Journal of Systems and Software

Volume 46, Issues 2â€“3, 15 April 1999, Pages 91-105

# Software process simulation modeling: Why? What? How?

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https://doi.org/10.1016/S0164-1212(99)00003-5



## Abstract

Software process simulation modeling is increasingly being used to address a variety of issues from the strategic management of software development, to supporting process improvements, to software project management training. The scope of software process simulation applications ranges from narrow focused portions of the life cycle to longer term product evolutionary models with broad organizational impacts. This article provides an overview of work being conducted in this field. It identifies the questions and issues that simulation can be used to address (`why'), the scope and variables that can be usefully simulated (`what'), and the modeling approaches and techniques that can be most productively employed (`how'). It includes a summary of the papers in this special issue of the Journal of Systems and Software, which were presented at the First International Silver Falls Workshop on Software Process Simulation Modeling (ProSim'98). It also provides a framework that helps characterize work in this field, and applies this new characterization scheme to many of the articles in this special issue. This paper concludes by offering some guidance in selecting a simulation modeling approach

paper concludes by offering some guidance in selecting a simulation modeling approach for practical application, and recommending some issues warranting additional research.

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**Dr. Marc I. Kellner** is a senior scientist at the Software Engineering Institute (SEI) of Carnegie Mellon University and has pioneered much of the work on software process modeling and definition conducted at the SEI. He has published more than 30 refereed papers on software process issues and has delivered approximately 100 technical presentations at numerous conferences world-wide. He has also taught tutorials on process modeling, definition and related topics to more than 1,100 software professionals. Currently, Kellner leads a team developing exemplary process guides for paper and for the Web, as well as continuing his research and development work in other areas, including quantitative process model simulation. Prior to joining the SEI in 1986, Kellner was a professor at Carnegie Mellon University, where he established and directed a B.S. degree program in Information Systems. He has also served on the faculty of The University of Texas (Austin) and consulted for several organizations. Kellner received his Ph.D. in Industrial Administration â€“ Systems Sciences (specializing in MIS) from Carnegie Mellon University. He also holds a B.S. in Physics, a B.S. in Mathematics, both with University Honors, an M.S. in Computational Physics and an M.S. in Systems Sciences, all from Carnegie Mellon University.

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**Dr. David M. Raffo** received his Ph.D. in Operations Management and Masters degrees in Manufacturing Engineering and Industrial Administration from Carnegie Mellon University. His current research is in the area of strategic software process management and software process simulation modeling. Raffo has twenty-one refereed publications in the software engineering and management fields. He has received research grants from IBM, Tektronix, the National Science Foundation, the Software Engineering Research Center (SERC) and Northrop-Grumman. Prior professional experience includes managing software development and consulting projects at Arthur D. Little, Inc., where he received the company's Presidential Award for outstanding performance. Currently, Dr. Raffo is an Assistant Professor of Operations Management and Information Systems in the School of Business Administration at Portland State University. He is Co-Director of Portland State University's Center for Software Process Improvement and Modeling.

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