



# On Computing: The Fourth Great Scientific Domain

By Paul S. Rosenbloom



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Computing is not simply about hardware or software, or calculation or applications. Computing, writes Paul Rosenbloom, is an exciting and diverse, yet remarkably coherent, scientific enterprise that is highly multidisciplinary yet maintains a unique core of its own. In *On Computing*, Rosenbloom proposes that computing is a great scientific domain on a par with the physical, life, and social sciences.

Rosenbloom introduces a relational approach for understanding computing, conceptualizing it in terms of forms of interaction and implementation, to reveal the hidden structures and connections among its disciplines. He argues for the continuing vitality of computing, surveying the leading edge in computing's combination with other domains, from biocomputing and brain-computer interfaces to crowdsourcing and virtual humans to robots and the intermingling of the real and the virtual. He explores forms of higher order coherence, or macrostructures, over complex computing topics and organizations. Finally, he examines the very notion of a great scientific domain in philosophical terms, honing his argument that computing should be considered the fourth great scientific domain.

With *On Computing*, Rosenbloom, a key architect of the founding of University of Southern California's Institute for Creative Technologies and former Deputy Director of USC's Information Sciences Institute, offers a broader perspective on what computing is and what it can become.

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### Editorial Review

#### Review

*On Computing* is an unusual, and welcome, mix of conventional academic text and personal odyssey...this book offers an innovative set of tools that could kick-start debate and research on the future structure of the sciences.

(John Gilbey *Nature*)

Paul Rosenbloom goes well beyond the argument that computing is important and pervasive. His startling and well-grounded claim is that computing has become the fourth great domain of science, alongside the traditional physical, life, and social sciences. This book should be on every scientist's desk.

(Peter J. Denning, coauthor of *The Innovator's Way*; Past President of ACM)

*On Computing* by Paul Rosenbloom explices a novel and profound theory of the computing sciences -- much as string theory unifies and underpins physics. It is an overarching vista of how the Computing Sciences continues to develop as the fourth great scientific domain.

(**Ira Pohl**, Associate Dean for Future Curricula and Online Education; Professor of Computer Science, University of California, Santa Cruz)

Computing science has transformed the world, yet we can't even agree on its definition or where it sits in the intellectual 'org chart.' *On Computing* suggests that the reason has been hiding in plain sight: computing can only be fully understood when framed as a new, fourth great domain of science. Along the way, *On Computing* also provides a wonderful tour of the frontiers of computing, clarifies the nature of multidisciplinary scholarship, elucidates the symbiotic connection between science and engineering, and tantalizes us with how much more awaits us.

(Haym Hirsh, Professor, Department of Computer Science, Rutgers University)

Overall, this book is a splendid contribution to the philosophy of science.

(**Anthony J. Duben** *Computing Reviews*)

#### About the Author

Paul S. Rosenbloom is Professor in the Computer Science Department at the University of Southern California and Project Leader at USC's Institute for Creative Technologies.

### Users Review

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**Stephen Conway:**

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