## Contents

**Part I Background**

1 What Is an Agent? And What Is an Agent Community?  
Walter F. Truszkowski ........................................... 3

2 Introduction to Formal Methods  
Michael Hinchey, Jonathan P. Bowen, and Christopher A. Rouff .... 25

3 Formal Methods and Agent-Based Systems  
Michael Luck and Mark d’Inverno ................................ 65

**Part II Formal Methods in Agent Design**

4 A Process-Algebraic Agent Abstraction  
Albert Esterline, Toinette Rorie, and Abdollah Homaifar .......... 99

5 Dynamic Team Formation in Executable Agent-Based Systems  
Michael Fisher, Chiara Ghidini, and Antony Kakoudakis ........... 139

6 Scenario-Based Engineering of Multi-Agent Systems  
Jon Whittle and Johann Schumann ............................... 159

**Part III Formal Agent Verification and Redesign**

7 Verification Within the KARO Agent Theory  
Ullrich Hustadt, Clare Dixon, Renate A. Schmidt, Michael Fisher,  
John-Jules Charles Meyer, and Wiebe van der Hoek .............. 193
8 Assuring the Behavior of Adaptive Agents
Diana F. Spears .................................................. 227

9 Agents in a Wild World
Tim Menzies and Ying Hu ................................. 259

Part IV Significant Applications

10 Formal Methods at NASA Goddard Space Flight Center
Christopher A. Rouff, James L. Rash, Michael G. Hinchey, and
Walter F. Truszkowski ........................................... 287

11 Formal Verification of Autonomy Models
Charles Pecheur, Reid Simmons, and Peter Engrand ........... 311

A Walking And-Or Graphs in Linear Time
Tim Menzies and Ying Hu .................................. 341

Index .......................................................... 343