

Find out how to access preview-only content

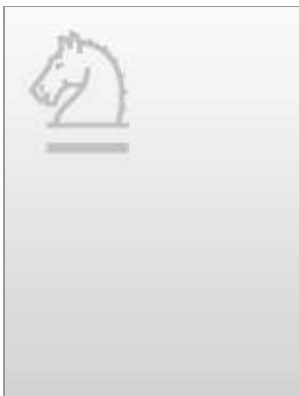
Book on Demand Get Access
Ontology, Epistemology, and Teleology for Modeling and Simulation

Intelligent Systems Reference Library Volume 44, 2013, pp 335-358

Ontological, Epistemological, and Teleological Perspectives on Service-Oriented Simulation Frameworks

Abstract

This chapter investigates service-oriented simulation frameworks from the ontological, epistemological, and teleological perspectives. First, we give an overview of various specific frameworks that imply particular referential ontological, epistemological, and teleological perspectives for real world systems. Then we combine the partial considerations derived from the review into a unifying framework. It inspects the crossover between the disciplines of M&S, service-orientation, and software/systems engineering. From a methodological perspective, we show its ontological, epistemological, and teleological implications for abstract approaches. The unifying framework can, in turn, facilitate the classification, evaluation, selection, description, and prescription of the known or proposed frameworks. Thus, the referential and methodological perspectives build a systematical philosophical foundation of the service-oriented simulation paradigm.



Related Content



References (46)

1. Erl, T.: *Service-Oriented Architecture: Concepts, Technology, and Design*. Prentice Hall PTR, United States (2005)
2. Chen, Y.: *Modeling and Simulation for and in Service-Oriented Computing Paradigm*. *Simulation* 83(1), 3–6 (2007), doi:10.1177/0037549707079218 CrossRef
3. Mittal, S.: *DEVS Unified Process for Integrated Development and Testing of Service Oriented Architectures*. Ph.D Dissertation, The University of Arizona, United States – Arizona (2007)
4. Fan, C.: *DDSOS: A Dynamic Distributed Service-Oriented Modeling and Simulation Framework*. Ph.D Dissertation, Arizona State University, United States – Arizona (2006)
5. Wang, W.G., Yu, W.G., Li, Q., Wang, W.P., Liu, X.C.: *Service-Oriented High Level Architecture*. In: *European Simulation Interoperability Workshop*, Edinburgh, Scotland. Simulation Interoperability Standards Organization (2008)
6. Li, B.H., Chai, X.D., Di, Y.Q., Yu, H.Y., Du, Z.H., Peng, X.Y.: *Research on Service Oriented Simulation Grid*. In: *Proceedings of Autonomous Decentralized Systems, ISADS 2005*, Chengdu, China, pp. 7–14 (2005), doi:10.1109/ISADS.2005.1452008
7. Zhang, T.: *Research on Key Technologies of Service-Oriented Semantically Composable Simulation*. Ph.D Dissertation, Changsha: National University of Defense Technology, China (2008)
8. NPS. *Naval Postgraduate School (NPS) MOVES Institute: eXtensible Modeling and Simulation Framework (XMSF)* (2004), <http://www.movesinstitute.org/xmsf> (February 01, 2007)
9. Tolk, A.: *M&S Body of Knowledge: Progress Report and Look Ahead*. *SCS Magazine* 2(4) (2010)
10. Turnitsa, C., Padilla, J.J., Tolk, A.: *Ontology for Modeling and Simulation*. In: *Winter Simulation Conference*, pp. 643–651 (2010)
11. Hofmann, M., Pali, J., Mihelcic, G.: *Epistemic and Normative Aspects of Ontologies in Modelling and Simulation*. *Journal of Simulation* 5(3), 135–146 (2011) CrossRef
12. Sarjoughian, H., Kim, S., Ramaswamy, M., Yau, S.A.: *Simulation Framework for Service-Oriented Computing Systems*. In: *Winter Simulation Conference*, pp. 845–853 (2008)
13. Wainer, G.A., Madhoun, R., Al-Zoubi, K.: *Distributed Simulation of DEVS and Cell-DEVS Models in CD++ Using Web-Services*. *Simul. Model. Pract. Theory* 16(9), 1266–1292 (2008), doi:10.1016/j.simpat.2008.06.012 CrossRef

14. Tsai, W.T., Fan, C., Chen, Y., Paul, R.: A Service-Oriented Modeling and Simulation Framework for Rapid Development of Distributed Applications. *Simul. Model. Pract. Theory* 14(6), 725–739 (2006), doi:10.1016/j.simpat.2005.10.005 CrossRef
15. Möller, B., Löf, S.: Mixing Service Oriented and High Level Architectures in Support of the GIG. In: Spring Simulation Interoperability Workshop, San Diego, California. Simulation Interoperability Standards Organization (2005)
16. Wang, W.G., Xu, Y.P., Chen, X., Li, Q., Wang, W.P.: High Level Architecture Evolved Modular Federation Object Model. *Journal of Systems Engineering and Electronics* 20(3), 625–635 (2009)
17. Wang, W.G.: Service-Oriented Composable Simulation: Theory and Application for HLA Evolved. Ph.D Dissertation, Changsha: National University of Defense Technology, China (2011)
18. Brutzman, D., Zyda, M., Pullen, M., Morse, K.L.: Extensible Modeling and Simulation Framework (XMSF) Challenges for Web-Based Modeling and Simulation. In: XMSF 2002 Findings and Recommendations Report: Technical Challenges Workshop and Strategic Opportunities Symposium (2002)
19. Chen, X., Cai, W., Turner, S.J., Wang, Y.: SOAr-DSGrid: Service-Oriented Architecture for Distributed Simulation on the Grid. In: Proceedings of the 20th Workshop on Principles of Advanced and Distributed Simulation, PADS 2006, pp. 65–73 (2006)
20. Rycerz, K., Bubak, M., Malawski, M., Sloot, P.: A Framework for HLA-Based Interactive Simulations on the Grid. *Simulation* 81(1), 67–76 (2005) CrossRef
21. Pan, K., Turner, S.J., Cai, W., Li, Z.A.: Service Oriented HLA RTI on the Grid. In: 2007 IEEE International Conference on Web Services, ICWS 2007, pp. 984–992 (2007)
22. Strellich, T.P., Adams, D.P., Sloan, W.W.: Simulation-Based Transformation with the Service Integration/Interoperation Infrastructure. *Technology Review Journal* 13(2), 99–115 (2005)
23. Zeigler, B.P., Hammonds, P.E.: Modeling & Simulation-Based Data Engineering: Introducing Pragmatics into Ontologies for Net-Centric Information Exchange. Academic Press, New York (2007)
24. Yilmaz, L.: A Strategy for Improving Dynamic Composability: Ontology-Driven Introspective Agent Architectures. *Journal of Systemics, Cybernetics, and Informatics* 5(5), 1–9 (2007)
25. Wang, W.G., Wang, W.P., Zhu, Y.F., Li, Q.: Service-Oriented Simulation Framework: An Overview and Unifying Methodology. *Simulation* 87(3), 221–253 (2011), doi:10.1177/0037549710391838 CrossRef
26. Ritchey, T.: Problem Structuring Using Computer-Aided Morphological Analysis. *The Journal of the Operational Research Society* 57(7), 792–801 (2006) CrossRef

27. Hall, A.D.: Three-Dimensional Morphology of Systems Engineering. *IEEE Transactions on Systems Science and Cybernetics* 5(2), 156–160 (1969), doi:10.1109/TSSC.1969.300208 CrossRef
28. Zeigler, B.P., Praehofer, H., Kim, T.G.: *Theory of Modeling and Simulation: Integrating Discrete Event and Continuous Complex Dynamic Systems*, 2nd edn. Academic Press, USA (2000)
29. Petty, M.D., Weisel, E.W.: *Composability Lexicon*. In: *Spring Simulation Interoperability Workshop*. Simulation Interoperability Standards Organization (2003)
30. Szabo, C., Teo, Y.M., See, S.A.: Time-Based Formalism for the Validation of Semantic Composability. In: *Winter Simulation Conference*, pp. 1411–1422 (2009)
31. Tolk, A., Muguira, J.A.: The Levels of Conceptual Interoperability Model. In: *Fall Simulation Interoperability Workshop*, Orlando, Florida. Simulation Interoperability Standards Organization (2003)
32. Tolk, A., Diallo, S.Y., Turnitsa, C.D.: Applying the Levels of Conceptual Interoperability Model in Support of Integrability, Interoperability, and Composability for System-of-Systems Engineering. *Systemics, Cybernetics, and Informatics* 5(5), 65–74 (2008)
33. Tolk, A., Bair, L.J., Diallo, S.Y.: Supporting Network Enabled Capability by Extending the Levels of Conceptual Interoperability Model to an Interoperability Maturity Model. *JDMS* (2012), doi:10.1177/1548512911428457
34. Hofmann, M.A.: Challenges of Model Interoperation in Military Simulations. *Simulation* 80(12), 659–667 (2004) CrossRef
35. Papazoglou, M.P., van den Heuvel, W.J.: *Service Oriented Architectures: Approaches, Technologies and Research Issues*. *The International Journal on Very Large Data Bases* 16(3), 389–415 (2007), doi:10.1007/s00778-007-0044-3 CrossRef
36. McKenzie, F.D., Petty, M.D., Xu, Q.: Usefulness of Software Architecture Description Languages for Modeling and Analysis of Federates and Federation Architectures. *Simulation* 80(11), 559–576 (2004), doi:10.1177/0037549704050185 CrossRef
37. Robinson, S.: *Modes of Simulation Practice: Approaches to Business and Military Simulation*. *Simul. Model. Pract. Theory* 10(8), 513–523 (2002) CrossRef
38. IEEE (2008) *Systems and Software Engineering - System Life Cycle Processes*. 15288-2008
39. Mei, H., Shen, J.R.: Progress of Research on Software Architecture. *Journal of Software* 17(6), 1257–1275 (2006) CrossRef
40. Jamshidi, M.: *System of Systems Engineering—Innovations for the 21st Century*. John Wiley & Sons, New York (2009)

41. Yilmaz, L.: On the Need for Contextualized Introspective Models to Improve Reuse and Composability of Defense Simulations. *JDMS* 1(3), 141–151 (2004)
42. Tsai, W.T.: Service-Oriented System Engineering: A New Paradigm. In: Proceedings of the 2005 IEEE International Workshop on Service-Oriented System Engineering, SOSE 2005, Beijing, China, pp. 3–6 (2005), doi:10.1109/SOSE.2005.34
43. Tsai, W.T., Bai, X.Y., Chen, Y.N.: On Service-Oriented Software Engineering. Tsinghua University Press, Beijing (2008)
44. Wang, W.G., Tolk, A., Wang, W.P.: The Levels of Conceptual Interoperability Model: Applying Systems Engineering Principles to M&S. In: SCS Spring Simulation Multiconference, SpringSim 2009, San Diego, CA, USA, pp. 375–384. ACM (2009)
45. Tolk, A., Diallo, S.Y., King, R.D., Turnitsa, C.D.: A Layered Approach to Composition and Interoperation in Complex Systems. *SCI*, vol. 168, pp. 41–74. Springer (2009)
46. Wang, W.G., Wang, W.P., Zander, J., Zhu, Y.F.: Three-Dimensional Conceptual Model for Service-Oriented Simulation. *Journal of Zhejiang University Science A* 10(8), 1075–1081 (2009) CrossRef

About this Chapter

Title
Ontological, Epistemological, and Teleological Perspectives on Service-Oriented Simulation Frameworks

Book Title
Ontology, Epistemology, and Teleology for Modeling and Simulation

Book Subtitle
Philosophical Foundations for Intelligent M&S Applications

Pages
pp 335-358

Copyright
2013

DOI
10.1007/978-3-642-31140-6_17

Print ISBN
978-3-642-31139-0

Online ISBN
978-3-642-31140-6

Series Title
Intelligent Systems Reference Library

Series Volume
44

Series ISSN
1868-4394

Publisher
Springer Berlin Heidelberg

Copyright Holder

Springer-Verlag Berlin Heidelberg

Additional Links

- [About this Book](#)

Topics

- [Computational Intelligence](#)
- [Artificial Intelligence \(incl. Robotics\)](#)
- [Epistemology](#)
- [Philosophy of Technology](#)

Keywords

- [Ontology](#)
- [Epistemology](#)
- [Teleology](#)
- [Service-oriented simulation](#)
- [Service-oriented architecture \(SOA\)](#)
- [Software engineering](#)
- [Systems engineering](#)
- [Referentiality](#)
- [Methodology](#)
- [Composability](#)
- [Interoperability](#)

Industry Sectors

- [Electronics](#)
- [IT & Software](#)
- [Telecommunications](#)

eBook Packages

- [eBook Package english full Collection](#)
- [eBook Package english Engineering](#)

Editors

- Andreas Tolk  (ID1)

Editor Affiliations

- ID1. Dept. Engineering Management &, Systems Engineering, Old Dominion University

Authors

- Wenguang Wang ⁽¹⁾
- Weiping Wang ⁽¹⁾
- Qun Li ⁽¹⁾
- Feng Yang ⁽¹⁾

Author Affiliations

- 1. National University of Defense Technology, Changsha, China

Confirm download

The cost of downloading this content will be charged to your organisation.

If you have a cost code, please enter it:

What is this?

6,826,299 scientific documents at your fingertips
© Springer, Part of Springer Science+Business Media

You have been redirected to our new and improved site.

More info I'm good, don't tell me again
.springer.com