

# Contents

Keynote Address .....	1
Toward a Discipline for Software Engineering .....	3
<i>Speaker: Watts S. Humphrey, Software Engineering Institute</i>	
Is Software Engineering? .....	5
<i>Speaker: Anthony Hall, Praxis Systems plc, Bath, United Kingdom</i>	
Session 1: Software Engineering Education in the 1990s .....	9
<i>Moderator: Norm E. Gibbs, Software Engineering Institute</i>	
Software Engineering Education in the 1990s—The Way Forward. ....	11
<i>Douglas D. Grant, Swinburne University of Technology, Hawthorn, Victoria, Australia</i>	
Experience with a Course on Architectures for Software Systems .....	23
<i>David Garlan, Mary Shaw, Chris Okasaki, Curtis M. Scott, Carnegie Mellon University, Pittsburgh, Pennsylvania, and Roy F. Swonger, Digital Equipment Corporation, Nashua, New Hampshire</i>	
On Teaching the Rational Design Process .....	44
<i>Terry Shepard, Royal Military College of Canada, Kingston, Ontario, Canada, and Dan Hoffman, University of Victoria, Victoria, British Columbia, Canada</i>	
Session 2: University Perspective on Industry-Oriented Courses and Software Reuse .....	63
<i>Moderator: Neal S. Coulter, Florida Atlantic University, Boca Raton, Florida</i>	
Teaching an Industry-oriented Software Engineering Course .....	65
<i>Bernd Bruegge, Carnegie Mellon University, Pittsburgh, Pennsylvania</i>	
Integrating Research, Reuse, and Integration into Software Engineering Courses .....	88
<i>A. Jefferson Offutt and Roland H. Untch, Clemson University, Clemson, South Carolina</i>	
Software Reuse in an Educational Perspective .....	99
<i>Guttorm Sindre, Even-André Karlsson, and Tor Stålhane, Norwegian Institute of Technology, Trondheim, Norway</i>	

Session 3: Panel Discussion. . . . .	115
<i>Moderator: Maribeth B. Carpenter, Software Engineering Institute</i>	
Industry Requirements for Academic and Continuing Education Programs in Software Engineering. . . . .	117
<i>Panel Moderator: Timothy J. Lulofs, Pacific Bell, San Ramon, California</i>	
Session 4: Formal Methods and Engineering Instruction . . . . .	119
<i>Moderator: Keith R. Pierce, University of Minnesota at Duluth, Duluth, Minnesota</i>	
Formal Methods and the Engineering Paradigm . . . . .	121
<i>Michael J. Lutz, Rochester Institute of Technology, Rochester, New York</i>	
Formal Methods for Software Engineers: Tradeoffs in Curriculum Design . . . . .	131
<i>David Garlan, Carnegie Mellon University, Pittsburgh, Pennsylvania</i>	
Teaching Protocol Engineering in Honours Year . . . . .	143
<i>Richard Lai, La Trobe University, Bundoora, Victoria, Australia</i>	
Session 5: Panel Discussion. . . . .	157
<i>Moderator: Nancy R. Mead, Software Engineering Institute</i>	
Across the Wire: Teaching Software Engineering at a Distance. . . . .	159
<i>Panel Moderator: Peter H. Lutz, Rochester Institute of Technology, Rochester, New York</i>	
Session 6: Panel Discussion. . . . .	161
<i>Moderator: Gary Ford, Software Engineering Institute</i>	
Issues in Licensing Professional Software Engineers. . . . .	163
<i>Panel Moderator: Donald Gotterbarn, East Tennessee State University, Johnson City, Tennessee</i>	

Session 7: Educating Practitioners .....	165
<i>Moderator: Jorge Diaz-Herrera, Software Engineering Institute</i>	
Teaching Software Verification and Validation to Software Practitioners. ....	167
<i>David R. Luginbuhl and James E. Cardow, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio</i>	
(Continuing) Education of Software Professionals .....	180
<i>Ilkka J. Haikala, Tampere University of Technology, Tampere, Finland, and Jukka Marijarvi, Nokia Telecommunications, Tampere, Finland</i>	
The Software Engineering - Patent Law Interface: A Practitioner's View .....	194
<i>George M. Taulbee, Bell, Seltzer, Park, &amp; Gibson, P.A., Charlotte, North Carolina</i>	
Session 8: Integrating Software Engineering with Computer Science. ....	245
<i>Moderator: Anneliese von Mayrhauser, Colorado State University, Fort Collins, Colorado</i>	
A Joint Master's Level Software Engineering Subtrack .....	247
<i>Don Epley, The University of Iowa, Iowa City, Iowa</i>	
Planning for Software Engineering Education Within a Computer Science Framework at Marshall University .....	257
<i>James W. Hooper, Marshall University, Huntington, West Virginia</i>	
Integrating Object-Oriented Software Engineering in the Computer Science Curriculum .....	270
<i>Raj Tewari and Frank Friedman, Temple University, Philadelphia, Pennsylvania</i>	
Session 9: Product and Practice Models for the Engineering of Software. ....	285
<i>Moderator: Keith R. Pierce, University of Minnesota at Duluth, Duluth, Minnesota</i>	
Putting the Engineering into Software Engineering .....	287
<i>Software Architectures Engineering Project: Richard S. D'Ippolito, Kenneth J. Lee, Charles P. Plinta, Jeffrey A. Stewart, Software Engineering Institute, and Paul D. Bailor, Thomas C. Hartrum, Air Force Institute of Technology, Wright-Patterson Air Force Base, Ohio</i>	

Session 10: Panel Discussion . . . . .	299
<i>Moderator: Linda Hutz Pesante, Software Engineering Institute</i>	
Continuing Education and Training for Software Process Improvement . . . . .	301
<i>Panel Moderator: A. Winsor Brown, McDonnell Douglas Space Systems Company, Huntington Beach, California</i>	
Software Process Training: A Formal and Informal Approach at McDonnell Douglas Electronic Systems Company. . . . .	308
<i>Karen L. Powel, McDonnell Douglas, Santa Ana, California</i>	
Session 11: Laboratory and Project Experiences . . . . .	313
<i>Moderator: Neal S. Coulter, Florida Atlantic University, Boca Raton, Florida</i>	
Undergraduate Software Engineering Laboratory at Texas A&M University . . . . .	315
<i>William M. Lively and Mark Lease, Texas A&amp;M University, College Station, Texas</i>	
Software Engineering Course Projects: Failures and Recommendations. . . . .	324
<i>Manmahesh Kantipudi, James S. Collofello, Arizona State University, Tempe, Arizona, Ken W. Collier, Northern Arizona University, Flagstaff, Arizona, and Scott Medeiros, Motorola, Inc., Scottsdale, Arizona</i>	
Use of the Individual Exchange Project Model in an Undergraduate Software Engineering Laboratory. . . . .	339
<i>J. Kaye Grau and Norman Wilde, The University of West Florida, Pensacola, Florida</i>	
Session 12: Corporate Experience . . . . .	349
<i>Moderator: Maribeth B. Carpenter, Software Engineering Institute</i>	
Creating a Software Engineering Training Program in a Level I Organization. . . . .	351
<i>Rich Pavlik and Kathy Jacobs, Honeywell Inc., Phoenix, Arizona</i>	

Corporate Software Engineering Education for Six Sigma: Course Development and Assessment of Success. . . . .	360
<i>Sandi Coker, Motorola University, Schaumburg, Illinois, Bud Glick, Motorola-SRD, Rolling Meadows, Illinois, Lavon Green, Purdue University, Hammond, Indiana, and Anneliese von Mayrhauser, Colorado State University , Fort Collins, Colorado</i>	
The IBM Cleanroom Software Engineering Technology Transfer Program. . . . .	380
<i>Richard C. Linger and R. Alan Spangler, IBM, Gaithersburg, Maryland</i>	
Experiences with an Interactive Video Code Inspection Laboratory . . . . .	395
<i>Michael G. Christel, Software Engineering Institute</i>	
Session 13: Funding, Practica, and Principles. . . . .	413
<i>Moderator: Gary Ford, Software Engineering Institute</i>	
Panel: Current Funding Opportunities Through the National Science Foundation. . . . .	415
<i>Doris K. Lidtke and Caroline E. Wardle, National Science Foundation, Washington, D.C.</i>	
The Influence of Software Engineering Paradigms on Individual and Team Project Results. . . . .	417
<i>William Junk and Paul Oman, University of Idaho, Moscow, Idaho</i>	
Engineering Principles and Software Engineering . . . . .	437
<i>Alfs T. Berztiss, University of Pittsburgh, Pittsburgh, Pennsylvania</i>	