

Contents

1	Introduction to “Systems Engineering and Artificial Intelligence” and the Chapters	1
	William F. Lawless, Ranjeev Mittu, Donald A. Sofge, Thomas Shortell, and Thomas A. McDermott	
2	Recognizing Artificial Intelligence: The Key to Unlocking Human AI Teams	23
	Patrick Cummings, Nathan Schurr, Andrew Naber, Charlie, and Daniel Serfaty	
3	Artificial Intelligence and Future of Systems Engineering	47
	Thomas A. McDermott, Mark R. Blackburn, and Peter A. Beling	
4	Effective Human–Artificial Intelligence Teaming	61
	Nancy J. Cooke and William F. Lawless	
5	Toward System Theoretical Foundations for Human–Autonomy Teams	77
	Marc Steinberg	
6	Systems Engineering for Artificial Intelligence-based Systems: A Review in Time	93
	James Llinas, Hesham Fouad, and Ranjeev Mittu	
7	Human-Autonomy Teaming for the Tactical Edge: The Importance of Humans in Artificial Intelligence Research and Development	115
	Kristin E. Schaefer, Brandon Perelman, Joe Rexwinkle, Jonroy Canady, Catherine Neubauer, Nicholas Waytowich, Gabriella Larkin, Katherine Cox, Michael Geuss, Gregory Gremillion, Jason S. Metcalfe, Arwen DeCostanza, and Amar Marathe	

8	Re-orienting Toward the Science of the Artificial: Engineering AI Systems	149
	Stephen Russell, Brian Jalaian, and Ira S. Moskowitz	
9	The Department of Navy's Digital Transformation with the Digital System Architecture, Strangler Patterns, Machine Learning, and Autonomous Human-Machine Teaming	175
	Matthew Sheehan and Oleg Yakimenko	
10	Digital Twin Industrial Immune System: AI-driven Cybersecurity for Critical Infrastructures	197
	Michael Mylrea, Matt Nielsen, Justin John, and Masoud Abbaszadeh	
11	A Fractional Brownian Motion Approach to Psychological and Team Diffusion Problems	213
	Ira S. Moskowitz, Noelle L. Brown, and Zvi Goldstein	
12	Human-Machine Understanding: The Utility of Causal Models and Counterfactuals	247
	Paul Deignan	
13	An Executive for Autonomous Systems, Inspired by Fear Memory Extinction	259
	Matt Garcia, Ted Goranson, and Beth Cardier	
14	Contextual Evaluation of Human-Machine Team Effectiveness	283
	Eugene Santos Jr, Clement Nyanhongo, Hien Nguyen, Keum Joo Kim, and Gregory Hyde	
15	Humanity in the Era of Autonomous Human-machine Teams	309
	Shu-Heng Chen	
16	Transforming the System of Military Medical Research: An Institutional History of the Department of Defense's (DoD) First Electronic Institutional Review Board Enterprise IT System	333
	J. Wood and William F. Lawless	
17	Collaborative Communication and Intelligent Interruption Systems	349
	Nia Peters, Margaret Ugolini, and Gregory Bowers	
18	Shifting Paradigms in Verification and Validation of AI-Enabled Systems: A Systems-Theoretic Perspective	363
	Niloofar Shadab, Aditya U. Kulkarni, and Alejandro Salado	

19	Toward Safe Decision-Making via Uncertainty Quantification in Machine Learning	379
	Adam D. Cobb, Brian Jalaian, Nathaniel D. Bastian, and Stephen Russell	
20	Engineering Context from the Ground Up	401
	Michael Wollowski, Lilin Chen, Xiangnan Chen, Yifan Cui, Joseph Knierman, and Xusheng Liu	
21	Meta-reasoning in Assembly Robots	425
	Priyam Parashar and Ashok K. Goel	
22	From Informal Sketches to Systems Engineering Models Using AI Plan Recognition	451
	Nicolas Hili, Alexandre Albore, and Julien Baclet	
23	An Analogy of Sentence Mood and Use	471
	Ryan Phillip Quandt	
24	Effective Decision Rules for Systems of Public Engagement in Radioactive Waste Disposal: Evidence from the United States, the United Kingdom, and Japan	509
	Mito Akiyoshi, John Whitton, Ioan Charnley-Parry, and William F. Lawless	
25	Outside the Lines: Visualizing Influence Across Heterogeneous Contexts in PTSD	535
	Beth Cardier, Alex C. Nieslen, John Shull, and Larry D. Sanford	