Changing Agreements:
Intention Reconsideration Based On Assumptions And Reasons * † ‡

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Most researchers in agreement technologies are working on how to make or negotiate *new* agreements, less on changing *existing* agreements. This motivates our main research question: *How to develop technology to support the change of agreements?* In the master's thesis [1] of the first author we start from a real-world case study in enterprise architecture [2]. We notice that, similar to agreement technology, the revision of architectural decisions is a key issue in enterprise architecture. Therefore, we focus our work on creating an abstract framework supporting the change of agreements. We represent agreements as intentions, which are plans the agents commit to, chosen from a set of possible alternatives under discussion. Change of agreements is therefore intention reconsideration.

The past work on intention reconsideration of Cohen and Levesque [3] or Rao and Georgeff [4] describes three types of commitment strategies: open-minded, single-minded and blindly committed. The agents are reconsidering their commitments based on their belief of a possible fulfilment or on the existence of a goal. In these scenarios, the commitments are not explicitly linked to assumptions about the world or based on intentions previously committed to. What is missing is a reason for intentions, which can be another intention. Having this observation as starting point, we focus on creating a framework that can accommodate reasons for intentions, underlying assumptions for an intention, revision of intentions as well as creation of new ones as alternatives. We do not fully automate the change of agreements. Instead, our logical abstract framework for intention reconsideration provides a setting to define actual procedures.

Even if we are inspired by Shoham's model of intention reconsideration [5, 6], a key difference is the fact that our framework provides actual algorithms for intention reconsideration, whereas Shoham gives rationality postulates for change of intentions based on the AGM paradigm.

For representing the assumptions, we use Shoham's optimistic preconditions. A plan is a sequence of actions, and the particular property of Shoham's model

is that a plan does not have to imply the preconditions of its actions. The only condition is that the preconditions of the actions are possible. He calls this an optimistic interpretation of plans. We do not discuss whether this assumption is realistic in his setting, but we adopt this optimistic interpretation for assumptions. When an assumption does not hold, we treat it as a precondition which is violated.

Agreements are often modelled as a set of dependencies, but opinions differ on how to represent dependencies and relate them to other concepts. A dependency is not only an intention, but also a reason for the intention. Consequently, to define agreements as sets of dependencies, we also need to represent the reasons for the intentions. Moreover, these reasons are needed to explain how intentions are reconsidered.

Our algorithms are based on three ideas. First, if an assumption is violated, then we have to reconsider all intentions based on the assumption. Second, if an intention is retracted, then we have to find new intentions to satisfy the reasons. However, in general, when intentions have to be reconsidered, there can be many reasons for this change. To be able to change the assumptions and intentions, we introduce the notion of explained event. Third, an explained event contains not only the assumptions which are violated and the intentions which are reconsidered, but also the reasons for the violations and reconsiderations.

Our goal is to keep our framework as simple as possible. The logical foundations introduced by Cohen and Levesque are relatively complex and with two more extensions (reasons and assumptions) the language would become too difficult to use in many applications, such as enterprise architecture or agreement technologies. The abstract framework created by us is intended to be used in enterprise architecture, whose domain is less formal, more human orientated. We believe that by the abstract nature of our work, it can be applied successfully to other types of agreements. In addition, we provide a graphical representation of the framework, incorporating agreements, alternatives, reasons and assumptions.

References

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