

ICSE 97

International Conference
on Software Engineering



Pulling Together

FINAL PROGRAM



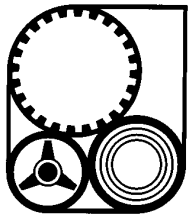
*Sponsored by the ACM Special
Interest Group on Software
Engineering (SIGSOFT) and
IEEE Computer Society —
Technical Council on Software
Engineering (TCSE)*



Boston, Massachusetts USA

Sheraton Boston Hotel & Towers

May 17–23, 1997



ICSE 97 International Conference
on Software Engineering

Pulling Together



ACKNOWLEDGEMENTS

Putting together this ICSE and these proceedings was a far larger task than any one of us realized. We are in deep gratitude to the work of the Organizing Committee, the Program Committee, the Professional Track Committee, and all the Operations personnel. We would like to extend our particular thanks to our close colleagues, on whom we have heavily depended: Wendy Cooper (UMass); Jeff Potter (Potter Publishing Studios); Kari Nies, Debra Brodbeck, Aileen Broccardo, Roy Fielding, Neno Medvidovic, and Razaq Siddiq (UCI); Gianpaolo Cugola (Politecnico di Milano); Melissa Gislou (CEFRIEL); and Elisa van Dam and Monica Stevenson (Nth Degree).

Welcome to the 1997 International Conference on Software Engineering, ICSE 97. The theme of ICSE 97 is "Pulling Together." Pulling together denotes coordinated action of many individuals in achieving a common goal. It also describes the coming together of many different perspectives, concerns, and abilities to find a common ground and a way of achieving cooperation. Pulling together is fundamentally dynamic in nature, and is often a matter of explicit negotiation and communication.

Major changes have been instituted in ICSE 97 to help the software engineering community pull together, in the full sense of that phrase. The conference is a reflection of the vision that the organizing committee had when planning began back in 1994. A broadened outlook for the conference challenges old beliefs, promotes new ideas and new synergies, and provides for a dynamic, exciting program. New or expanded conference activities include a doctoral symposium, lessons and reports from software engineering organizations, and posters. A major addition to the conference is a suite of sessions and activities focusing on the interests and needs of the practicing professional. Numerous invited presentations, timely panel topics, experience reports, and an expanded tutorial program are included.

Everyone associated with planning ICSE 97 has focused from the outset on expanding the community of attendees for the conference. We have looked toward increased scope of topics and a broader range of attendees, while still preserving the traditional technical program that has served the conference well over the years. With the help of a Professional Program committee, we have expanded the number of invited speakers while also including the traditional invited keynote speakers. These invited speakers include well-known technologists and consultants, many of whom are regular speakers at commercially-sponsored conferences.

Papers constitute the core of the Technical Program. Research papers describe innovative and significant work in the research and practice of software engineering. Experience reports describe the application of software engineering methods, theory or tools to the development of significant software products. Of the 219 full technical papers submitted for review, the program committee accepted 41 research papers and 9 experience reports. A new element, Software Engineering in Organizations: Lessons and Status Reports, attracted 18 submissions of which 11 appear in the conference.

As with previous ICSEs the main conference is accompanied by a tutorial and workshop program. This year the number of tutorials and range of topics was substantially expanded. Workshops enable intensive focus on specific topics of interest, typically in a form which encourages interaction among the participants. nine workshops and co-located symposia help round out this year's ICSE.

We are pleased you could join us.

W. Richards Adrion
ICSE 97 General Chair

Alfonso Fuggetta, Richard N. Taylor, Anthony I. Wasserman
ICSE 97 Program Coordinators

KEYNOTE PRESENTATIONS

ICSE 97 • BOSTON, MASSACHUSETTS, USA • MAY 17-23, 1997

Beyond Software Engineering: Ten Imperatives for the Successful Software Developer at the End of the Decade

by Ed Yourdon

Edward Yourdon, methodologist, author, consultant, and publisher of American Programmer, developed the “Yourdon method” of structured systems analysis and design implemented on most of today's CASE software engineering tools, and is a world expert

in software engineering. Author of 20 textbooks and more than 200 articles, he chairs international conferences on CASE technology, is a Professor at Universidad CAECE in Buenos Aires, and has received numerous honors and awards from universities and societies worldwide.



ED YOURDON

Java and the Evolution of Web Software

by Guy Steele

Guy L. Steele Jr. is a Distinguished Engineer at Sun Microsystems Laboratories in Chelmsford, Massachusetts, and is responsible for research in programming languages, parallel algorithms, implementation strategies, and architectural and software support. He is working with James

Gosling and Bill Joy on the detailed specification of the Java programming language. An ACM Fellow and a Fellow of the AAI, he was a senior scientist at Thinking Machines Corporation, a member of technical staff at Tartan Laboratories, and an assistant professor at Carnegie-Mellon University.



MARK WEISER

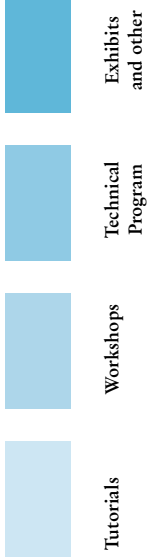
Software Engineering That Matters to People

by Mark Weiser

Mark Weiser is chief technologist at the Xerox Palo Alto Research Center (PARC). Prior to joining PARC, Weiser taught at the University of Maryland from 1979 to 1987, where he headed the Computer Science Laboratory. Weiser has started three

companies, and he has written more than 75 technical publications. His Ubiquitous Computing program envisions PCs being replaced with invisible computers embedded in everyday objects. Weiser is the drummer with rock band Severe Tire Damage, the first live band on the Internet.

ICSE SCHEDULE



SATURDAY

	HILTON	FAIRFAX B	BEACON B	BEACON E	BEACON D
9 a.m. --					
10 a.m. --					
11 a.m. --					
noon --					
1 p.m. --	Symposium on Software Reusability (Tutorials)	Software Engineering for Parallel & Distributed Systems	Migration Strategies for Legacy Systems	Living with Inconsistency	Second ISEW Cleanroom Workshop
2 p.m. --					
3 p.m. --					
4 p.m. --					
5 p.m. --					
6 p.m. --					

SUNDAY

	HILTON	FAIRFAX B	DALTON	COMMONWEALTH	EXETER	HAMPTON	BERKELEY	GARDNER	BEACON A	BEACON D	BEACON F	BEACON G	FAIRFAX A
9 a.m. --													
10 a.m. --													
11 a.m. --													
noon --													
1 p.m. --	Symposium on Software Reusability	Software Engineering for Parallel & Distributed Systems	SCM7		2A SW Interoperability: Principles and Practice	1A Software Process Improvement: Methods and Lessons Learned	1B A Realistic, Commercially Robust Process for the Development of OO Software Systems	2B Distributed Software Architectures	2C Effective Use of COTS Components	1C Software-Reliability-Engineered Testing Practice			1D Java: A Language for Software Engineering
2 p.m. --													
3 p.m. --													
4 p.m. --													
5 p.m. --													
6 p.m. --													

MONDAY

	HILTON	INDEPENDENCE W	DALTON	CLARENDON	COMMONWEALTH	EXETER	HAMPTON	BERKELEY	GARDNER	BEACON B	BEACON D	LIBERTY C	KENT	INDEPENDENCE E	CONSTITUTION
9 a.m. --															
10 a.m. --															
11 a.m. --															
noon --															
1 p.m. --															
2 p.m. --	Symposium on Software Reusability	Doctoral Consortium	SCM7	Software Engineering on the Web	4A The Experience Factory: How to Build and Run One	4D Defining Families: The Commonality Analysis	4C Making Requirements Measurable	5E SW Process Improvement Approach for Small Orgs.	5A A Survey of OO Analysis and Design Methods	4E Evaluating Software Technology	5D Reverse Engineering Strategies for Software Migration	5C A Primer on Empirical Studies		5B Simplifying the Evolution of Java Programs	
3 p.m. --															
4 p.m. --															
5 p.m. --															
6 p.m. --															

The Personal Process (PSP)SM In Software Engineering

6E Euro. and US SW Process Maturity Models

6D Comprehension and Evolution of Legacy Software

6B Formal Broadband and Multimedia Systems

6A Design Patterns for OO Software Development

6C Software Engineering Data Analysis Techniques

TUESDAY

	GRAND BALLROOM	CONSTITUTION	COMMONWEALTH	INDEPENDENCE W	HAMPTON A/B	EXHIBIT HALL	INDEPENDENCE E
9 a.m. --							
10 a.m. --	1 Opening and Keynote address						
11 a.m. --	2 A ICSE/SSR Joint Session	B Exploiting the Internet	C Object Technology	D CASE	E Analysis (Demos)	Break	Informal Research Demos & Posters
noon --							
1 p.m. --							
2 p.m. --	3 C Platforms for SW Execution	D Large Systems Experience I	A Formal Specifications	B Reliability	E Software Evolution (Demos)	Exhibits	
3 p.m. --							
4 p.m. --	4 D Advantages of Maintaining a High CMM Level	C Legacy Systems & Testing	A Inspection & Reviews	B User Interface & Specifications	E Software Evolution & Maintenance (Demos)	Break	
5 p.m. --							
6 p.m. --						Conference Reception	

WEDNESDAY

	GRAND BALLROOM	CONSTITUTION	COMMONWEALTH	INDEPENDENCE W	HAMPTON A/B	EXHIBIT HALL	INDEPENDENCE E
9 a.m. --							
10 a.m. --	5 Keynote Address						
11 a.m. --	6 D Java Dev. Environments	B Metrics	A Static Analysis	C Collaboration	E Reverse Engin./Maint. (Demos)	Break	Informal Research Demos & Posters
noon --							
1 p.m. --							
2 p.m. --	7 A Process	D Large Systems Exp.	B HW/SW Issues	C Architecture Recovery	E Requirements (Demos)	Exhibits	
3 p.m. --							
4 p.m. --	8 Plenary						
5 p.m. --	9 A Rev. Engin./ Proj. Under.	C Management Issues	D Collaborative SW Engin.	B Process Improvement	E Component Integration (Demos)	REPUBLIC FOYER Break	
6 p.m. --			ACM/SIGSOFT IEEE-CS/TCSE				
					TOP OF THE HUB Reception, 7-10		

THURSDAY

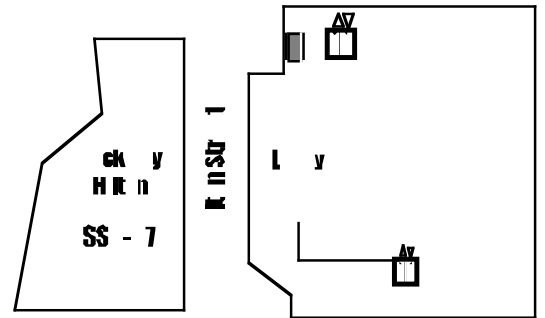
	GRAND BALLROOM	CONSTITUTION	COMMONWEALTH	INDEPENDENCE W	HAMPTON A/B		GARDNER
9 a.m. --							
10 a.m. --	10 Keynote Address						
11 a.m. --	11 A Analysis of C & C++	C SW Architecture	D Intro to CORBA	B Economic & Legal Issues	E Environments (Demos)		IWSEE4
noon --							
1 p.m. --							
2 p.m. --	12 A OO Tech.	B Testing & Analysis	D Databases & WWW	C Process Issues		REPUBLIC FOYER Break	
3 p.m. --							
4 p.m. --	13 Closing Remarks						
5 p.m. --							

FRIDAY

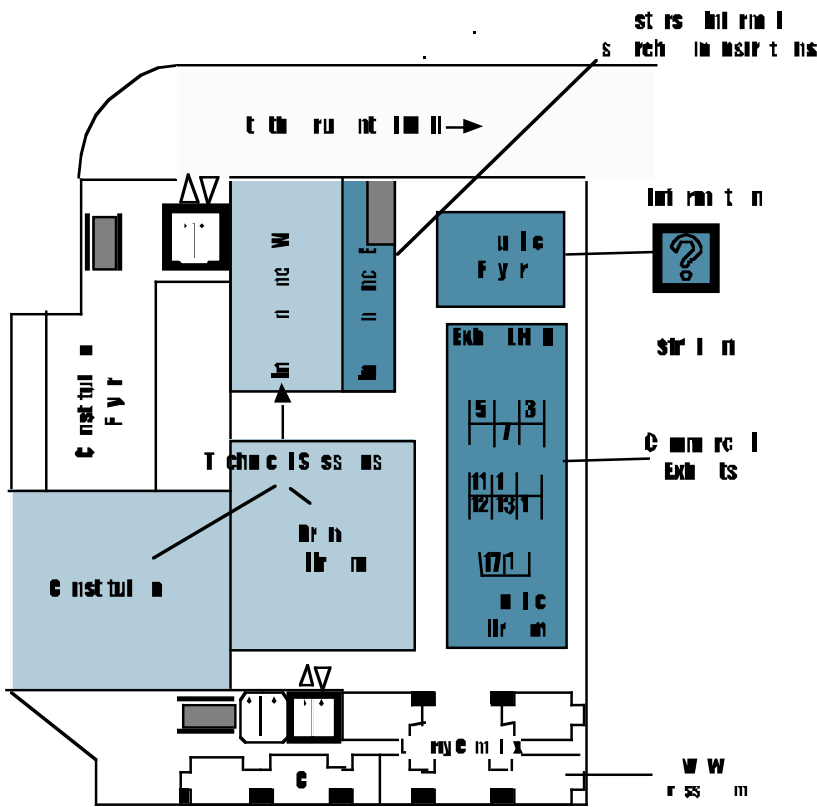
9 a.m. --
10 a.m. --
11 a.m. --
noon --
1 p.m. --
2 p.m. --
3 p.m. --
4 p.m. --
5 p.m. --

SHERATON BOSTON HOTEL & TOWERS

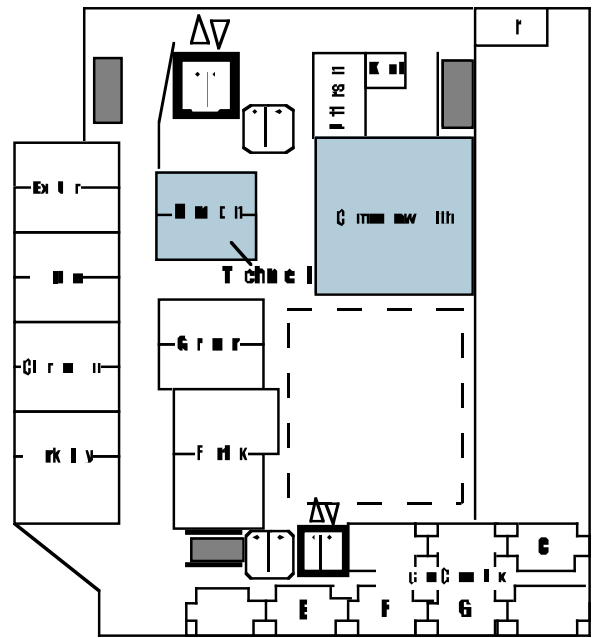
ICSE97 Conference Map



Lvl 1, First Floor



Lvl 2, Second Floor



Lvl 3, Third Floor

WORKSHOPS & SYMPOSIA

Symposium on Software Reusability

Sat (begins 9 am), Sun. & Mon. • May 17,18,19 HILTON HOTEL

The Symposium on Software Reusability is ACM's bi-annual forum for the exchange of ideas, research and development results and experiences in all aspects of software reusability. SSR'97 invites you to participate in tutorials, keynotes, panels, and all aspects of the technical program. The technical program consists of paper presentations and panels on current topics in software reusability. Paper sessions include the latest developments in software architecture, domain analysis and engineering, object-oriented reuse, reuse on the Internet, and application generators and program transformation. The panels provide a chance for lively interaction with experts in the field. Saturday–Monday, May 17–19. (SSR tutorials are held Saturday) Contact: Guillermo Arango, (arango@montrouge.wireline.slb.com)

<http://www.owego.com/~ssr97/>

Living With Inconsistency

Saturday•May 17•8:30 am-6:00 pm BEACON E

In this workshop, we take a broader view. We are interested in living with inconsistency as part of doing requirements engineering. While some types of inconsistency can be detected and removed early on, other types may not even be noticeable until a system is in production for months or years.

Contact: Steph Fickas (fickas@cs.uoregon.edu)

<http://www.ics.uci.edu/icse97/workshop/inconsistency.html>

The Second ISEW Cleanroom Workshop

Saturday•May 17•9:00am-5:00pm BEACON D

An opportunity for practitioners and researchers active in Cleanroom to exchange experiences and discuss problems of common interest. Contact: Graeme Smith (gs@q-labs.de)

http://www.q-labs.com/isew_icse.html

Software Engineering for Parallel and Distributed Systems

Saturday (begins 8:30am) & Sunday•May 17 & 18 FAIRFAX B

The aim of PDSE'97 is to continue to provide a forum for exchange of information and publication of the latest technological and theoretical advances in software engineering for parallel and distributed systems. The workshop will focus on the problems that are unique to the software engineer developing parallel and distributed systems. Contact: Stefano Russo (russo@nadis.dis.unina.it)

<http://www.osl.cs.uiuc.edu/PDSE97/welcome.html>

Software Engineering on the Web

Monday•May 19•9:00am-6:00pm CLARENDON

This workshop identifies near and midterm goals of how best to develop and use the world wide web for software engineering. Contact: David Eichmann (eichmann@ricis.cl.uh.edu)

<http://ricis.cl.uh.edu/SEWWW/>

Seventh International Workshop on Software Configuration Management (SCM7)

Sunday (begins 10:50 am) & Monday, May 18 & 19 DALTON

SCM is the discipline of managing the evolution of families of software systems. It involves supporting the versioning, com-

position, and generation of all relevant software items, as well as controlling and supporting related systems. The goal of this workshop is to bring together researchers, vendors and practitioners to discuss the state of the art in SCM as well as challenges for the future. Contact: Reidar Conradi (conradi@idt.ntnu.no)

<http://www.cs.colorado.edu/~andre/scm7-cfp.html>

Process Modelling and Empirical Studies of Software Evolution

Sunday•May 18•9:00 am-5:00pm COMMONWEALTH

Discussion and collaboration between researchers and practitioners in empirical process modelling studies of large-scale systems development and evolution. Contact: Rachel Harrison (rh@ecs.soton.ac.uk)

<http://louis.ecs.soton.ac.uk/~rh/cfp.html>

Migration Strategies for Legacy Systems

Saturday•May 17•9:00am-5:00pm BEACON B

Improving the value of legacy systems is of high concern to organizations nowadays. The modernization of old software helps in gaining control of maintenance costs, in improving system performance, or in moving to a distributed and more efficient environment. Contact: Rene R. Kloesch (R.Kloesch@infosys.tuwien.ac.at)

<http://www.infosys.tuwien.ac.at/Research/ICSE97-WS/>

Fourth International Workshop on Software Engineering Education (IWSEE4)

Friday•May 23•9:00am-5:00pm GARDNER

The purpose of the IWSEE series is to exchange experiences and discuss new ideas for teaching the difficult subject of software engineering among educators, students, and practitioners. Contact: John Werth (jwerth@cs.utexas.edu)

Doctoral Consortium

Monday•May 19•8:00am-7:00pm INDEPENDENCE WEST

The Doctoral Consortium's goal is to publicly discuss research goals, methods, and results at an early enough stage in Ph.D. research to provide useful guidance in completing the dissertation research and initiation of a research career. The consortium and ICSE will also provide an opportunity for student participants to interact with established researchers and others in the wider software engineering community. Contact: Michal Young (young@cs.purdue.edu)

<http://www.ics.uci.edu/icse97/doctoral.html>

TUTORIALS

SESSION 1: SUNDAY, 9 A.M. – 6 P.M.

Bill Curtis is Vice President and Chief Scientist with TeraQuest Metrics, Inc., a company that works with client organizations to improve their software development capability. He is a former Director of the Software Process Program in the Software Engineering Institute at Carnegie Mellon University. He works with the SEI, is a founding faculty member of the Software Quality Institute at the University of Texas, and he works with organizations to increase their software development capability.

Timothy D. Korson is currently a senior partner in the training and consulting firm Software Architects, executive director of Comsoft, and director of Southern Adventist University's Software Technology Center. He is a former visiting scientist at the SEI who taught software engineering at Clemson University for 7 years.

John D. Musa, an independent consultant, was recently Technical Manager of Software Reliability Engineering (SRE) at AT&T Bell Laboratories, Murray Hill, NJ. He is a creator of the field of software reliability engineering and is widely recognized as the leader in its practical application. He initiated and spearheaded SRE practice at AT&T and was involved in developing most of the details. Musa is a Fellow of the IEEE, and an international leader in software engineering.

Jim Waldo is a Senior Staff Engineer with JavaSoft, the Sun Microsystems operating company responsible for the Java language and environment, where he leads a group responsible for the distributed computing infrastructure for Java.

Jack C. Wileden is a Professor in the Department of Computer Science at the University of Massachusetts at Amherst whose research centers on tools and techniques supporting seamless integration of advanced capabilities into computing systems. *Alan Kaplan* is on the faculty of the Department of Computer Science at Flinders University in Adelaide, South Australia. His research includes tools and techniques supporting software development, O-O databases, and interoperability.

Software Process Improvement: Methods and Lessons Learned

Bill Curtis

HAMPTON

1A The growing functionality expected from modern products and systems has resulted in an exponential growth in the software required to run them. During the 1970s and the early 1980s, software developers focused their investments on advanced workstations, languages, and CASE tools to improve their performance. The benefits of these investments were far lower than promised. A software process movement emerged in the mid-1980s when shortcomings in managing development and maintenance processes were recognized as prime inhibitors of growth in software productivity and quality.

A Realistic, Commercially Robust Process for the Development of Object-Oriented Software Systems — Case Study

Tim Korson

BERKELEY

1B The successful adoption of object technology requires far more than simply the adoption of an OO language. Methods for OO analysis and design must be selected and configured to fit within an overall software development process. This session examines the required elements of a realistic, commercially robust process for the development of object-oriented software systems.

Software-Reliability-Engineered Testing Practice

John D. Musa

BEACON D

1C SRET is testing of software-based systems which employs reliability objectives and profiles of system use to speed testing while ensuring the necessary reliability. It helps us deal with the pressure to get software-based products to market faster while still meeting customer reliability needs. You will learn how to perform the major activities of SRET: defining “necessary” reliability, developing operational profiles, preparing for testing, executing tests, and interpreting failure data. The tutorial uses a simple but realistic example throughout to illustrate the points.

Java: A Language for Software Engineering

Jim Waldo

FAIRFAX A

1D Java, an object-oriented language that allows dynamic loading of binary code over a network of heterogeneous machines, includes features to write robust, error-free code and thus presents a platform for serious software engineering. We will examine the packages that allow Java to be used in traditional distributed systems programming and for more advanced, Java-only environments that support the Remote Method Invocation system.

SESSION 2: SUNDAY, 8 A.M. – NOON

Software Interoperability: Principles and Practice

Jack Wileden, Alan Kaplan

EXETER

2A Software interoperability is fundamental to such topics as development based on components, reuse, and infrastructure for distributed or network-based systems. As a result, a variety of (often partial) approaches to interoperability have appeared, each offering a potential solution to interoperability problems. Yet what these approaches offer, how they compare, and exactly what problems they are solving is generally unclear. Some foundations for understanding and evaluating interoperability problems and proposed approaches for solving those problems.

Distributed Software Architectures*Jeff Kramer, Jeff Magee*

GARDNER

2B Software architectures has been identified as a critical design concern when bridging the gap between system requirements and implementation, particularly in large, complex software systems. Software Architecture is the structure of the components of a program or system, their interrelationships, and principles and guidelines governing their design and evolution over time. It provides a clear and well-defined level at which to describe, understand, and analyze system designs.

Jeff Kramer is a Professor at Imperial College, and head of the Distributed Software Engineering research section. His research interests include requirement analysis techniques, design and analysis methods, software construction languages and software development environments. *Jeff Magee* is assistant director of the Department of Computing at Imperial College. His interests include software engineering of parallel and distributed systems.

Effective Use of COTS (Commercial-Off-the-Shelf) Software Components in Long Lived Systems*W. Morven Gentleman*

BEACON A

2C This tutorial looks at kinds of COTS software components that can be used in long lived systems, and the technology available for building around them. The potential benefits and risks of this approach to systems are examined. Modifications of conventional development processes are required to focus on where time and cost expenditures occur, and where risks arise.

W. Morven Gentleman heads the Software Engineering Laboratory in the Institute for Information Technology at the National Research Council of Canada. He has taught at the University of Waterloo and has been among the technical staff at Bell Telephone Laboratories. His Ph.D. from Princeton in 1966 is in Mathematics. His research activities include software engineering, computer architecture, robotics, computer algebra, and numerical analysis.

SESSION 3: SUNDAY, 1-5 P.M.

Rigorous Requirements for Real-Time Systems: Evolution and Application of the SCR Method*Stuart Faulk, Connie Heitmeyer*

BEACON F

3A SCR, a practical formal requirements method, can reduce critical errors and decrease costs in industrial development of embedded, high-assurance systems. Requirements errors remain the most intractable and costly problem in embedded software development. Formal methods offer techniques for early error detection and correction but are widely perceived as impractical for large, complex, embedded systems. SCR has systematically addressed the problems of industrial use of formal requirements methods. The resulting methods and tools offer a proven, practical, industrial-strength approach for formal specification and analysis of critical system requirements.

Stuart Faulk is on the faculty of the University of Oregon's Department of Computer and Information Science. Previously, he led the development of the Consortium Requirements Engineering Method (CoRE) and successfully applied the SCR method in industry. *Connie Heitmeyer* heads the Software Engineering Section of the Naval Research Laboratory's High Assurance Computer Systems branch. She leads research and development efforts in formal methods and CASE tools supporting the construction of real-time, embedded software.

Software and Business Process Technology*Volker Grubm, Wilhelm Schaefer*

BEACON G

3B The state-of-the-art technology in software process and business process technology and its exploitation in an industrial context includes languages, tools, and substrates (database and operating system functionality) being used to model, analyze, and execute business and software processes. The industrial context is based on building, using, and selling a complete workflow environment including tools for modelling, analyzing, and executing workflows. This environment called LEU (LION Environment) is used in various industrial sectors like real estate, software process, and insurance.

Dr. Volker Grubm has been chief technical officer of a German software house called LION since 1992. He is responsible for a software development department of 150 people. *Dr. Wilhelm Schaefer* is professor of Computer Science at the University of Paderborn, Germany. Prior appointments have been at the University of Dortmund and McGill University in Montreal and a position in industry where he served as the head of an RD department of a medium-size software house focussing on CASE tools and information systems.

An Introduction to OMG/CORBA*Wolfgang Emmerich*

GARDNER

3C The Common Object Request Broker Architecture (CORBA) standard adopted by the Object Management Group (OMG) is the industry standard middleware for heterogeneous and distributed object-oriented computing. Participants will be provided with an overview of the different constituents of the CORBA standard. Although the main focus of the tutorial is on the standard and its rationales, participants will also be provided with a brief overview of the most important products implementing CORBA.

Dr. Wolfgang Emmerich is a senior consultant of the OMG representative in Central Europe, LogOn Technology Transfer. *Dr. Emmerich* has given numerous CORBA training courses to the software industry in many European countries and consulted on the use of CORBA in companies and software houses. *Dr. Emmerich* is also a Lecturer at City University London, where he teaches distributed systems and software engineering.

SESSION 4: MONDAY, 9–6 P.M.

Frank E. McGarry is a senior member of the Executive Staff at Computer Sciences Corporation after having spent 28 years at NASA/ Goddard, where he headed the Software Engineering Branch. *Victor Basili* is a professor of computer science at the Institute for Advanced Computer Studies at the University of Maryland at College Park, where he served as chairman for six years. His interests include quantitative approaches for software management, engineering, and quality assurance.

Watts S. Humphrey founded the Software Process Program of the Software Engineering Institute at Carnegie Mellon University. He is a Fellow of the Institute and is a research scientist on its staff. He was director of programming quality and process at IBM. *James Over*, a Senior Member of the Technical Staff at the Software Engineering Institute (SEI), has worked in several technical areas within the SEI Software Process Program. His interests include software engineering, software process, and quality management. He is the co-author of publications on software process definition and improvement.

Bashar Nuseibeh is head of the Software Engineering Laboratory at Imperial College, London. His research interests are in distributed software engineering, and he is working on supporting multiple views and managing inconsistencies in software development. *Suzanne Robertson* is a teacher and consultant specialising in modelling techniques for system development. She has co-authored courses on systems analysis and software design for systems, requirements engineering, quality assessment and problem solving. She develops techniques for identifying and reusing requirements

Mark Ardis, a member of the Technical Staff in the Software Production Research Department at Bell Laboratories, Lucent Technologies, taught software engineering courses at the University of Illinois at Urbana-Champaign, the Wang Institute of Graduate Studies, and Carnegie Mellon University (CMU). *David Weiss* is the head of the Software Production Research Department at Bell Laboratories, Lucent Technologies. He has been director of reuse and measurement for the Software Productivity Consortium.

Shari Lawrence Pfleeger is president of Systems/Software Inc., a consultancy specializing in software engineering research and technology transfer. In addition, she is a visiting professorial research fellow at City University's Centre for Software Reliability.

The Experience Factory: How to Build and Run One*Vic Basili, Frank McGarry*

COMMONWEALTH

4A This course presents the fundamental concepts behind software process and product improvement using measurement and evaluation in an Experience Factory Organization. It will provide a set of examples associated with understanding the software engineering process, product, and environment, improving it over time and packaging experience in the form of models and measures to create an experience base that can be reused by future projects. It discusses how this approach is being used in the Software Engineering Laboratory (SEL) at NASA/ Goddard Space Flight Center and how it has been expanded to other NASA sites and to other production environments in private corporations such as Computer Sciences Corporation (CSC).

The Personal Process (PSP)SM*Watts S. Humphrey, James W. Over*

CONSTITUTION

4B The PSP method uses quality management principles and the Capability Maturity Model (CMM)SM framework and uses sound engineering principles in software development and maintenance work. The principal message of the PSP is that engineers should use process management concepts to identify and perfect the methods that are most effective for them. Engineers using PSP significantly improve the quality of their work, learn how to plan their projects, and improve their productivity. Average quality improvements of five to ten times are normal, as are productivity improvements of 25% or more.

Personal Software Process, PSP, Capability Maturity Model, and CMM are service marks of Carnegie Mellon University.

Making Requirements Measurable*Bashar Nuseibeh, Suzanne Robertson*

HAMPTON

4C Participants in this interactive full-day tutorial examine measurability by building a requirements specification for a familiar system. After presenting an overview of requirements engineering activities, the tutorial focuses on how to measure requirements for testability, relevance, completeness, consistency, coherency, traceability and satisfaction. A requirements template is used as a guide to discovering requirements and building the specification. A requirement is "measurable" if there is an unambiguous way of determining whether a given solution fits that requirement.

Defining Families: The Commonality Analysis*Mark Ardis, David Weiss*

EXETER

4D One approach of systematically engineering software domains is to develop families of software and to invest in facilities for rapidly producing family members. This full-day tutorial describes the commonality analysis process, a systematic approach to analyzing families. The result of the analysis forms the basis for designing reusable assets that can rapidly produce family members. A practice commonality analysis will be guided by experienced users of the process.

Evaluating Software Technology*Shari Lawrence Pfleeger*

BEACON B

4E This tutorial examines the issues involved in evaluating the effects of software methods and tools on our products, processes and resources. It reviews measurement theory and the basics of experimental design and analysis to suggest guidelines for how we should investigate the benefits and costs of our actions. Principles are illustrated with actual industrial examples, including two in-depth case studies. In addition to designing our own investigations, the tutorial enables us to understand when the results of others apply to our own situations.

SESSION 5: MONDAY, 8 A.M.–NOON

A Survey of Object-Oriented Analysis and Design Methods*Martin Fowler*

GARDNER

5A A guided tour of common OO techniques, some less-known but valuable techniques, and where to go for more information. We explore techniques for structural, architectural, and behavioral modelling with process techniques used in OO development. The tutorial discusses the Unified Modelling Language, model perspectives, design by contract, event modelling, and the translation process.

Martin Fowler is an independent consultant who has pioneered the use of Object Oriented analysis and design for business information systems. These include health care for the UK National Health Service, derivatives trading for Citibank, and payroll for Chrysler. He is also a leader in developing analysis patterns and is the author of the book *Analysis Patterns: Reusable Object Models*.

Simplifying the Evolution of Java Programs*Linda Seiter, Karl Lieberherr, Doug Orleans*

INDEPENDENCE EAST

5B An in-depth look at the ability of existing models and languages to support different forms of reuse and evolution. We present techniques for achieving dynamic behavior in a static, class-based model and language. We present the public-domain programming tool Demeter/Java, which implements a special kind of context object, called a visitor object. To enable the direct expression of visitor objects and to express traversal strategies for objects in Java, we present a simple, public domain, programming tool extension to Java (the Demeter/Java language) and show how it is translated back into Java. Programs become more flexible, both structurally and behaviorally — and also shorter.

Linda Seiter is a visiting professor at Boston College. Her current research interests include semantics of languages that support evolution and reuse. *Karl Lieberherr* is a Professor in the College of Computer Science at Northeastern University. His current research interests are methods and tools for developing adaptable software for open systems, with special emphasis on adaptive software. *Doug Orleans* is a PhD student at Northeastern University, and the principal architect of Demeter/Java.

A Primer on Empirical Studies*Dewayne E. Perry, Adam A. Porter, and Lawrence G. Votta*

LIBERTY C

5C A sound empirical basis for software and process engineering and research by focusing on the basic characteristics of empirical studies. The key to empirical work is credibility — everything else follows from this primary characteristic. We advocate a model in which there is more control involved, resulting in more detailed information gathered. Rather than emphasize general phenomenology, we emphasize trying to find underlying mechanisms. Attendees assess the credibility of empirical work either as reported in the software engineering literature or as done by themselves and to apply the results to their own work.

Dewayne E. Perry, Adam A. Porter, and Lawrence G. Votta have rich backgrounds in software engineering research and practice, covering the entire range of technical and management aspects of engineering large and small software systems, and a broad range of software engineering research problems. In particular, they have been instrumental in forging a new approach to software engineering experimentation in both in vitro and in vivo contexts.

Reverse Engineering Strategies for Software Migration*Hausi A. Muller*

BEACON D

5D The need to maintain and improve software and information systems has risen dramatically over the past decade. Dealing with old software systems that are billion-dollar assets to corporations and governments is a critical problem. Migrating and reengineering involves capturing, preserving, and extending knowledge about software, analyzing and understanding software, and finally changing, improving, and evolving software. Reverse engineering approaches have been particularly useful in the arena of reverse engineering: the process of generating new information about software.

Dr. Hausi Muller is a principal investigator of CSER (Centre for Software Engineering Research), a Canadian Centre for Excellence sponsored by NSERC, NRC, and industry including IBM. His research interests include software evolution, software reverse engineering, software architecture, program understanding, software re-engineering, and maintenance. He served as Program Co-Chair for ICSM-94, CASE-95, and WPC-96. He is on the Editorial Board of IEEE TSE.

A Software Process Improvement Approach Tailored for Small Organizations and Small Projects*Judith G. Brodman, Donna L. Johnson*

BERKELEY

5E A small organization or project faces issues when implementing a software process improvement program. Alternative practices that satisfy the intent of the SEI's Capability Maturity Model (CMM) practices and goals address the setting up and sustaining of a viable process improvement program. The growth pattern shows areas of improvement as an organization matures — vertical linkages between process areas through the levels of the CMM and the evolutionary definition of metrics through the levels of maturity.

Judith G. Brodman and *Donna L. Johnson* are CEO and President, respectively, of LOGOS International, Inc. They consult with software organizations on software process improvement initiatives. They have also researched the return-on-investment for software process improvement initiatives and issues facing small organizations in their improvement efforts.

SESSION 6: MONDAY, 1 – 5 P.M

Wolfgang Pree is Associate Professor at the University of Linz. He is author of *Design Patterns for Object-Oriented Software Development* (Addison-Wesely/ACM Press, 1995) and of *Framework Patterns* (SIGS Books, New York City, 1996). *Hermann Sikora* is a managing director of RACON Linz Software, Inc., a company owned by and producing software for the largest private bank consortium in Austria. Sikora holds a Ph.D. in computer science and a degree in management information systems.

Stefan Fischer is a graduate of the University of Mannheim. Formerly a research assistant at the Institute of Applied Computer Science (Department for Computer Networks) of the University of Mannheim, he is a postdoctoral fellow at the University of Montreal, Canada. *Stefan Leue* received his Master's Degree in Computer Science from the University of Hamburg in 1990, and his Ph.D. degree from the University of Berne. Formerly a research associate and doctoral candidate at the University of Berne, he is an Assistant Professor at the University of Waterloo.

Amrit L. Goel is Professor of Electrical and Computer Engineering and a member of the Computer and Information Science Faculty at Syracuse University. Dr. Goel's current interests are in software reliability and testing, fault tolerant software, and performance modeling of parallel systems. He was recently elected a fellow of the IEEE for his contributions to the reliability of computer software.

Vaclav Rajlich is a professor and former chair of the Department of Computer Science at Wayne State University, Detroit, Michigan. Before that, he was an associate professor at the University of Michigan in Ann Arbor, and software manager at the Research Institute for Mathematical Machines in Prague, Czech Republic.

Marilyn Bush, an independent consultant, is one of the authors of the revised SEI Capability Maturity Model as well as an author of the SEI's CMM Introductory Course and a qualified SEI Lead Assessor. She was recently a member of the SEI team asked to revamp the SEI Assessment Method and Lead Assessor Course, and she is a certified instructor for the SEI CMM Introductory Course and one of three people worldwide now certified to teach the SEI Lead Assessor Course.

Design Patterns for Object-Oriented Software Development

Wolfgang Pree, Hermann Sikora

GARDNER

6A Design patterns support the development and reuse of extensible OO software components. They represent a complimentary enhancement of existing OO analysis and design (OOAD) methods. The tutorial will give an overview of state-of-the-art design patterns approaches, including pattern catalogs and framework patterns. A selection of useful patterns will be discussed in detail. The tutorial will also introduce hot spot cards, which have proved to be a useful communications vehicle between domain experts and software engineers in order to exploit the potential of design patterns.

Formal Methods for Broadband and Multimedia Systems

Stefan Fischer, Stefan Leue

BEACON D

6B Formal methods have been applied successfully to specify "traditional" communication protocols, services, and network applications. With high-speed networks, new distributed applications impose requirements on the communication subsystem that are different from those on traditional systems. To meet application-level performance requirements, highly efficient techniques to implement communication software have been developed. Formal description techniques (in particular, SDL and Estelle) can be used for the requirements specification, design, and implementation stages in the life-cycle of broadband communication systems.

Software Engineering Data Analysis Techniques

Amrit Goel, Miyoung Shin

BERKELEY

6C During the past few years, there has been an increasing emphasis on the use of quantitative measures for monitoring and controlling software projects. As a result, collection of product and process data has become a standard practice in major software development organizations. While there has been a growing emphasis on the collection of metrics data, relatively very little work has been done on the systematic use of appropriate data analysis techniques. For metrics or measurement undertakings to be successful, we feel that it is essential to address both the data collection and analysis activities as mutually inseparable.

Comprehension and Evolution of Legacy Software

Vaclav Rajlich

LIBERTY C

6D Legacy systems have one or several of the following attributes: they were implemented many years ago, their technology became obsolete, their structure deteriorated, they represent a large investment, they contain business rules not recorded elsewhere, they cannot be easily replaced, or the original authors are not available. Software comprehension typically consumes more than a half of the difficult effort of maintaining legacy systems. The tutorial will give an overview of the available techniques and tools.

European and American Software Process Maturity Models and Assessments

Marilyn Bush

KENT

6E How do assessments generate increased productivity? How do software process assessments work? What principles underlie all current software process improvement models worldwide? Four major software process improvement models are on the international scene: ISO 9001 and 9000 3, Bootstrap, the SEI Capability Maturity Model (CMM) and Software Process Improvement and Capability Determination (SPICE). All these models acknowledge similar state of the practice principles of good software quality development process, but each involves a different take on assessing organizational process maturity.

TECHNICAL PROGRAM

TUESDAY, MAY 20, 1997

Morning

8:30-10:30AM
GRAND BALLROOM

SESSION 1

1 OPENING SESSION AND KEYNOTE ADDRESS:
Chairs: W. Richards Adrion, Anthony I. Wasserman
Beyond Software Engineering Ed Yourdon

10:30-11:00AM
REPUBLIC EXHIBIT HALL

BREAK

11:00AM-12:30PM
2A • GRAND BALLROOM

SESSION 2

2A TECHNICAL PAPERS: **ICSE/SSR Joint Session**
Chair: Mehdi Harandi

- *Reuse Library Interoperability and the World Wide Web:* Shirley V. Browne, (University of Tennessee, USA) James W. Moore, (Mitre Corporation, USA)
- *Reuse of Off-the-Shelf Components in CS-Style Architectures:* Nenad Medvidovic, Peyman Oreizy, Richard N. Taylor (Univ. of California at Irvine, USA)
- *Configuring Designs for Reuse:* Anssi Karhinen, Alexander Ran, Tapio Tallgren (Nokia Research Center, Finland)

CONSTITUTION

2B TECHNICAL PAPERS:
Exploiting the Internet
Chair: Alexander Wolf

- *An Architecture for WWW-based Hypercode Environments:* Gail E. Kaiser, Stephen E. Dossick, Wenyu Jiang, Jack Jingshuang Yang (Columbia University, USA)
- *Anywhere, Anytime Code Inspections: Using the Web to Remove Inspection Bottlenecks in Large-Scale Software Development:* James M. Perpich (Lucent Technologies, Inc., USA), Dewayne E. Perry (Bell Laboratories, USA), Adam A. Porter (University of Maryland, USA), Lawrence G. Votta, Jr. (Bell Laboratories, Lucent Technologies USA), Michael W. Wade (Lucent Technologies Inc., USA)
- *Designing Distributed Applications with Mobile Code Paradigms:* Antonio Carzaniga (Politecnico di Milano, Italy), Gian Pietro Picco (Politecnico di Torino, Italy), Giovanni Vigna (Politecnico di Milano, Italy)

COMMONWEALTH

2C LESSONS FROM ORGANIZATIONS: **Object Technology**
Chair: Don Batory

- *Leveraging a Large Banking Organization to Object Technology:* Werner Karbach, Joerg Noack, Hans-Bernd Kittlaus (German Savings Bank Organization, Germany)
- *Tailoring OMT for an Industry Software Project:* Jeffrey Melanson (Siemens Medical Systems, USA), Robert L. Nord (Siemens Corporate Research, USA), Dilip Soni (Siemens Corporate Research, USA)

INDEPENDENCE WEST

2D STATE OF THE ART REPORT: **CASE: past, present, and future** David Notkin, (University of Washington, USA) Chair: Herm Fischer

HAMPTON A/B

2E FORMAL RESEARCH DEMOS: **Analysis**
Chair: Laura K. Dillon

- *Verification of Concurrent Software with FLAVERS:* Gleb Naumovich, Lori A. Clarke, Leon J. Osterweil (University of Massachusetts, Amherst, USA), Matthew B. Dwyer (Kansas

State University, USA)

- *Nitpick, A Tool for Interactive Design Analysis:* Craig Damon (Carnegie Mellon U., USA)

12:30 - 2:00PM

LUNCH BREAK

Afternoon

2:00 - 3:30 PM

SESSION 3

COMMONWEALTH

3A TECHNICAL PAPERS: **Formal Specifications**
Chair: Richard Kemmerer

- *An Object-Oriented Modeling Method for Algebraic Specifications in CafeOBJ:* Shin Nakajima (NEC Corp., Japan), Kokichi Futatsugi (Japan Advanced Institute of Science & Technology, Japan)
- *Formalizing and Integrating the Dynamic Model within OMT:* Enoch Y. Wang, Heather A. Richter, Betty H. C. Cheng (Michigan State University, USA)
- *Introducing Formal Specification Methods in Industrial Practice:* Luciano Baresi, Alessandro Orso, Mauro Pezzé (Politecnico di Milano, Italy)

INDEPENDENCE WEST

3B TECHNICAL PAPERS: **Reliability**
Chair: Adam Porter

- *Choosing a Testing Method to Deliver Reliability:* Phyllis Frankl (Polytechnic University, USA), Dick Hamlet (Portland State University, USA), Bev Littlewood (City University, U.K.), Lorenzo Strigini (City University, U.K.)
- *Re-estimation of Software Reliability After Maintenance:* Andy Podgurski (Case Western Reserve Univ., USA), Elaine J. Weyuker (AT&T Research Labs, USA)
- *A Study on the Failure Intensity of Different Software Faults:* Kazuyuki Shima, Shingo Takada, Ken'ichi Matsumoto, Koji Torii (Nara Institute of Science and Technology, Japan)

GRAND BALLROOM

3C PANEL: **Platforms for Software Execution: Databases vs. Operating Systems vs. Browsers**

Chair: Richard Selby
Panelists: Paul Dorsey (Dulcian, Inc., USA), Jeff Anders (Sun Microsystems, USA), Larry Bernstein (Bell Labs, USA), Randy Davis (MIT, USA)

CONSTITUTION

3D INVITED PRESENTATIONS:
Large Systems Experience I
Chair: Jerry Fiddler

- *How I Learned to Stop Worrying and Love the 5ESS!* Eric Sumner, Rebecca Grinter, Lawrence G. Votta (Bell Laboratories, Lucent Technologies, USA)
- *Architecting Families of Software Intensive Products,* Alexander Ran (Nokia Research Center, USA), Hamish Kellock and Peter Hjort (Nokia Telecommunications, Finland)

HAMPTON A/B

3E FORMAL RESEARCH DEMOS: **Software Evolution**
Chair: William Griswold

- *Endeavors: A Process System Infrastructure:* Arthur S. Hitomi, Gregory Alan Bolcer, Richard N. Taylor (University of California, Irvine, USA)
- *Argo: A Design Environment for Evolving Software*

TECHNICAL PROGRAM

Architectures: Jason E. Robbins, David M. Hilbert, David F. Redmiles (University of California, Irvine, USA)

3:30-4:00PM BREAK
REPUBLIC EXHIBIT HALL

4:00-6:00PM SESSION 4
COMMONWEALTH

4A TECHNICAL PAPERS: **Inspections and Reviews**

Chair: Ross Jeffery

- *An Empirical Study of Communication in Code Inspections*: Carolyn B. Seaman, Victor R. Basili (University of Maryland, USA)
- *A Case Study of Distributed, Asynchronous Software Inspection*: Michael V. Stein, John Riedl (University of Minnesota, USA), Sören J. Harner (ICEM Systems, GmbH, Germany), Vahid Mashayekhi (DELL Computer Corp., USA)
- *Assessing software review meetings: A controlled experimental study using CSRS*: Adam A. Porter, Harvey P. Siy (University of Maryland, USA), Lawrence G. Votta (Bell Laboratories, Lucent Technologies, USA)
- *Understanding the Effects of Developer Activities on Inspection Interval*: Harvey P. Siy, Adam Porter (University of Maryland, USA), Lawrence G. Votta (Bell Laboratories, Lucent Technologies, USA)

INDEPENDENCE WEST

4B TECHNICAL PAPERS: **User Interface and Specifications**

Chair: Guillermo Arango

- *Early Specification of User-Interfaces: Toward a Formal Approach*: J.-P. Jacquot, D. Quesnot (Centre de Recherche en Informatique de Nancy, France)
- *Automated Analysis of Requirement Specifications*: William M. Wilson (Software Assurance Technology Center/GSFC, USA), Linda H. Rosenberg (Unisys Federal Systems/GSFC, USA), Lawrence E. Hyatt (NASA/GSFC, USA)
- *Integrating Support for Temporal Media into an Architecture for Graphical User Interfaces*: T.C. Nicholas Graham, Tore Urnes (York University, Canada)
- *A Meta-Model for Restructuring Stakeholder Requirements*: William Robinson and Slav Volkov (Georgia State University, USA)

CONSTITUTION

4C TECHNICAL PAPERS AND EXPERIENCE REPORTS (ER): **Legacy Systems and Testing**

Chair: Mary Jean Harold

- *Manipulating Recovered Software Architecture Views*: Alexander S. Yeh, David R. Harris, Melissa P. Chase (Mitre Corporation, USA)
- *Lessons on Converting Batch Systems to Support Interaction (ER)*: Robert DeLine, Gregory Zelesnik, Mary Shaw (Carnegie Mellon University, USA)
- *Applying Design of Experiments to Software Testing (ER)*: I. S. Dunitz, W. K. Ehrlich, B. D. Szablak (AT&T NCS OTC, USA), C. L. Malloes (AT&T Laboratories, USA), A. Iannino (Pipeline Associates, USA)
- *A Theory of Probabilistic Functional Testing*: Gilles Bernot (Université d'Evry, France), Laurent Bouaziz (CERMICS-ENPC, France), Pascale LeGall (Universite d'Evry, France)

GRAND BALLROOM

4D PANEL: **Advantages of Maintaining a High CMM Level**

Chair: Marie Silverthorn

- Panelists: Kelly Butler (Tinker AFB, USA), Bill Curtis (TeraQuest, USA), Mike Diaz (Motorola GED, USA), Jeff Perdue (ISPI, USA), Gary Wolf (Raytheon, USA), Alan Woody (Texas Instruments, USA)

HAMPTON A/B

4E FORMAL RESEARCH DEMOS: **Software Evolution and Maintenance**

Chair: Aniello Cimitile

- *Automatic Monitoring of Software Requirements*, Don Cohen, Martin S. Feather, K. Narayanaswamy, Stephen S. Fickas (Computing Services Support Solutions, USA)
- *Preventive Program Maintenance in Demeter/Java*, Karl Lieberherr, Doug Orleans (Northeastern U., USA)

Evening

6:00- 8:00 PM CONFERENCE RECEPTION
REPUBLIC EXHIBIT HALL

WEDNESDAY, MAY 21, 1997

Morning

8:30 - 10:00AM SESSION 5
GRAND BALLROOM

5 KEYNOTE ADDRESS: **Java and the Evolution of Web Software**

Guy Steele (Sun Microsystems, USA)
Chair: Richard N. Taylor

10:00-10:30AM BREAK
REPUBLIC EXHIBIT HALL

10:30AM - 12:00PM SESSION 6
COMMONWEALTH

6A TECHNICAL PAPERS: **Static Analysis**

Chair: Paola Inverardi

- *Analyzing Partially-Implemented Real-Time Systems*: George S. Avrunin (University of Massachusetts, USA), James C. Corbett (University of Hawaii, USA), Laura K. Dillon (University of California-Santa Barbara, USA)
- *Constructing Multi-Formalism State-Space Analysis Tools: Using Rules to Specify Dynamic Semantics of Models*: Mauro Pezze (Politecnico di Milano, Italy), Michal Young (Purdue University, USA)
- *Software Deviation Analysis*: Jon Damon Reese, Nancy G. Leveson (University of Washington, USA)

CONSTITUTION

6B TECHNICAL PAPERS: **Metrics**

Chair: Lawrence G. Votta

- *A Predictive Metric Based on Discriminant Statistical Analysis*: Maurizio Pighin, Roberto Zamolo (Università degli Studi di Udine, Italy)
- *Communication Metrics for Software Development*: Bernd Bruegge, Allen H. Dutoit (Carnegie Mellon University, USA)
- *Characterizing and Modeling the Cost of Rework in a Library of Reusable Software Components*: Victor R. Basili (University of Maryland, USA), Steven E. Condon (CSC, USA), Khaled El Eman (FIESE, Germany), Robert B. Hendrick, Walcelio Melo (Centre de Recherche Informatique de Montrial)

INDEPENDENCE WEST

6C STATE OF THE ART REPORT: **Everything You NEED to Know About Collaboration and Collaboration Software**

Mark S. Ackerman (University of California, Irvine)
Chair: Jeffrey Kramer

TECHNICAL PROGRAM

GRAND BALLROOM

6D PANEL: **Java Development Environments**

Chair: Anthony I. Wasserman
Panelists: Jeff Anders (Sun Microsystems, USA), Peter Kellogg-Smith (Asymetrix, USA), Leo Lucas (Aimtech, USA), Laurent Visconti (Metrowerks, USA)

HAMPTON A/B

6E FORMAL RESEARCH DEMOS: **Reverse Engineering and Maintenance**

Chair: David Rosenblum
• *Rigi: A Visualization Environment for Reverse Engineering*, Margaret-Anne Storey, Kenny Wong, Hausi Müller (University of Victoria, Canada)
• *An Object-Oriented Testing and Maintenance Environment*, Pei Hsia, David Kung (University of Texas, Arlington, USA)

12:00 - 1:15PM

LUNCH BREAK

Afternoon

1:15 - 2:15 PM

SESSION 7

GRAND BALLROOM

7A TECHNICAL PAPERS AND EXPERIENCE REPORTS (ER):

Process
Chair: Takuya Katayama
• *A New Software Project Simulator Based on Generalized Stochastic Petri-net*: Shinji Kusumoto, Osamu Mizuno, Tohru Kikuno, Yuji Hirayama (Osaka University, Japan), Yasunari Takagi, Keishi Sakamoto (OMRON Corporation, Japan)
• *The Criticality of Modeling Formalisms in Software Design Method Comparison (ER)*: Rodion M. Podorozhny, Leon Osterweil (University of Massachusetts, Amherst, USA)

COMMONWEALTH

7B TECHNICAL PAPERS: **Hardware/Software Issues**

Chair: Pankaj Jalote (Infosys Technologies, India)
• *A Specification of Software Controlling a Discrete-Continuous Environment*: Viktor Friesen, Stefan Jähnichen, Matthias Weber (Technische Universität Berlin, Germany)
• *Automatic Checking of Instruction Specifications*: Mary Fernández (AT&T Research, USA), Norman Ramsey (University of Virginia, USA)

INDEPENDENCE WEST

7C LESSONS FROM ORGANIZATIONS: **Architecture Recovery and Reverse Engineering**

Chair: David Garlan
• *Software Architecture Recovery of Embedded Software*: Wolfgang Eixelsberger, Lasse Warholm (ABB Corporate Research, Norway), Rene Klösch, Harald Gall (Technical University of Vienna, Austria)
• *Integrating Forward and Reverse Object-Oriented Software Engineering*, Christoph Welsch (ABB Corporate Research, Germany), Alexander Schalk (Adtranz, Germany), Stefan Kramer (ABB Color Emag Schaltanlagen, Germany)

CONSTITUTION

7D INVITED PRESENTATION/LESSONS FROM ORGANIZATIONS: **Large Systems Experience II**

Chair: TBA
Pragmatic Software Metrics for Iterative Development: Walker Royce (Rational Software, USA)
The Windows 95 User Interface: Iterative Design and Problem Tracking in Action: Kent Sullivan (Microsoft Corporation, USA)

HAMPTON A/B

7E FORMAL RESEARCH DEMOS: **Requirements**

Chair: Sol Greenspan
• *The SCR Method for Formally Specifying, Verifying, and Validating Requirements: Tool Support*. Constance Heitmeyer, James Kirby, Jr., Bruce Labaw (Naval Research Lab, USA)
• *GRAIL/KAOS: An Environment for Goal-Driven Requirements Engineering*. Robert Darimont, Emmanuelle Delor, Philippe Massonet, Axel van Lamsweerde (University Louvain, Belgium)

2:15 - 3:45 PM

SESSION 8

GRAND BALLROOM

8 PLENARY AWARD SESSION

Chairs: W. Richards Adrion, Alfonso Fuggetta, Richard N. Taylor, Anthony I. Wasserman
• ACM, ACM/SIGSOFT, IEEE Computer Society and IEEE-CS/TCSE awards
• Invited talk on the most influential papers of ICSE9
• *Software Processes are Software Too, Revisited: An Invited Talk on the Most Influential Paper of ICSE 9* Leon J. Osterweil (University of Massachusetts, Amherst, USA)
• *Process Modelling — Where Next*, M.M. Lehman (Imperial College of Science and Technology, England)

3:45-4:15 PM

BREAK

REPUBLIC FOYER

4:15-5:45 PM

SESSION 9

GRAND BALLROOM

9A TECHNICAL PAPERS:

Reverse Engineering and Program Understanding

Chair: David Notkin
• *Lackwit: A Program Understanding Tool Based on Type Inference*: Robert O'Callahan, Daniel Jackson (Carnegie Mellon University, USA)
• *Assessing Modular Structure of Legacy Code Based on Mathematical Concept Analysis*: Christian Lindig, Gregor Snelting (Technische Universität Braunschweig, Germany)
• *Visualizing Interactions in Program Executions*: Dean F. Jerding, John T. Stasko (Georgia Institute of Technology, USA), Thomas Ball (Bell Laboratories, USA)

INDEPENDENCE WEST

9B EXPERIENCE REPORTS: **Process Improvement**

Chair: Jean-Claude Derniame
• *Measuring Requirements Testing*: Theodore Hammer (NASA Goddard Space Flight Center, USA), Linda H. Rosenberg (Unisys Federal Systems, USA), Lenore Huffman (SATC, USA), Lawrence E. Hyatt (NASA Goddard Space Flight Center, USA)
• *Integrating Measurement with Improvement: An Action-Oriented Approach*: Jo Ann Lane (Science Applications International Corporation, USA), David Zubrow (Carnegie Mellon University, USA)
• *Total Software Process Model Evolution in EPOS*: Minh N. Nguyen, Alf Inge Wang, Reidar Conradi (Norwegian University of Science & Technology, Norway)
• *An Improved Process for the Development of PLC Software*: Flavio Bonfatti (University of Modena, Italy), Gianni Gadda (Democenter Srl, Italy), Paola Daniela Monari (University of Modena, Italy)

9C • CONSTITUTION

9C LESSONS FROM ORGANIZATIONS: **Management Issues**

TECHNICAL PROGRAM

Chair: Michael Cusumano

- *Prioritizing Software Requirements in an Industrial Setting*: Kevin Ryan (University of Limerick, Ireland), Joachim Karlsson (Focal Point AB, Sweden)
- *Lessons Learned with the Systems Security Engineering Capability Maturity Model*: Rick Hefner (TRW, USA)
- *BOOTSTRAP: Four Years of Assessment Experience*: Franz Engelmann, Hans Stienen, Ernst Lebsanft (YNSPACE AG, Switzerland)

COMMONWEALTH

9D PANEL: Collaborative Software Engineering

Chair: Kanth Miriyala, Andersen Consulting

- Panelists: Prasun Dewan (University of North Carolina, USA), Philip Johnson (University of Hawaii, USA), Remo Pareschi (Rank Xerox Research Centre, France)

9E • HAMPTON A/B

9E FORMAL RESEARCH DEMOS: Component Integration

Chair: Martin Wirsing

- *ADE — An Architecture Design Environment for Component-Based Software Engineering*: Jim Q. Ning (Andersen Consulting, USA)
- *Package-Oriented Programming of Engineering Tools*: Kevin J. Sullivan, Jake Cockrell, Shengtong Zhang, David Coppit (University of Virginia, USA)

5:45-6:30PM

ACM/SIGSOFT OPEN MEETING

COMMONWEALTH

A meeting for SIGSOFT members and other interested parties

6:30 - 7:15PM

IEEE-CS/TCSE OPEN MEETING

COMMONWEALTH

A meeting for TCSE members and other interested parties

Evening

7:00 - 10:00 PM

RECEPTION

Top of the Hub

THURSDAY, MAY 22, 1997

Morning

8:30 - 10:00AM

SESSION 10

GRAND BALLROOM

10 KEYNOTE ADDRESS:

Software Engineering That Matters to People

Mark Weiser (Xerox PARC, USA)

Chair: Alfonso Fuggetta

10:00-10:30AM

BREAK

REPUBLIC FOYER

10:30AM - 12:00PM

SESSION 11

GRAND BALLROOM

11A TECHNICAL PAPERS: **Analysis of C & C++**

Chair: Mauro Pezzé

- *An Investigation into Coupling Measures for C++*: Lionel Briand (IESE, Germany), Prem Devanbu (AT&T Research, USA), Walcelio Melo (CRIM, Canada)
- *Incremental Analysis of Side Effects for C Software Systems*:

Jyh-shiarn Yur, Barbara G. Ryder (Rutgers University, USA), William A. Landi (Siemens Corporate Research, USA), Phil Stocks (Rutgers University, USA)

- *Flow Insensitive C++ Pointers and Polymorphism Analysis and its Application to Slicing*: Paolo Tonella, Giuliano Antoniol, Roberto Fiutem (IRST, Italy), Ettore Merlo (Ecole Polytechnique C.P., Canada)

INDEPENDENCE WEST

11B TECHNICAL PAPERS: **Economic and Legal Issues**

Chair: TBA

- *The Effect of Department Size on Developer Attitudes to Prototyping*: J. M. Verner (City University of Hong Kong, Hong Kong), N. Cerpa (University of New South Wales, Australia)
- *Copyright in Shareware Software Distributed on the Internet — The Trumpet Winsock Case*: Cristina Cifuentes (University of Queensland, Australia), Anne Fitzgerald (University of Tasmania, Australia)
- *On the Economics of Mass-Marketed Software*: Richard J. Botting (California State University at San Bernadino, USA)

CONSTITUTION

11C STATE-OF-THE-ART REPORT:

Software Architecture

Speaker: Dewayne E. Perry, (AT&T Bell Laboratories)

Chair: Richard N. Taylor

COMMONWEALTH

11D MINI-TUTORIAL: **An Introduction to CORBA**

Speaker: Richard Soley (Object Management Group, USA)

Chair: Will Tracz

HAMPTON A/B

11E FORMAL RESEARCH DEMOS: **Environments**

Chair: Barbara Lerner

- *Developing Graphical SE Tools with PROGRES*, Andy Schürr, Andreas J. Winter (University Aachen, Germany)
- *TINA ACE: An Environment for Specifying, Developing and Generating TINA Services*: Piergiorgio Bosco, Giovanni Martini, Corrado Moiso (CSELT, Italy)

12:00 - 1:30PM

LUNCH BREAK

Afternoon

1:30 - 3:00PM

SESSION 12

GRAND BALLROOM

12A TECHNICAL PAPERS:

Object-Oriented Technology

Chair: John McHugh

- *Abstract Syntax from Concrete Syntax*: David S. Wile (University of Southern California, USA)
- *Open Implementation Design Guidelines*: Gregor Kiczales, John Lamping, Cristina Videira Lopes, Chris Maeda, Anurag Mendhekar (Xerox Palo Alto Research Center, USA), Gail Murphy (University of British Columbia, Canada)
- *Hooking into Object-Oriented Application Frameworks*: Garry Froehlich, H. James Hoover, Ling Liu, Paul Sorenson (University of Alberta, Canada)

CONSTITUTION

12B TECHNICAL PAPERS AND EXPERIENCE REPORTS (ER):

Testing & Analysis

Chair: Kokichi Futatsugi

- *Using Formal Methods to Reason about Architectural Standards*: Kevin J. Sullivan (University of Virginia, USA),

TECHNICAL PROGRAM

John Socha (Socha Computing Inc., USA), Mark Marchukov
• *Model-Checking of Real-Time Systems: A Telecommunications Application (ER)*: Rajeev Alur, Lalita Jategaonkar Jagadeesan (Bell Laboratories, USA), Joseph J. Kott, James E. Von Olnhausen (Lucent Technologies, USA)
• *Specification-based Testing of Reactive Software: Tools and Experiments (ER)*: Lalita Jategaonkar Jagadeesan (Bell Laboratories, USA), Adam Porter (University of Maryland at College Park, USA), Carlos Puchol (The University of Texas at Austin, USA), J. Christopher Ramming (AT&T Laboratories, USA), Lawrence G. Votta (Bell Laboratories, USA)

INDEPENDENCE WEST

12C LESSONS FROM ORGANIZATIONS: **Process Issues**

Chair: Elliot Chikofsky
• *Code Reviews Enhance Software Quality*: Richard A. Baker, Jr. (Schneider Automation Inc., USA)
• *Implementing Cleanroom Software Engineering into Mature CMM-Based Software Organizations*: Robert Oshana (Texas Instruments, USA), Frank P. Coyle (Southern

Methodist University, USA)

COMMONWEALTH

12D PANEL: **Databases and the World Wide Web**

Chair: Anthony I. Wasserman
Panelists (partial list): Larry Alston (Object Design, USA), Doron Sherman (NetDynamics, USA)

3:15 - 4:30 P.M.

SESSION 13

GRAND BALLROOM

13 PANEL: **Closing Remarks**

Conference ends at 4:30 p.m.

EXHIBITION

HOURS: TUESDAY 10:30 AM - 8:00 PM

WEDNESDAY 10:00 AM - 2:00 PM

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W. Richards Adrion
University of Massachusetts
Lederle GRC
Box 34610
Amherst, MA 01003 USA
adrion@cs.umass.edu
http://www.cs.umass.edu/
~adrion
+1-413-545-2475
+1-413-545-3729 (fax)

PROGRAM

COORDINATORS

Alfonso Fuggetta
Dipartimento di Elettronica e
Informazione
Politecnico di Milano
Pza Leonardo da Vinci, 32
20133 Milano, Italy
fuggetta@elet.polimi.it
+39-2-2399-3540
+39-2-2399-3411 (fax)
http://www.elet.
polimi.it/~fuggetta

Richard N. Taylor
Information and Computer Science
University of California, Irvine
Irvine, CA 92697-3425 USA
taylor@ics.uci.edu
+1-714-824-6429
+1-714-824-1715 (fax)
http://www.ics.uci.edu/~taylor

Anthony I. Wasserman
Software Methods & Tools
176 Gold Mine Dr.
San Francisco, CA 94131
tonyw@methods-tools.com
http://www.methods-tools.com

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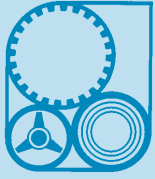
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ICSE98

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Technical Papers	Report research or practical experiences	20 August 1997 (electronic abstract) 3 September 1997 (full paper due)
Panels	Discuss and debate pressing issues	1 August 1997
Software Engineering in Organizations: Lessons and Status Reports	Summaries of work taking place in institutions, organizations, or groups	1 December 1997
Tutorials	Teach Software Engineering techniques and theory	15 September 1997
Workshops	Discuss focused topic in a small-group setting	1 July 1997
Exhibition	Show commercial and research tools	1 January 1998
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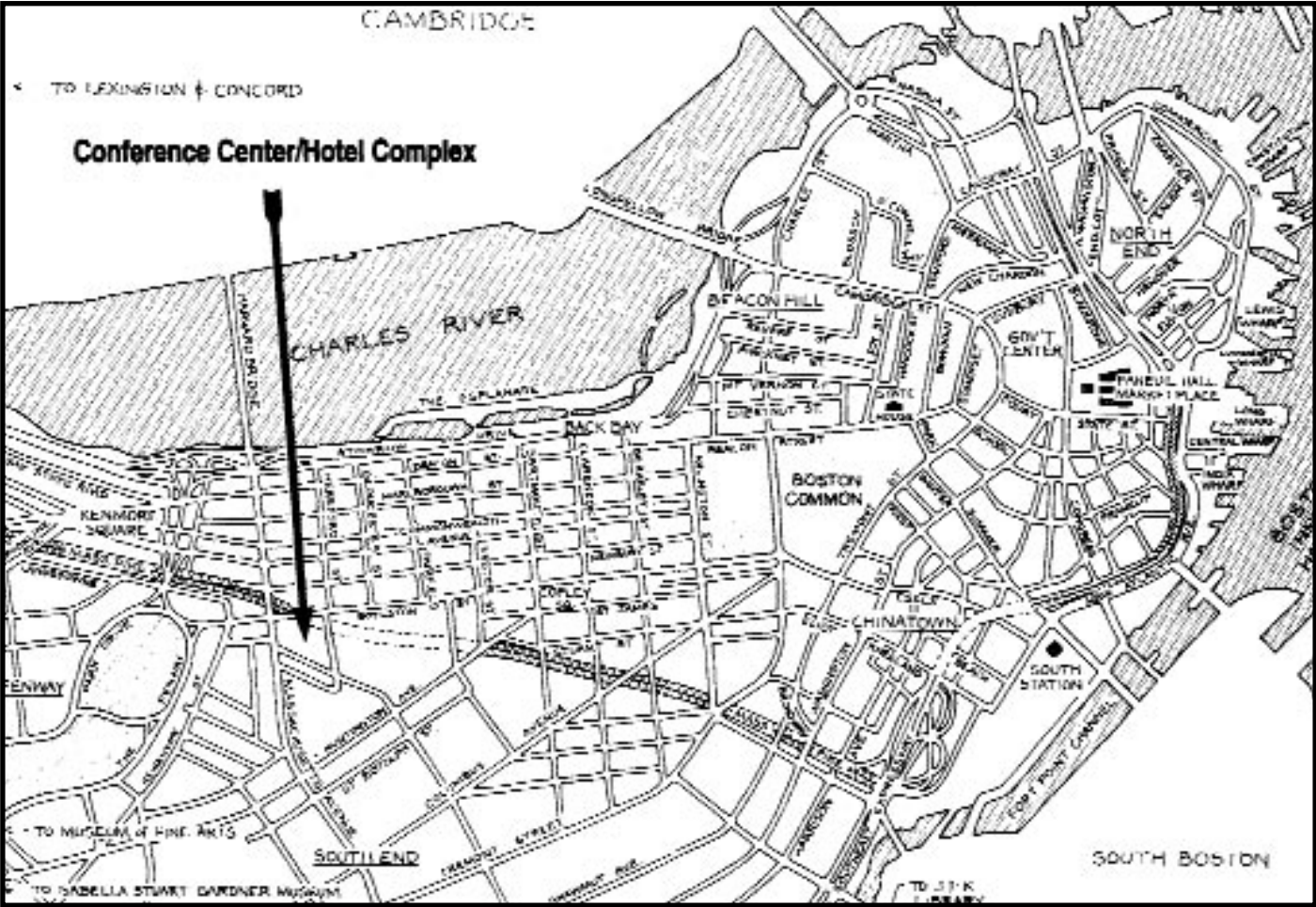
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