

Building Ontologies with Basic Formal Ontology (MIT Press)

By Robert Arp, Barry Smith, Andrew D. Spear

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In the era of "big data," science is increasingly information driven, and the potential for computers to store, manage, and integrate massive amounts of data has given rise to such new disciplinary fields as biomedical informatics. Applied ontology offers a strategy for the organization of scientific information in computer-tractable form, drawing on concepts not only from computer and information science but also from linguistics, logic, and philosophy. This book provides an introduction to the field of applied ontology that is of particular relevance to biomedicine, covering theoretical components of ontologies, best practices for ontology design, and examples of biomedical ontologies in use.

After defining an ontology as a representation of the types of entities in a given domain, the book distinguishes between different kinds of ontologies and taxonomies, and shows how applied ontology draws on more traditional ideas from metaphysics. It presents the core features of the Basic Formal Ontology (BFO), now used by over one hundred ontology projects around the world, and offers examples of domain ontologies that utilize BFO. The book also describes Web Ontology Language (OWL), a common framework for Semantic Web technologies. Throughout, the book provides concrete recommendations for the design and construction of domain ontologies.

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Editorial Review

Review

This book addresses the important, 2,000-year-old challenge of how to soundly formalize the content and organization of scientific knowledge. As a user and teacher of ontological methods in medicine and engineering I have for years warned my students that the design of domain ontologies is a black art with no theoretical foundations and few practical principles. Without progress on the problem, I argue, many fields ranging from informatics and computer science to AI and cognitive science will struggle to achieve their enormous potential, or to do so in a way that is convincing or safe. I now have a much more positive story for my students. Arp, Smith, and Spear have combined years of experience and lessons learned in diverse application domains into this treasure trove of guidance and good practice for the ontology builder. In the journey from black art to a truly scientific theory for ontology design, this book is an important milestone.

(John Fox, Department of Engineering Science, University of Oxford; Director, OpenClinical knowledge sharing project)

The only way you can teach computers 'things' is by building an ontology. This book is an excellent guide to designing ontologies. With the help of this book, you can make computers seem to understand materials, diseases, or any concept you want.

(T. Bedirhan Üstün, M.D., World Health Organization)

About the Author

Robert Arp is a researcher and analyst for the U.S. Army at Fort Leavenworth, Kansas, who has worked on ontologies for the U.S. Air Force and the National Institutes of Health. He is the author of *Scenario Visualization: An Evolutionary Account of Creative Problem Solving*. Barry Smith is SUNY Distinguished Professor of Philosophy at the University of Buffalo and Director of the National Center for Ontological Research. Andrew Spear is Assistant Professor of Philosophy at Grand Valley State University in Allendale, Michigan.

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