



Teamwork in Multi-Agent Systems: A Formal Approach

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DESCRIPTION

What makes teamwork tick?

Cooperation matters, in daily life and in complex applications. After all, many tasks need more than a single agent to be effectively performed. Therefore, teamwork rules!

Teams are social groups of agents dedicated to the fulfilment of particular persistent tasks. In modern multiagent environments, heterogeneous teams often consist of autonomous software agents, various types of robots and human beings.

Teamwork in Multi-agent Systems: A Formal Approach explains teamwork rules in terms of agents' attitudes and their complex interplay. It provides the first comprehensive logical theory, TeamLog, underpinning teamwork in dynamic environments. The authors justify design choices by showing TeamLog in action.

The book guides the reader through a fascinating discussion of issues essential for teamwork to be successful:

- What is teamwork, and how can a logical view of it help in designing teams of agents?
- What is the role of agents' awareness in an uncertain, dynamic environment?
- How does collective intention constitute a team?
- How are plan-based collective commitments related to team action?

- How can one tune collective commitment to the team's organizational structure and its communication abilities?
- What are the methodological underpinnings for teamwork in a dynamic environment?
- How does a team and its attitudes adjust to changing circumstances?
- How do collective intentions and collective commitments arise through dialogue?
- What is the computational complexity of TeamLog?
- How can one make TeamLog efficient in applications?

This book is an invaluable resource for researchers and graduate students in computer science and artificial intelligence as well as for developers of multi-agent systems. Students and researchers in organizational science, in particular those investigating teamwork, will also find this book insightful. Since the authors made an effort to introduce TeamLog as a conceptual model of teamwork, understanding most of the book requires solely a basic logical background.

ABOUT THE AUTHOR

Barbara Dunin-Keplicz is the head of the Multi-agent Systems Group at the Institute of Informatics of the Warsaw University and at the Institute of Computer Science of the Polish Academy of Sciences (ICS PAS). She was awarded a M.Sc. in 1976 from Warsaw University, PhD in 1990 from Jagiellonian University, and her habilitation in 2004 from ICS PAS. Dunin-Keplicz was a visiting research fellow at the Department of Computer Science at the Free University of Amsterdam, 1994-1997, and at the Department of Artificial Intelligence at the University of Groningen, from 1998. Her publications and research have been interdisciplinary. Starting from computational linguistics, reasoning about action and change, and formal theories of multiagent systems, including Agent Communication Languages, she is now focused on foundations of multiagent systems, especially on the theory of motivational attitudes in BDI systems.

Rineke Verbrugge is Associate Professor at the University of Groningen at the Institute of Artificial Intelligence, to which she has been affiliated from 1997. Since 2002, she has been leader of the group Multi-agent Systems at the university, where her work focused on logics in artificial intelligence, specifically multi-agent systems, reasoning about others, and group reasoning. She received a M.Sc. (cum laude) in Mathematics in 1988 and a Ph.D. in Mathematics in 1993, both from the University of Amsterdam. Subsequently, she was post-doc at the Department of Logic at the Charles University in Prague (TEMPUS grant) and at the Department of Logic at the University of Gothenburg (NWO Talent stipend), as well as Visiting Assistant Professor at

the Department of Linguistics and Philosophy at the Massachusetts Institute of Technology (MIT). From 1995 to 1997, she was Assistant Professor at the Department of Artificial Intelligence at the Vrije Universiteit Amsterdam.

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