Table of Contents

IEEE International Conference on Software Maintenance—ICSM'99

Message from the General Chair xi
Messages from the Programme Co-Chairs xii
Conference Committee xiv
Reviewers xvii

WEDNESDAY, SEPTEMBER 1

Speaker: Ian Sommerville, Lancaster University, UK

Session 1: Reverse Engineering
Chair: Cornelia Boldyreff, University of Durham, UK

Requirements Recovery from Legacy Systems by Analysing and Modelling Behaviour
K. Liu, A. Alderson, Z. Qureshi

Recovering High-Level Views of Object-Oriented Applications from Static and Dynamic Information
T. Richner, S. Ducasse

Extracting Objects of Ada Programs Using Module Features
Y. Zhou, B. Xu

Session 2: Tools
Chair: Roberto Ciampoli, O. Group, Italy

A Tool Suite for Evolving Legacy Software
S. Rugaber

Building Documentation Generators
A. van Deursen, T. Kuipers

Bunch: A Clustering Tool for the Recovery and Maintenance of Software System Structures
S. Mancoridis, B. S. Mitchell, Y. Chen, E. R. Gansner
Panel 1: Resolved: Software Maintenance Is Nothing More Than Another Form of Development
Chair: Norman Schneidewind, Naval Postgraduate School, USA
Panelists: Barbara Kitchenham, Keele University, UK
Frank Niessink, Vrije Universiteit, The Netherlands
Janice Singer, National Research Council, Canada
Anneliese von Mayrhauser, Colorado State University, USA
Hongji Yang, De Montfort University, UK

Session 3: Migration
Chair: Andrea De Lucia, University of Sannio, Italy
Assembler to C Migration Using the FermaT Transformation System
M. P. Ward
Restructuring Legacy C Code into C++
R. Fanta, V. Rajlich
Evolutionary Migration of Legacy Systems to an Object-Based Distributed Environment
M. A. Serrano, C. Montes de Oca, D. L. Carver

Session 4: Visualisation and Understanding
Chair: Paul Luker, De Montfort University, UK
Visualizing Software Release Histories: The Use of Color and Third Dimension
H. Gall, M. Jazayeri, C. Riva
A Language Independent Approach for Detecting Duplicated Code
S. Ducasse, M. Rieger, S. Demeyer
Component Module Classification for Distributed Software Understanding
N. C. Mendonca, J. Kramer

Poster Session 1: Software Maintenance—The Future (I)
Chair: I. Coutts, Loughborough University, UK

Session 5: Architectures and Frameworks
Chair: Keith Gallagher, Loyola College, USA
Experience Paper: Experience with a Reverse Engineering Architecture Approach to Increase Understanding
A. von Mayrhauser, J. Wang, Q. Li
M. Mattsson, J. Bosch
B. Chatters
Session 6: Management
Chair: Nicholas Zvegintzov, Software Management Network, USA

*Experience Paper:* Beyond Year 2000 Remediation: The Compliance Verification: A Case Study
M. Interesse, R. Dabbico

*Experience Paper:* Challenges and Experiences in Managing Major Software Evolution Endeavours Such as Euro Conversion or Y2000 Compliance
R. R. Klösch, W. Eixelsberger

*Experience Paper:* Maintenance at ABB (I): Software Problem Administration Processes
M. Kajko-Mattsson

THURSDAY, SEPTEMBER 2

Keynote Speech: The Design of Design
Speaker: Frederick P. Brooks, Jr., University of North Carolina, USA

Session 7: Testing
Chair: Loredana Mancini, O. Group, Italy

Test Case Prioritization: An Empirical Study
G. Rothermel, R. H. Untch, C. Chu, M. J. Harrold

Automatic Unit Test Data Generation Using Mixed-Integer Linear Programming and Execution Trees
S. Lapierre, E. Merlo, G. Savard, G. Antoniol, R. Fiutem, P. Tonella

Testing of Concurrent Programs After Specification Changes
I. S. Chung, H. S. Kim, H. S. Bae, Y. R. Kwon, D. G. Lee

Session 8: Object-Oriented Technology
Chair: Sasa M. Dekleva, DePaul University, USA

Maintaining Traceability During Object-Oriented Software Evolution: A Case Study
G. Antoniol, G. Canfora, A. De Lucia

Hot Spot Recovery in Object-Oriented Software with Inheritance and Composition Template Methods
R. Schauer, S. Robitaille, F. Martel, R. K. Keller

Object-Oriented Design Pattern Inference
P. Tonella, G. Antoniol

Panel 2: Doing Software Maintenance for Business Change
Chair: Ned Chapin, InfoSci Inc., USA

*Panelists:* John M. Edwards, Loughborough University, UK
Miguel A. Serrano, Louisiana State University, USA
Harry M. Sneed, SES Software Engineering Services, Germany
Jeffrey M. Voas, Reliable Software Technologies, USA
Session 9: Reuse and Validation
Chair: Rudolf K. Keller, University of Montreal, Canada

Generation of Software Renovation Factories from Compilers 245
A. Sellink, C. Verhoef

A Semi-Formal Approach to Assist Software Design with Reuse 256
W. C. Chu, C. P. Hsu, C. W. Lu, X. He

Criteria for Testing Exception-Handling Constructs in Java Programs 265
S. Sinha, M. J. Harrold

Session 10: Models and Processes
Chair: Thomas M. Pigoski, Technical Software Services, USA

Software Quality Maintenance Model 277
N. F. Schneidewind

Common Concept Apparatus Within Corrective Software Maintenance 287
M. Kajko-Mattsson

Models to Promote Effective System Change 297
D. W. Bustard, R. Oakes, Z. He

Session 11: Processes and Technology
Chair: Harry Sneed, Software Engineering Service, Germany

Experience Paper: Maintenance at ABB (II): Change Execution Processes 307
M. Kajko-Mattsson

Experience Paper: Reverse Compilation of Digital Signal Processor Assembler Source to ANSI-C 316
A. Johnstone, E. Scott, T. Womack

Experience Paper: Effort Distribution in a Six-Year Industrial Application Framework Project 326
M. Mattsson

Session 12: Measurement and Improvement
Chair: Spencer Rugaber, Georgia Institute of Technology, USA

Experience Paper: Software Reliability: Assumptions, Realities and Data 337
M. Defamie, P. Jacobs, J. Thollembeck

Experience Paper: A Case Study in Object-Oriented Maintenance 346
M. L. Domsch, S. R. Schach

Experience Paper: Quality Improvement in Switching-System Software 353
T. Fukuda, T. Yamaguchi, T. Yamada

Experience Paper: Preparing Measurements of Legacy Software for Predicting Operational Faults 359
T. M. Khoshgoftaar, E. B. Allen, X. Yuan, W. D. Jones, J. P. Hudepohl
FRIDAY, SEPTEMBER 3

Session 13: Architecture
Chair: Perdita Stevens, University of Edinburgh, UK

A Two-Phase Process for Software Architecture Improvement
R. Krikhaar, A. Postma, A. Sellink, M. Stroucken, C. Verhoef

Browsing and Searching Software Architectures
S. E. Sim, C. L. A. Clarke, R. C. Holt, A. M. Cox

A Semantic Foundation for Architectural Reengineering and Interchange
S. Woods, S. Carrière, R. Kazman

Session 14: Software Change and Impact Analysis (I)
Chair: Taghi M. Khoshgoftaar, Florida Atlantic University, USA

Evaluating the Use of Dominance Trees for C and COBOL
E. Burd, M. Munro

A Framework for Analysing the Effect of “Change” in Legacy Code
S. Zhou, H. Zedan, A. Cau

Reuse-Driven Interprocedural Slicing in the Presence of Pointers and Recursion
D. Liang, M. J. Harrold

Short Paper Session 1: Software Maintenance—The Future (II)
Chair: Paul Layzell, UMIST, UK

Performance of Object-Oriented Software Code: Profiling and Instrumentation
N. Melab, H. Basson, M. Bouneffa, L. Deruelle

An Industry Perspective on Decompilation
L. Freeman, C. Cifuentes

Characteristics of Object Evolution Processes
T. Nakatani, T. Tanai

Salvaging an Ancient Legacy System at the German Foreign Office
H. M. Sneed, E. Nya’ry

Short Paper Session 2: Software Maintenance—The Future (III)
Chair: David Bustard, Ulster University, UK

Comprehending Multilanguage and Multiparadigm Software
P. K. Linos, S. R. Schach

Visualising Software—A Key Research Area
C. Knight, M. Munro
A Competence Web on Software Maintenance
R. Lindqvist, G. Hjertman, M. Eriksson, M. Modig

Measuring Ripple Effect for Software Maintenance
S. Black

Increasing Mainframe Software Maintenance Efficiency and Effectiveness: An Empirical Study of
Microcomputer versus Mainframe Based Tools
H. A. Kanter, T. Muscarello

Session 15: Software Change and Impact Analysis (II)
Chair: Rachel Harrison, University of Southampton, UK

Impact Analysis in Real-Time Control Systems
J. Li, P. H. Feiler

Simultaneous Demand-Driven Data-Flow and Call Graph Analysis
G. Agrawal

A Methodology for the Automated Introduction of Design Patterns
M. O'Cinnéide, P. Nixon

Session 16: Measurement and Empirical Studies
Chair: Norman Schneidewind, Naval Postgraduate School, USA

Using Coupling Measurement for Impact Analysis in Object-Oriented Systems
L. C. Briand, J. Wüst, H. Lounis

Metrics for Controlling Effort During Adaptive Maintenance of Object-Oriented Systems
F. Fioravanti, P. Nesi, F. Stortoni

Evolution and Errors: An Empirical Example
C. R. Douce, P. J. Layzell

Panel 3: On the Threshold of Y2K
Chair: Shawn Bohner, META Group, USA

Panelists: Spencer Rugaber, Georgia Institute of Technology, USA
Raj Sood, Dofasco, Canada
Lee White, Case Western Reserve University, USA

Keynote Speech: Software System Maintenance and Evolution in an Era of Reuse, COTS, and Component-Based Systems
Speaker: M. M. Lehman, Imperial College, UK

Author Index

x