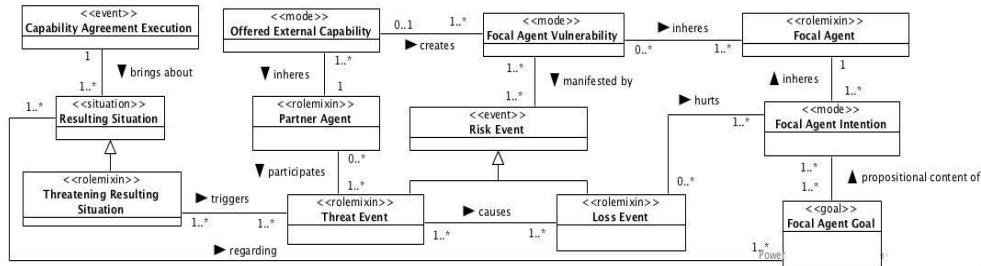


Fig. 3. Shared Capability and Risk

4 Conclusions

In this paper we presented an ontological analysis of capability agreements in the context of interconnected organizations. We propose that capability agreements imply a relation of duality between capabilities and vulnerabilities: at the same time that it creates a chain of dependencies on capabilities throughout the alliances network, it forms a chain of vulnerabilities between the participant nodes, that may enable the occurrence of risk events. As a next direction, we plan to expand the presented analysis to broader agreements, in which two or more participants endows a subset of its capabilities to the alliance.

References

1. Azevedo, C. et al.: Modeling Resources and Capabilities in Enterprise Architecture: A Well-Founded Ontology-Based Proposal for ArchiMate, Information Systems, Oxford University Press (2015)
2. Barney, J.: Firm resources and sustained competitive advantage. *Journal of Management*, 17: 99-120 (1991)
3. Castelfranchi, C.: Commitments: From Individual Intentions to Groups and Organizations. In *Proceedings of the First International Conference on Multi-Agent Systems*. AAAI-Press and MIT Press, 41– 48 (1995)
4. Guizzardi, G.: Ontological foundations for structural conceptual models (2005)
5. Guizzardi, R.; Guizzardi, G.: Ontology-Based Transformation Framework from TROPOS to AORML. *Social Modeling for Requirements Engineering, Cooperative Information Systems Series*: 547–570 (2011)
6. Guizzardi, G., Wagner, G., Falbo, R.A., Guizzardi, R.S.S., Almeida, J.P.A.: Towards Ontological Foundations for the Conceptual Modeling of Events, 32nd International Conference on Conceptual Modeling (ER) (2013)
7. Lavie, D.: The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review*, 31(3), 638-658 (2006)
8. Penrose, E.T.: *The Theory of the Growth of the Firm*. New York: Wiley (1959)
9. Teece, D.; Pisano, G.: *The Dynamic Capabilities of Firms: An Introduction*. *Industrial and Corporate Change* 3: 537–556 (1994)
10. Sales, T.P., Baião, F., Guizzardi, G., Guarino, N., Mylopoulos, J.: The common ontology of value and risk. In: 37th Int. Conf. on Conceptual Modeling (ER) (2018)