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Together We Know How to Achieve: An Epistemic Logic of Know-How

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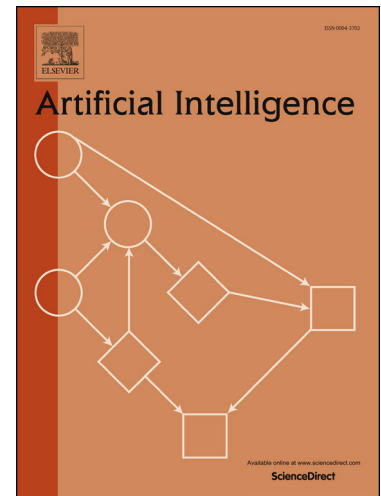
PII: S0004-3702(18)30328-X  
DOI: <https://doi.org/10.1016/j.artint.2018.06.007>  
Reference: ARTINT 3082

To appear in: *Artificial Intelligence*

Received date: 26 May 2017  
Revised date: 24 May 2018  
Accepted date: 12 June 2018

Please cite this article in press as: P. Naumov, J. Tao, Together We Know How to Achieve: An Epistemic Logic of Know-How, *Artif. Intell.* (2018), <https://doi.org/10.1016/j.artint.2018.06.007>

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# Together We Know How to Achieve: An Epistemic Logic of Know-How

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## Abstract

The existence of a coalition strategy to achieve a goal does not necessarily mean that the coalition has enough information to know how to follow the strategy. Neither does it mean that the coalition knows that such a strategy exists. The article studies an interplay between the distributed knowledge, coalition strategies, and coalition “know-how” strategies. The main technical result is a sound and complete trimodal logical system that describes the properties of this interplay.

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## 1. Introduction

An agent  $a$  comes to a fork in a road. There is a sign that says that one of the two roads leads to prosperity, another to death. The agent must take the fork, but she does not know which road leads where. Does the agent have a strategy to get to prosperity? On one hand, since one of the roads leads to prosperity, such a strategy clearly exists. We denote this fact by modal formula  $S_a p$ , where statement  $p$  is a claim of future prosperity. Furthermore, agent  $a$  knows that such a strategy exists. We write this as  $K_a S_a p$ . Yet, the agent does not know what the strategy is and, thus, does not know how to use the strategy. We denote this by  $\neg H_a p$ , where *know-how* modality  $H_a$  expresses the fact that agent  $a$  knows how to achieve the goal based on the information

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