Preparing for the Software Century
Software Engineering Challenges for the Global Electronic Community

The 21st International Conference on Software Engineering
Los Angeles Airport Marriott Hotel
Los Angeles, CA, USA, 16-22 May 1999
http://sunset.usc.edu/r1/icse99

Advance Program

Sponsored by ACM SIGSOFT and the IEEE Computer Society Technical Council on Software Engineering in cooperation with ACM SIGAda and ACM SIGPLAN.
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Greetings
Software pervades the growing web of computers, communications, personal and commercial services, financial and public services, and entertainment services, evolving into the global electronic community of the 21st century. Providing timely, cost-effective, high-quality software for the diverse stakeholders of this community will require the best possible technology and practices the software engineering community can provide.

ICSE 99 provides a number of linked forums for bringing together software engineering practitioners and researchers to present and discuss the most promising approaches for meeting these challenges. The forums include the main conference 19-21 May 1999 and associated special-topic workshops, symposia and tutorials 16-18 May and 22 May.

The primary objective of ICSE 99 is to provide software engineering practitioners with useful techniques and insights for dealing with emerging software technology. ICSE 99 includes nine in-depth sessions of case studies and industry experiences from leading practitioners in critical software engineering areas. These include software reuse, process maturity, rapid application development, COTS integration, software and systems architecture, and critical applications involving financial integrity and human safety.

These topics plus Internet and Web software engineering, distributed objects, requirements engineering, design patterns, test and evaluation, evolution, tools, metrics, and risk management are covered in the technical paper sessions, workshops, tutorials, commercial exhibits, and research demonstrations. In addition, two associated symposia will be held before and after ICSE 99: the Harlan Mills’ Legacy Colloquium focused on successful transition of research results into practice, and the 1999 Symposium on Software Reuse (SSR’99).

The ICSE 99 keynote speakers and panel provide an exceptional opportunity to gain perspective on the big-picture trends and implications in software engineering. Dr. William Wulf, President of the U.S. National Academy of Engineering, will address some of the software engineering aspects of national policy and strategy issues. Dr. Alan Kay, Vice President and Disney Fellow, Walt Disney Imagineering, will illuminate some exciting and challenging new applications areas enabled by software technology. Dr. Butler Lampson, Architect at Microsoft Corp., will provide his perspectives on the most influential computer and software technologies for the 21st Century, followed by a panel session of complementary perspectives from Dr. Stephen Cross (CMU-SEI), Dr. Anita Jones (U. of Virginia), Dr. David Parnas (McMaster U., Canada) and Walker Royce (Rational).

We would like to thank the volunteer committee members listed on the opposite page for their many hours of talented and dedicated work. We also greatly appreciate the support of ICSE’s traditional sponsors, ACM SIGSOFT and the IEEE Computer Society Technical Council on Software Engineering. In particular, we wish to thank the following industrial sponsors for their enlightened support of ICSE 99’s objectives to bridge software engineering research and practice:

Gold Sponsors: Bellcore (an SAIC Company), EDS, and TRW
Silver Sponsor: Northrop Grumman

If you are looking for perspectives and techniques for dealing with your current and future software challenges, ICSE 99 is the best upcoming place to find them. We encourage you to register early for reduced rates and ensured accommodations at the LAX Marriott. We hope to see you at the ICSE 99 in May.

Barry Boehm, General Chair
David Garlan, Program Co-Chair
Jeff Kramer, Program Co-Chair

About ACM
ACM, the Association for Computing Machinery, is the world’s oldest and largest educational and scientific computing society. With a worldwide membership of 80,000 IT practitioners and academics, ACM is the premier forum for all those who wish to keep abreast of the latest information, trends and developments in the IT industry. ACM offers its members an unprecedented number of publications, conferences, tutorials, and special interest groups. (http://www.acm.org).

About ACM SIGSOFT
ACM SIGSOFT focuses on issues relating to all aspects of software engineering, providing a forum for computing professionals from industry, government and academia to examine principles, practices, education, and new research results in software engineering. In addition to ICSE, SIGSOFT sponsors the Foundations of Software Engineering Conference and a variety of one-time and ongoing workshops that bring practitioners, researchers, and educators together to discuss and debate timely issues. SIGSOFT publishes a bimonthly newsletter, Software Engineering Notes, which includes articles submitted by members as well as the popular forum “Risks to the Public”, which describes software safety mishaps and concerns. (http://www.acm.org/sigsoft).

About IEEE CS
The IEEE Computer Society is the oldest and largest association of computer professionals in the world. It offers over 90,000 members a comprehensive program of publications, meetings, and technical and educational activities, fostering an active exchange of information, ideas, and innovation. The society is the world’s leading publisher of technical material in the computing field. No other professional or commercial organization comes close to matching the Computer Society in terms of the quality, quantity, or diversity of its publications. Headquartered in Washington, DC, the society serves its members from offices in Los Alamitos, CA; Tokyo, Japan; and Brussels, Belgium. The society is the largest technical society within the Institute of Electrical and Electronics Engineers, Inc. (http://www.computer.org)

About TCSE
The Technical Council on Software Engineering (TCSE) is the IEEE Computer Society’s coordinating body for innovative programs and services in software engineering. TCSE is at the forefront of information exchange and support for both practitioners and researchers throughout the software engineering field. (http://www.tcse.org)

Conference at a Glance
See http://sunset.usc.edu/r1/icse99 for the latest updates.

Sunday 16 May
8:30 AM - 5:00 PM ICSE Workshop (See page 6)

Monday 17 May
8:30 AM - 5:00 PM ICSE Tutorials (See pages 4-5)
8:30 AM - 5:00 PM ICSE Workshops (See pages 6-8)

Tuesday 18 May
8:30 AM - 5:00 PM ICSE Workshops (See pages 5-6)
8:30 AM - 5:00 PM ICSE Workshops (See pages 7-8)
3:00 PM - 7:00 PM Exhibits (See page 14)
5:00 PM - 7:00 PM Opening Reception (See page 17)

Wednesday 19 May
9:00 AM - 5:30 PM ICSE Technical Sessions (See pages 8-9)
10:00 AM - 4:00 PM Exhibits (See page 14)

Thursday 20 May
8:00 AM - 5:30 PM ICSE Technical Sessions (See pages 9 & 12)
10:00 AM - 4:00 PM Exhibits (See page 14)
6:00 PM - 9:00 PM Poolside Fiesta Reception (see page 17)

Friday 21 May
8:00 AM - 4:00 PM ICSE Technical Sessions (See pages 12-13)
4:15 PM - 7:45 PM SSR Professional Development Seminars (See page 13)

Saturday 22 May
8:00 AM - 5:00 PM SSR Technical Sessions (See page 13)
8:30 AM - 5:00 PM ICSE Workshop (See page 8)

Sunday 23 May
8:00 AM - 3:00 PM SSR Technical Sessions (See page 13)
Tutorial Program

Tutorials are an opportunity, for relatively modest cost, to learn from a recognized expert in a software area. The ICSE99 Tutorial Program offers a wide spectrum of up to date material to suit both new and experienced software professionals. The tutorials have been carefully selected to give a balance between introductory and specialized material and to address many of the most pressing issues in the real world of software engineering.

Object-orientation continues to progress, leading to concerns about distribution, interoperability, design patterns and component adaptation. All are covered by half or full day tutorials. Requirements remain a major problem area so techniques for analyzing and validating them are valuable, while management issues, such as risk management, reliability and project control will be of interest to practicing and aspiring project leaders. Other key tutorial topics covered include software architecture and software measurement and while all of the tutorials reflect the experience of their presenters there are also some that are based primarily on industrial experience with, for example, object-oriented software design or software reuse.

In summary, participants can fashion their own combination of tutorials from this wide selection as we believe that there should be something here to interest every software practitioner or researcher.

Monday 17 May 1999

TMF1 Distributed Objects
Wolfgang Emmerich, University College London, we@acm.org
Neil Roodyn, Cognitech Ltd., City Cloisters, Neil@cognitech.co.uk
Monday 17 May, 8:30 am - 5:00pm

The aim of this full-day tutorial is to motivate the need for and discuss the principles of object-oriented distribution middleware, such as OMG/CORBA, Microsoft/DCOM and Java/RMI. We will present common problems that occur when designing applications using distributed objects, such as non-synchronous communication, locating objects, administering the object life cycle and object transactions. We will then outline techniques for solving these problems and show how these techniques can be implemented with CORBA, DCOM and RMI. The tutorial is designed for an audience with intermediate experience level, who have basic knowledge of OO design and programming.

TMF2 Overview of Practical Software Measurement
Joyce Statz, TeraQuest Metrics, Inc., statz@teraquest.com
Monday 17 May, 8:30 am - 5:00pm

In this workshop students learn a method to select and apply software measures that directly support their project needs and address project-specific issues. The Practical Software Measurement (PSM) material was developed using measurement experiences of personnel from about 50 organizations, working with both large and small projects. The workshop covers the key concepts of PSM and gives students experience with PSM practices using a case study. Students base their work on a collection of common project issues and useful standard measures defined in the PSM Guide Book. Using the tailoring practices, they match appropriate measures to project issues. They specify the data to collect and describe the types of analyses to perform in order to answer particular project questions. They interpret graphs of results for the case study and describe their findings. Based on this experience and using the PSM Guide Book, they can develop a useful set of measures for their own specific project.

TMF3 Introduction to Personal Software Engineering Project Management Process
A. Winsor Brown, University of Southern California, awbrown@sunrise.usc.edu
Monday 17 May, 8:30 am - 5:00pm

Understanding and practice in a Personal Software Engineering Project Management Process (PPMP), and the lower levels of the Personal Software Process (PSP), are provided by this tutorial. It covers the full content and context of PPMP, a proven, practical way to expose software engineers to the software engineering project management issues of estimating, planning, and tracking in the PSP spirit. Using a combination of presentation, discussion and seven exercises to communicate the material, it provides the attendees with the basic tools and techniques to increase their personal productivity in managing their SE projects as well as writing and software development.

TMA1 Inquiry Driven Requirements Analysis
Colin Potts, College of Computing, Georgia Institute of Technology, potts@cc.gatech.edu
Monday 17 May, 8:30 am - 12:30pm

Requirements analysis is all about thinking and deciding. This tutorial introduces an incremental, question-driven refinement process for system and software requirements that manages the transitions from vague to precise, abstract to concrete, and idealized to robust requirements. Goal-driven and scenario-exploration techniques are given equal weight. An example of an evolving system is used throughout. The material is based on ScenIC, a method developed for evolving systems under DARPA/EDCS, but no specific modeling notations or tools will be introduced. Instead, the emphasis is on participants evaluating these principles and practices so that they can apply them in their own contexts.

TMA2 Defining Families - Commonality Analysis
Mark A. Ardis, Lucent Technologies, maa@lucent.com
David A. Cuka, Bell Laboratories, dculka@lucent.com
Monday 17 May, 8:30 am - 12:30pm

A recent trend in both the software engineering research and industrial communities has been to seek ways to systematically engineer software domains. One approach is to develop families of software and to invest in facilities for rapidly producing family members. This tutorial teaches the commonality analysis process, a systematic approach to analyzing families. The result of the analysis forms the basis for designing reusable assets that can be used to rapidly produce family members. Participants will learn the principles underlying the approach and will perform a practice commonality analysis guided by experienced users of the process.

TMP1 Verification and Validation of Requirements for Mission Critical Systems
Steve Easterbrook, Research Associate Professor, NASA IV&V Facility Fairmont, West Virginia
Monday 17 May, 1:30 pm - 5:30 pm

The aim of this tutorial is to introduce a number of practical techniques for analyzing requirements for embedded, mission critical systems, along with a general model for applying them as part of an independent verification and validation process. We will emphasize
the use of formal modeling techniques, but with a purely practical aim: we will demonstrate how to select and apply an appropriate analysis technique, irrespective of whether the project to which it is to be applied routinely uses any formal specification languages. The tutorial draws on our experiences with lightweight formal techniques applied to NASA programs, in which we have demonstrated that formal techniques offer a great deal of value as a modeling tool for analysis of mission critical software requirements, without incurring the expense of formally specifying these requirements. The tutorial will include several NASA case studies.

TTF2 Software Interoperability: Principles and Practice
Jack C. Wileden, Computer Science Department, University of Massachusetts, wileden@cs.umass.edu
Alan Kaplan, Department of Computer Science, Clemson University, kaplan@cs.clemson.edu
Monday 17 May, 1:30 pm - 5:30 pm

Software interoperability is fundamental to a number of contemporary software engineering topics, such as component-based software development, software reuse and distributed or network-based software. A variety of (often partial) approaches to interoperability exist, but what they do, how they compare, and exactly what problems they are solving is sometimes unclear. This tutorial is intended to provide a solid understanding of software interoperability problems and various proposed approaches to solving those problems. Participants should expect to gain a generally applicable foundation for assessing both problems and approaches, a detailed understanding of several specific approaches, and an ability to understand and critically evaluate new and different interoperability problems and approaches in the future.

Tuesday 18 May 1999

TTF1 Managing By The Numbers: Quantitative Measurement and Control of Software Projects
Richard E. (Dick) Fairley, Oregon Graduate Institute, dfairley@cse.ogi.edu
Tuesday 18 May, 8:30 am - 5:00 pm

Software is an intangible entity produced by the intellectual effort of software engineering teams. It is therefore important that those involved have effective mechanisms for measuring project status in a reliable and timely manner and that corrective action be taken before deviations become disasters. Project factors that must be measured and controlled include schedule milestones, cost of resources, product features, quality attributes, risk factors, and process effectiveness. This one-day course presents an integrated framework of methods, tools, and techniques for measuring and controlling project factors. Elements of the framework include work breakdown structures, activity networks, work packages, incremental development, binary tracking, earned value reporting, technical performance measurement, and closed-loop problem resolution.

TTF2 Risk Management in Software Development: A Technology Overview and the Riskit Method
Jyrki Kontio, Nokia Telecommunications, jyrki.kontio@ntc.nokia.com
Tuesday 18 May, 8:30 am - 5:00 pm

Explicit and systematic management of risks in software projects has become a more common practice amongst leading software organizations. However, often the methods used have severe theoretical and practical limitations that may lead to biased or inappropriate control of risks. The first part of this tutorial presents a critical overview of the current risk management technology, discussing the pros and cons of main approaches, as well as guidelines for their use. The second part of the tutorial presents the Riskit method with concrete examples and exercises. Riskit is a risk management method that has been developed to provide a theoretically sound, yet practical risk management approach. The method has been used and evaluated in several industrial projects in Europe and in the U.S.

TTF3 Failure and Success Factors in Reuse Programs: A Synthesis of Industrial Experiences
Michel Ezran, Valtech, France, me@valtech.fr
Maurizio Morisio, Politecnico di Torino, Italy, morisio@polito.it
Colin Tully, European Software Process Improvement Foundation, colint@espi.co.uk
Tuesday 18 May, 8:30 am - 5:00 pm

Software reuse has long been recognized as having very high potential impact in building better software, cheaper and sooner. This full-day tutorial presents the essential concepts of systematic reuse and how to introduce it effectively. Main topics include: overview; reusable assets; repository; processes; management; metrics; technology. Running throughout are examples and lessons learned (success and failure factors) from industrial case histories. Delegates will receive free copies of "Practical software reuse: the essential guide", authored by the presenters of the tutorial. Participants should have a reasonable background in software engineering and process; no prior knowledge of software reuse is required.

TTF4 Round-Trip Engineering with Design Patterns, UML, Java and C++ [Tuesday all day]
Wilhelm Schaefer and Albert Zuendorf, Dept. of CS, University of Paderborn
wilhelm@uni-paderborn.de and zuendorf@uni-paderborn.de
Tuesday 18 May, 8:30 am - 5:00 pm

The tutorial presents the state-of-the-art in methodologies and tools for round-trip-engineering of object-oriented software systems. Round-trip-engineering allows designing an application, (semi) automatically deriving its implementation, manually adapting and completing this implementation, automatically updating the design documents, allowing design changes, updating the implementation without loss of manually created code, etc. Design documents cover not only (UML) class diagrams but also behavior diagrams like message sequence charts, collaboration diagrams, state charts, and activity diagrams.

In addition, round-trip engineering with design patterns is addressed. This covers design by combining design patterns, implementation of design patterns (including code generation), and the recognition of standard design patterns in code fragments.

TTA1 Adaptable Components
Grady H. Campbell, Jr., Prosperity Heights Software, gradycampbell@acm.org
Tuesday 18 May, 8:30 am - 12:30 pm

Traditional approaches to reuse are characterized by uncertainty, complexity, and excessive effort: deciding whether a component with appropriate capability exists, choosing between several components apparently meant for the same purpose, and safely modifying a chosen component to fit a particular need properly. Reuse routinely requires tailoring to support particular needs but the most effective time to consider and accommodate alternate uses is during component development rather than at the time of reuse. As part of a systematic methodology of Domain-specific Engineering, Adaptable Components are the means for developers to instrument reusable components so that alternate versions can be derived mechanically from a single source.
Software architecture is increasingly recognized as an important level of design for software systems. Issues include overall organization of a software system, assignment of function to computational elements, protocols of interaction, and emergent system properties such as end-to-end latencies and throughputs. Until recently, design and analysis of software architecture has been largely informal and ad hoc, relying on box-and-line diagrams and conventions about the meanings of those documents. Recently, a number of architectural modeling notations and tools have been proposed. Several of these have reached a level of maturity at which they can provide tangible benefits to practicing software architects. This tutorial provides an overview of emerging approaches to architectural modeling and an in-depth treatment of selected architectural specification, analysis, and design techniques.

Subject-oriented programming (SOP) is a practical approach to object-oriented (OO) programming-in-the-large. SOP addresses some well-known limitations of OO development without forcing developers to adopt new languages or abandon the OO paradigm. These limitations include impediments to non-invasive system evolution and extension, large-scale reuse and integration, system decomposition, and multi-team and decentralized development. The tutorial shows participants how to use the SOP approach and describes tools to facilitate its use in practice. Participants will learn how to identify and address, using SOP, some difficult and pervasive problems in their own OO development activities. They will also learn how to leverage SOP to facilitate the use of design patterns, frameworks, and reusable components.

Software reliability modeling is attracting increasing attention, yet most software engineers have little familiarity with these models or their basis in traditional reliability engineering. This half-day tutorial is designed to provide software engineers with a broad overview of the concepts and statistical models used in traditional reliability engineering, and to demonstrate how those models have been applied to software reliability. Participants will learn both the basic techniques for software reliability testing as well as the use of various statistical methods for effectively analyzing the data gathered by software reliability tests.

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The problems that people are confronted with in such projects involve many different aspects of software engineering as well as technical issues related to the Internet.


WM3 Testing Distributed Component-Based Systems
Andreas Ulrich, Siemens AG, Munich, Germany,
andreas.ulrich@mchp.siemens.de
Monday 17 May, 8:30 am- 5:00 pm

This workshop deals with new advances in test methods and test technologies for the emerging class of distributed component-based systems that are built on basis of middleware software like COM, CORBA, or Java RMI, including systems comprising Commercial-Of-The-Shelf components. The workshop will discuss what efforts in software technology and research are required to cope with testing such systems and will provide a forum for the exchange of experiences and first results on this topic.

http://www.siemens.com/ICSE99workshop/

WM4 First Workshop on Economics-Driven Software Engineering Research (EDSER-1)
Kevin Sullivan, Department of Computer Science, University of Virginia, USA, sullivan@virginia.edu
Monday 17 May, 8:30 am- 5:00 pm

There is a disconnect between software engineering practice and research. One likely reason for this problem is that most practitioners must develop software under a set of demanding economic constraints, while relatively little software engineering research accounts for such constraints in an explicit way. There are several goals to this workshop: one, to raise the visibility of this issue; two, to find ways to help to close the gap by accounting more explicitly for economic constraints in software engineering research, but without having research become focused on short-term issues; and three, to lay out an agenda for further work in the area.

http://www.cs.virginia.edu/~sullivan/EDSER1

WM5 Software Transformation Systems
Marcelo Sant’Anna, Software Engineering Lab, PUC-Rio, Brazil, santanna@ies.inf.puc-rio.br
Monday 17 May, 8:30 am- 5:00 pm

Automated support for the structural and semantic manipulation of software leads to higher levels of quality and productivity in software. To that end, researchers have been trying to merge symbolic manipulation techniques with compiler technologies to produce software transformation systems, or more concisely, transformation systems. Transformation systems are language-oriented environments allowing the specification of problems in domain-specific terms, or low or high level specification and the definition of sets of manipulation operators (i.e., transformations) that can be applied to these components. In this workshop, we want to bring together the most active researchers in the area of transformation systems so that a substantive evaluation and comparison of software transformation techniques can be made.

http://www.les.inf.puc-rio.br/sts99

WM1 Software Engineering for Parallel and Distributed Systems
Peter Croll, University of Sheffield, UK, croll@computer.org
Monday-Tuesday 17-18 May, 8:30 am- 5:00 pm

Many software applications require the use of explicit concurrent programming techniques in order to meet their specification. Concurrency and distribution are needed to exploit the processing power of multiprocessor systems in order to achieve high performance, to provide fault-tolerance and reliability in safety-critical and real-time systems, and to deal with physically distributed computing resources. Some application areas include distributed information systems, client/server systems, multimedia systems, CSCW, high-performance computing, simulation, real-time and process control systems, embedded systems and manufacturing systems. Managing parallelism and distribution for applications in the above areas is a complex activity, demanding for adequate engineering methodologies and proper support tools.

WM2 Engineering Distributed Objects
Wolfgang Emmerich, Dept. of Computer Science, University College London, UK., we@acm.org
Monday-Tuesday 17-18 May, 8:30 am- 5:00 pm

Standards for object-oriented middleware, such as CORBA, Java RMI and DCOM are now used in industrial practice, though their impact on software architectures is only poorly understood. This workshop aims to identify the differences between engineering local and distributed objects and to find principles, methods and techniques to assist in the systematic engineering of distributed object-based software architectures. Industrial case studies will be selected by the program committee and be distributed to all workshop attendees in advance. Case studies will be presented during a joint session with PDSE’99. http://www.cs.ucl.ac.uk/EDO99

WM3 Constructing Software Engineering Tools (CoSET’99)
Jonathan Gray, School of Computer and Information Science, University of South Australia, gray@cis.unisa.edu.au
Monday-Tuesday 17-18 May, 8:30 am- 5:00 pm

The provision of automated software engineering tools to support a software development process can play an important role in the promotion and adoption of the process and its associated method(s), both within a particular organization and within the software engineering community generally.

The development of these tools is itself a significant software engineering task. The symposium is based around the participants’ experience reports of constructing their SEE, IPSE, CASE, CAME, and meta-CASE tools. The purpose of the symposium is to bring together an international audience of researchers and practitioners with similar interests and experience, to exchange ideas, and to learn about different technologies and techniques for software engineering tool development.


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Preparing for the Software Century

WMT4  CBSE - Component-Based Software Engineering
Alan Brown, Sterling Software, USA, alan_brown@sterling.com
Monday-Tuesday 17-18 May, 8:30 am- 5:00 pm

The second workshop on CBSE will build on the results of the Kyoto workshop to develop a foundation for the practice of CBSE. This foundation will take the form of an engineering handbook for CBSE. The goal of this workshop will be to quickly converge on a detailed outline of this engineering handbook, and to then flesh out selected portions of this handbook, as a basis for immediate community critique. The workshop organizers see this second workshop as a single (but formative) event in a community-wide process of developing an engineering handbook for CBSE. We expect work on the handbook to precede the formal workshop event in Los Angeles.


Technical Sessions

WEDNESDAY 19 MAY 1999

Session 1: 9:00 - 10:30 am
Keynote Address:
Dr. William A. Wulf, President, U.S. National Academy of Engineering, “Are We ‘Inventing the Future’ or ‘Fumbling’ It?”

Session 2: 11:00 a.m. - 12:30 p.m.
Architectures: Composition Techniques
Using Off-The-Shelf Middleware to Implement Connectors in Distributed Software Architectures
Eric M. Dashofy, Nenad Medvidovic, Richard N. Taylor (University of California, Irvine)

Exploiting ADLs to Specify Architectural Styles Induced by Middleware Infrastructures
Elisabetta Di Nitto, David Rosenblum (University of California, Irvine)

A Flexible Approach to Alliances of Complex Applications
David J. Kasik, Conrad E. Kimball, Jimmie L. Felt, Kenneth B. Frazier (Boeing)

Metrics: Cost Estimation
Software Architecture Classification for Estimating the Cost of COTS integration
Danii Yakimovich (University of Maryland), James M. Bieman (Colorado State University), Victor R. Basili (University of Maryland)

Explaining the Cost of European Space and Military Projects
Lionel C. Briand, Khaled El Emam, Isabella Wieczorek (Fraunhofer Institute)

An Assessment and Comparison of Common Software Cost Estimation Modeling Techniques
Lionel C. Briand, Khaled El Emam, Katrina D. Maxwell (DATAMAX), Dagmar Surmann, Isabella Wieczorek (Fraunhofer Institute)

Intellectual Property Issues for Software
Invited Industry Presentations: Rapid Application Development
Speaker - Arnold Pittler, Motorola
Speaker - Charles Leinbach, C-Bridge
Discussant - Joyce Fitzpatrick, EDS

Session 3: 2:00- 3:30 p.m.
Architectures: Development Techniques
A Systematic Approach to Derive the Scope of Software Product Lines
Jean-Marc DeBaud, Klaus Schmid (IESE)

A Language and Environment for Architecture-Based Software Development and Evolution
Nenad Medvidovic, David S. Rosenblum, Richard N. Taylor (University of California, Irvine)

Note: This workshop has a different fee structure. Please see the registration form for details
Experience with Performing Architecture Tradeoff Analysis  
Rick Kazman, Mario Barbacci, Mark Klein, S. Jeromy Carriere  
(Carnegie Mellon University)

Metrics: Tools & Design  
Using Version Control Data to Evaluate the Impact of Software Tools  
David Atkins, Thomas Ball, Todd Graves, Audris Mockus (Bell Labs, Lucent)

Polymorphism Measures for Early Risk Prediction  
Saïda Benlarbi (Cistel Technology), Walcelio L. Melo (Oracle Brazil)

Investigating Quality Factors in Object-Oriented Designs: an Industrial Case Study  
Lionel Briand, Juergen Wuest (Fraunhofer Institute), Stefan Ikonomovski, Hakim Lounis (Centre de Recherche Informatique de Montreal)

Formal Research Demonstrations  
Two 40-minute demonstrations of novel software engineering research results

Invited Industry Presentations: Software Engineering and Money  
Speaker - Jim Horning, Intertrust  
Speaker - Richard Selby, Pacific Investment Management  
Discussant - Tim Pauling, Pricewaterhouse Coopers

Session 4: 4:00- 5:30 p.m.  
Widescale Computing  
Exploiting Smalltalk Modules In A Customizable Programming Environment  
Mark Woodman, Rob Griffiths, Malcolm Macgregor, Simon Holland, Hugh Robinson (The Open University)

Software Engineering Research Issues for Ubiquitous Computing  
Gregory D. Abowd (Georgia Tech)

Splitting the Organization and Integrating the Code: Conway’s Law Revisited  
James D. Herbsleb, Rebecca E. Grinter (Bell Laboratories, Lucent)

Evolution  
Automatic Method Refactoring by Using Weighted Dependence Graphs  
Katsuhiro Maruyama, Ken-ichi Shima (NTT Software)

Highly Reliable Upgrading of Components  
Jonathan E. Cook, Jeffrey A. Dage (New Mexico State)

Dynamically Discovering Likely Program Invariants to Support Program Evolution  
Michael Ernst, Jake Cockrell (University of Washington), William G. Griswold (University of California at San Diego), David Notkin (University of Washington)

Formal Research Demonstrations  
Two 40-minute demonstrations of novel software engineering research results

Invited Industry Presentations: COTS Integration  
Speaker - Dorothy McKinney, Lockheed Martin  
Speaker - Marie Silverthom, Texas Instruments  
Discussant - Tricia Oberndorf, CMU-SEI

THURSDAY 20 MAY 1999

Session 5: 8:00 - 10:30 am  
8:00 - 9:15 am: Keynote Address:  
Dr. Alan Kay, Vice President and Disney Fellow, Walt Disney Imagineering  
“The Computer Revolution Hasn’t Happened Yet”

9:15 - 9:30 am: break

9:30 - 10:30 am: Awards Presentations and Best Paper from ICSE-11

Session 6: 11:00 a.m. - 12:30 p.m.  
Program Composition  
Avoiding Packaging Mismatch with Flexible Packaging  
Robert DeLine (Carnegie Mellon University)

N Degrees of Separation: Multi-Dimentional Separation of Concerns  
Peri L. Tarr, Harold L. Ossher, William H. Harrison (IBM), Stanley M. Sutton, Jr (University of Colorado)

An Initial Assessment of Aspect-oriented Programming  
Elisa L.A. Baniassad, Robert J. Walker, Gail C. Murphy (University of British Columbia)

Program Analysis  
Call-Mark Slicing: An Efficient and Economical Way of Reducing Slices  
Katsuro Inoue (Osaka University), Minoru Jihira (NAIST), Akira Nishimatsu, Shinji Kusumoto (Osaka University)

System-Dependence-Graph-Based Slicing of Programs with Arbitrary Interprocedural Control-Flow  
Saurabh Sinha, Mary Jean Harrold (Ohio State University), Gregg Rothermel (Oregon State University)

An Incremental Flow-and Context-sensitive Pointer Aliasing Analysis  
Jyh-shiarn Yur, Barbara G. Ryder (Rutgers), William A. Landi (Siemens)

Formal Research Demonstrations  
Two 40-minute demonstrations of novel software engineering research results

Invited Industry Presentations: Software/System Definition and Architecting  
Speaker - Eberhardt Rechtin, President Emeritus, Aerospace  
Speaker - Peter Hantos, Xerox  
Discussant - Anthony Finkelstein, University College, London
## Summary Conference Schedule

<table>
<thead>
<tr>
<th>SUNDAY 16-MAY</th>
<th>MONDAY 17-MAY</th>
<th>TUESDAY 18-MAY</th>
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<tr>
<td><strong>8AM</strong></td>
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<tr>
<td>Full-day Workshop</td>
<td>Full-day Workshops:</td>
<td>Full-day Workshops:</td>
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<tr>
<td>WSM1 Web Engineering</td>
<td>WSM1 Web Engineering (continued)</td>
<td>WMT1 Software Engineering for Parallel and Distributed Systems</td>
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<tr>
<td><strong>9AM</strong></td>
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<tr>
<td>WSM1 Web Engineering</td>
<td>TMF1 Distributed Objects</td>
<td>TMA1 Inquiry Driven Requirements Analysis</td>
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<td><strong>10AM</strong></td>
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<tr>
<td>WM1 Principles of Software Change and Evolution (SC99)</td>
<td>TMF2 Overview of Practical Software Measurement</td>
<td>TMA2 Defining Families-Commonality Analysis</td>
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<td><strong>11AM</strong></td>
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<tr>
<td>WM2 Software Engineering over the Internet</td>
<td>TMF3 Introduction to Personal Software Engineering Project Management Process</td>
<td>TMA3 Software Engineering Project Management Process</td>
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<td>WM3 Testing Distributed Component-based Systems</td>
<td>Tutorial &amp; Workshop Luccheon</td>
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<td>WM4 First Workshop on Economics-Driven Software Engineering Research (EDE99)</td>
<td>Afternoon Tutorials:</td>
<td>Afternoon Tutorials:</td>
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<td><strong>2PM</strong></td>
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<td>WM5 Software Transformation Systems</td>
<td>TTP1 Managing By The Numbers: Quantitative Measurement and Control of Software Projects</td>
<td>TTA1 Adaptable Components</td>
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<tr>
<td>WMT1 Software Engineering for Parallel and Distributed Systems</td>
<td>TTP2 Risk Management in Software Development: A Technology Overview and the Riskit Method</td>
<td>TTA2 Using Subject-Oriented Programming to Overcome Common Problems in Object-Oriented Software Development</td>
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<tr>
<td>WMT2 Engineering Distributed Objects</td>
<td>TTP3 Failure and Success Factors in Reuse Programs: A Synthesis of Industrial Experiences</td>
<td>TTP4 Round-Trip Engineering with Design Patterns, UML, Java and C++</td>
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<td><strong>5PM</strong></td>
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<tr>
<td>WMT4 CBSE - Component-Based Software Engineering (Continued from Monday)</td>
<td>WT1 Recognition of Dr. Harlan Mills’ Legacy</td>
<td>TTP5 Empirical Studies of Software Reliability Modeling</td>
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**ICSE 99 Exhibit**
3:00 - 7:00 pm

**Welcome Reception**
5:00 - 7:00 pm
<table>
<thead>
<tr>
<th>Time</th>
<th>WEDNESDAY 19-MAY</th>
<th>THURSDAY 20-MAY</th>
<th>FRIDAY 21-MAY</th>
<th>SATURDAY 22-MAY</th>
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<tr>
<td>8AM</td>
<td>Technical Program: Session 1</td>
<td>Technical Program: Session 5</td>
<td>Technical Program: Session 9</td>
<td>Full-day Workshop</td>
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<td></td>
<td>Keynote Address: Dr. William A. Wulf President U.S. National Academy of Engineering</td>
<td>8:00 am - 9:15 am Keynote Address: Dr. Alan Kay VP and Disney Fellow Walt Disney Imagineering</td>
<td>Agents, Mobility &amp; Interoperability Reverse Engineering Case Studies IIP: Software Process Maturity: Is Level Five Enough?</td>
<td>Symposium on Software Reusability SSR'99 This program continues on Sunday 23 May from 8:00 am to 3:00 pm as well.</td>
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<tr>
<td>1PM</td>
<td>Poolside Southwestern Fiesta Reception 6:00 to 9:00 pm</td>
<td>Technical Program: Session 10 Inspections, Debugging, &amp; Prototyping Testing Model Checking Talk and Trustworthy Systems Panel Case Studies</td>
<td>SSR 99 Reception 6 - 7 pm</td>
<td>Technical Program: Session 12 Panel: Future Computer Systems and Software Engineering Closing: ICSE Summary and Prospects</td>
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IIP: = Invited Industry Presentations
Prepare for the Software Century

Technical Sessions (continued)

Thursday 20 May 1999

Session 7: 2:00 - 3:30 p.m.

Reuse & Browsing
Reusing Single System Requirements from Application Family Requirements
Barry Keepence, Mike Mannion (Napier University), Hermann Kaindl (Siemens AG), Joe Wheaon (European Space Operations Centre)
Assessing Software Libraries by Browsing Similar Classes, Functions, and Relationships
Amir Michail, David Notkin (University of Washington)
Chime: Customizable Hyperlink Insertion & Maintenance Engine for Software Engineering Environments
P. Devanbu (University of California at Davis), Y.F. Chen, E. Gansner (AT&T Labs), H. Muller, J. Martin (University of Victoria)

Specification & Verification
A Specification Matching Based Approach to Reverse Engineering
Gerald C. Gannod (Arizona State University), Betty H.C. Cheng (Michigan State University)
Data Flow Analysis for Checking Properties of Concurrent Java Programs
Gleb Naumovich, George S. Avrunin, Lori A. Clarke (University of Massachusetts at Amherst)
Patterns in Property Specifications for Finite-state Verification
Matthew B. Dwyer (Kansas State University), George S. Avrunin (University of Massachusetts at Amherst), James C. Corbett (University of Hawaii)

Formal Research Demonstrations
Two 40-minute demonstrations of novel software engineering research results.

Invited Industry Presentations: Software and System Safety
Speaker - David Mackenzie, Microsafe Systems
Speaker - Jack Janelle, Honeywell Air Transport Systems
Discussant - Art Pyster, FAA

Session 8: 4:00 - 5:30 p.m.

Distributed Systems
Dynamic Layout of Distributed Applications in FarGo
Ophir Holder, Israel Ben-Shaul, Hovav Gazit (Technion Institute)
A Cooperative Approach to Support Software Deployment Using the Software Dock
Richard S. Hall, Dennis Heimbigner, Alexander L. Wolf (University of Colorado)
Information Survivability Control Systems
Kevin Sullivan, John Knight, Xing Du, Steve Geist (University of Virginia)

Model Checking
Using the ASTRAL Model Checker to Analyze Mobile IP
Zhe Dang, Richard A. Kemmerer (University of California at Santa Barbara)
Decoupling Synchronization from Logic for Efficient Symbolic Model Checking of Statecharts
William Chan, Richard J. Anderson, Paul Beame, David Notkin (University of Washington), David H. Jones, William Warner (Boeing)
Analysis of a Scheduler for a CAD Framework
David S. Keyes, (Picker International, Inc), Laura K. Dillon, Moon Jung Chung (Michigan State University)

Formal Research Demonstrations
Two 40-minute demonstrations of novel software engineering research results.

Invited Industry Presentations: Software Reuse and Product Line Management
Speaker - Ted Biggerstaff, Microsoft
Speaker - Martin Griss, Hewlett Packard
Discussant - Jim Neighbors, Bayfront Technologies

Friday 21 May 1999

Session 9, 8:00 - 9:30 am

Agents, Mobility & Interoperability
Agent System Development Method Based on Agent Patterns
Yasuuki Tahara, Yutaka Irie, Akihiko Ohsuga, Shinichi Honiden (Toshiba Corporation)
Lime: Linda Meets Mobility
Gian Pietro Picco, Amy L. Murphy, Gruia-Catalin Roman (Washington University)
Adding more "DL" to "IDL": Towards More Knowledgeable Component Inter-operability
Alex Borgida (Rutgers University), Prem Devanbu (University of California at Davis)

Reverse Engineering
Pattern-Based Reverse-Engineering of Design Components
Rudolf K. Keller, Reinhard Schauer, Sebastien Robitaille, Patrick Page (University of Montreal)
Lightweight Extraction of Object Models from Bytecode
Daniel Jackson, Allison Waingold (MIT)
Identifying Objects Using Cluster and Concept Analysis
Arie van Deursen, Tobias Kuipers (CWI)

Case Studies
Haemo Dialysis Software Architecture Design Experiences
Perolof Bengtsson, Jan Bosch (University of Karlkrona Ronneby)
Architectural Framework Modeling in Telecommunication Domain
Giulio Fregonese, Alessandro Zorer, Giovanni Cortese (Sodalia SpA)
Baseball Seasons and Dog Years
David R. Barstow (TeraQuest Metrics Inc. and Instant Sports Inc.)

Invited Industry Presentations: Software Process Maturity: Is Level Five Enough?
Speaker - Roger Fordham, Motorola
Speaker - Tom De Marco, Atlantic Systems Guild
Discussant - Rick Hefner, TRW
Session 10, 10:00 - 12 noon

Inspections, Debugging, & Prototyping

Prototyping Real-Time Vision Systems: An Experiment in DSL Design
Alastair Reid, John Peterson, Greg Hager, Paul Hudak (Yale University)

Generalizing Perspective-Based Inspection to handle Object-Oriented Development Artifacts
Oliver Laitenberger, Colin Atkinson (Fraunhofer Institute)

Coca: A Debugger for C Based on Fine Grained Control Flow & Data Events
Mireille Ducasse (IRISA/INSA)

Testing

Using a Goal-driven Approach to Generate Test Cases for GUIs
Atif M. Memon, Martha E. Pollack, Mary Lou Soffa (University of Pittsburgh)

Lutess: a Specification-driven Testing Environment for Synchronous Software
L. du Bousquet, F. Oubaddessalam, J.-L. Richier, N. Zuanon (LSR-IMAG)

Residual Test Coverage Monitoring
Christina Pavlopoulou (Purdue University),
Michal Young (University of Oregon)

Model-Based Testing in Practice
S. Dalal, A. Jain, C. Lott, G. Patton, N. Karunanith, J.M. Leaton, B.M. Horowitz (Bellcore)

Case Studies

Product-Line Architectures in Industry: A Case Study
Jan Bosch (University of Karlskrona Ronneby)

Linux as a Case Study: Its Extracted Software Architecture
Ivan T. Bowman, Richard C. Holt (University of Waterloo),
Neil V. Brewster (University of Toronto)

A Software Architecture for Integrating Multiple Real-time Data Feeds
Neil Roodyn (Cognitech Ltd.)

Supporting Industrial Hyperwebs: Lessons in Scalability
Kenneth Anderson (University of Colorado, Boulder)

Model Checking / Survivable Systems

10:10:45 am: State of the Art Report: Software Model Checking
Gerard J. Holzmann

10:45 am- Noon: Panel: Survivability -- Issues in Software Engineering for Survivable Systems
Nancy Mead, SEI
John Knight, University of Virginia
Rick Linger, SEI
Robyn Lutz, JPL and Iowa State University
Jeffrey Voas, Reliable Software Technologies

Session 11, 1:00 - 2:15 pm

Keynote Address:
Dr. Butler Lampson, Architect, Microsoft Corporation,
"Computer Systems Research: Past and Future"

Session 12, 2:30 - 4:00 pm

2:30 - 3:45 pm Panel—Future Computer Systems and Software Engineering
Dr. Stephen Cross, Director, CMU Software Engineering Institute
Dr. Anita Jones, University Professor, University of Virginia
Dr. Butler Lampson, Architect, Microsoft Corporation
Dr. David Parnas, Professor, McMaster University, Canada
Walker Royce, Vice President, Process Technology, Rational

3:45 - 4:00 pm ICSE Summary and Prospects

ICSE 1999 Summary—Barry Boehm, David Garlan, Jeff Kramer
ICSE 2000 Prospects—Carlo Ghezzi, Kevin Ryan
ICSE 2001 Prospects—Hausi Muller, Mary Jean Harrold

Concurrent Symposium on Software Reusability (SSR’99)
Bridging The Gap Between Research And Practice
21-23 May 1999

General Chair:
Mehdi Jazayeri, Information Systems Institute,
Technical University of Vienna, Austria

Program Co-Chairs:
Ali Mili, Institute for Software Research,
Fairmont, WV 26554, USA, amili@cs.wvu.edu
R. Mittermeir, Institut für Informatik, Universität Klagenfurt,
Austria, mittermeir@ifi.uni-klu.ac.at

The Symposium on Software Reusability is a bi-annual forum, held in conjunction with the International Conference on Software Engineering, for the exchange of ideas, research and development results, and experiences in all aspects of software reuse. The theme of this symposium is “Bridging the Gap between Research and Practice” and its emphasis is to discuss how the current state of the art in the field of software reuse can be put to bear to bring about industrial standards in the practice of this discipline.

SSR’99 technical program consists of paper presentations, panels, and professional development sessions. The most recent advances in Reuse R&D will be presented in this program. The panels provide a chance for lively interaction with experts in the field. Co-location with ICSE and its workshops provides a unique opportunity to meet new colleagues, exchange ideas, and explore the vast opportunities that lie ahead.

SSR’99 Professional Development Seminars and SSR’99 Conference require separate sign up on the registration form. See web sites below for descriptions.

For more information visit SSR’99 web page or its European mirror at:
http://csalpha.unomaha.edu/~ssr99 and
http://ssr99.ifi.uni-klu.ac.at/ssr99/
Special Attractions

Invited Industry Presentations
Wednesday-Friday, 19-21 May

ICSE99 also features a new forum for leading industry practitioners to present and discuss leading-edge, practical techniques addressing critical issues in industrial software technology. These 90 minute sessions feature 35 minute practitioner talks, a 10 minute discussant summary, and 10 minutes for audience questions.

- Rapid Application Development
- Software Engineering and Money
- COTS Integration
- Software/System Definitions and Architecting
- Software and Systems Safety
- Software Reuse and Product Line Management
- Software Process Maturity: Is Level Five Enough?

Case Studies
Friday 20 May

This year features a new category of papers: case studies in software engineering. The case studies track forms an important part of the technical program with case studies appearing alongside, and selected in a manner similar to, standard technical papers. This year’s focus is on software architecture.

The selected case studies describe the architecture of a system accompanied by a rationale for the key design decisions. They are organized in such a way that the design can be used by other practitioners. We have selected case studies exhibiting significant examples of software architecture which can be used for study and insight.

Doctoral Workshop
Tuesday 18 May

The Doctoral Workshop is a forum for graduate students to present and discuss their dissertation research objectives, approaches, and preliminary results. The one day workshop aims to broaden the perspectives of selected new entrants to the software engineering community, and is targeted to students who are about one year from completion at the time of the workshop. Students receive guidance and comments in all aspects of their research from established researchers and the other attendees. Since we expect participants from all over the world, we have invited research from several academic cultures to explain their doctoral systems and provide informed guidance to the attendees.

The workshop is intended for students who have a specific research proposal and some preliminary results, but with sufficient time prior to thesis completion to benefit from the workshop experience. Attendance is by prior application and invitation.

For more information, contact: William Griswold, wgg@cs.ucsd.edu.

Formal Research Demonstrations
Wednesday-Thursday, 19-20 May

Formal research demonstrations enable conference participants to view research systems in action and to discuss the systems with the people who created them. Research demonstrations are intended to show early implementations of novel software engineering concepts that can be communicated effectively in front of a large audience using projection technology. In addition to the formal demonstrations, booths will be provided in the demonstration room to allow informal demonstrations throughout the conference. We consider any system that is at least six months away from appearing in a commercial product as a "research system".

Contact: Gail Kaiser, icse@cs.columbia.edu, for more information.

Exhibits
Tuesday 18 May, 3-7 p.m. Wednesday and Thursday 19-20 May, 10 a.m. to 4 p.m.

ICSE99 includes a full-fledged exhibit hall with exhibits ranging from the traditional book publishers supplying software engineering and computer science texts to leading companies offering software engineering capabilities and tools, education and training, and consulting services.

Exhibits open Tuesday afternoon through Thursday afternoon, May 18 – 20. To stimulate interaction between exhibitors and attendees, refreshments for breaks and lunch options are co-located with the exhibits.

For information on reserving exhibit space, contact ICSE 99 Exhibits Manager at R. E. Abraham & Associates, 919-419-8242, brianabraham@mindspring.com.

Posters and Informal Research Demonstrations
Wednesday-Thursday, 19-20 May, In Exhibit Hall during Exhibit Hours

Posters and Informal Research Demonstrations provide the opportunity to exhibit late-breaking results and to discuss these results with conference participants.

All types of work in software engineering may be presented using posters. Display space is provided in the Poster and informal demonstration room for the selected poster presenters.

Informal Research Demonstrations are intended for selected work that is very new, in a prototype stage, or otherwise not as fully developed as a formal research demonstration. Informal research demonstrations may also be used by selected presenters who feel their work can be more effectively presented to a small audience. Booths are set aside to allow ongoing demonstrations throughout the conference. Again, we consider any system which is at least six months away from appearing in a commercial product to be a "research system".

Contact: David Redmiles, redmiles@ics.uci.edu, for more information.
ADVANCE CALL FOR PARTICIPATION

"THE NEW MILLENNIUM": The focus of ICSE 2000 is on defining the research agenda for the new millennium. Research inevitably concentrates on providing new, advanced functions in a timely fashion. As this new technology is implemented, however, there is a growing need for its software components to be usable, dependable, adaptable and affordable. We must seek to facilitate the transition of technology from research into practical applications, while tightening up the feedback loop from practical experience into research. We also need to ensure continuous professional development for software engineers.

ICSE 2000 marks the starting point of a response to these challenges. In its aim to be the foundational conference on software engineering for the next millennium, ICSE 2000 will bring together researchers and professionals from across the globe in a diversity of forums. These include the main conference, tutorials and workshops. The main conference will feature refereed technical papers, invited industry presentations, panels and leading keynote speakers.

Submission Deadlines

Workshop proposals 1 July 1999
Tutorials 11 November 1999
Technical papers 11 November 1999
Panel proposals 11 November 1999
Case studies & technology transfer experiences 11 November 1999
Research demos and posters 25 February 2000
Doctoral symposium 25 February 2000
Teaching demos 25 February 2000

ALL DATES ARE FIRM

Event Dates

Workshops: 5, 6, 10 june 2000
Tutorials: 5, 6 june 2000
Doctoral symposium: 6 june 2000
Main program: 7, 8, 9 june 2000
Collocated events: 10, 11 june 2000

For further information

Please view the ICSE 2000 organisation web site or contact Carlo Ghezzi, Politecnico di Milano, Italy, ghezzi@elet.polimi.it or Harriet Cotter, University of Limerick, Ireland, harriet.cotter@ul.ie

General Chair
Carlo Ghezzi, Politecnico di Milano, Italy
ghezzi@elet.polimi.it

Program Chairs
Mehdi Jazayeri, Technische Universität Wien, Austria
jazayeri@infosys.tuwien.ac.at
Alexander Wolf, University of Colorado, USA
aw@cs.colorado.edu

Conference Organization Chair
Kevin Ryan, University of Limerick, Ireland
kevin.ryan@ul.ie

Invited Speakers
Grady Booch: has won worldwide renown for his pioneering work on object-oriented methods and is one of the creators of UML.

Manuel Castells: is professor of sociology and planning at the University of California, Berkeley, and author of the acclaimed trilogy on "Information Age: Economy, Society & Culture".

Chris Horn: founder and CEO of Iona Technologies plc, the world leader in CORBA compliant middleware.

Axel van Lamsweerde: is professor of computer science at UCL, Belgium, editor-in-chief of TOSEM, and a leading researcher in software engineering.

University of Limerick, Ireland.
May is a glorious time in Los Angeles. The area’s beaches, mountains, islands, theme parks, museums, theaters and restaurants are at their most enjoyable in May, and not yet crowded by summer tourism.

Known as the “Entertainment Capital” of the world, the greater Los Angeles area’s attractions include the original Disneyland, and exciting Universal Studios tour, historic Knott's Berry Farm, the Magic Mountain water and thrill rides, a large variety of museums, concerts and theaters, many professional sports teams, a recently revitalized downtown, and several world-renowned research universities. All of these attractions are reachable with 30 to 60 minutes travel from the conference hotel. Group tours will be available through the conference hotel's concierge desk before and after the conference.

For less structured idle time, there are public beaches with clean water, biking and jogging paths, modest surfing waves, boating opportunities, pier entertainment and shops and guaranteed sunshine within 10 to 30 minutes of the hotel.

The conference hotel, the Los Angeles Airport Marriott Hotel, is a world-class hotel offering a pleasant, relaxing, semi-tropical atmosphere and a variety of shops and restaurants. It is located just a free half-mile shuttle ride from the Los Angeles International Airport (LAX) and less than 2 miles from the Santa Monica Bay on the Pacific Ocean. The room rate is an attractive $119 per night, and applies all nights before and after the conference. Those who reserve first may request one of the poolside facing Lanai rooms.
Discounted Airfares through United Airlines:
1-800-521-4041

United is offering a 10% discount off the unrestricted mid-week coach fare or 5% discount off the lowest applicable fares to all attendees of ICSE 99. United is also offering an additional 5% off tickets purchased 60 days in advance. This special offer applies to travel on U.S. segments of all United Airlines, United Express and Shuttle by United flights. Either you or your travel agent can call 1-800-521-4041 and reference Meeting ID Code 559DE. Reservationists are on duty every day a week from 7:00 AM to 10:00 PM Eastern Standard Time.

Driving Directions from Area Airports

- Los Angeles International Airport (LAX) - 0.5 miles west of hotel: Take East Century Blvd. Hotel is on the left. (Hotel provides free shuttle service from LAX.)
- Burbank-Glendale-Pasadena (BUR) - 20 miles northeast of hotel: Take 101 Freeway West to 405 Freeway South. Exit Century Blvd. West. Go west 3/4 mile to hotel located on the right.
- Long Beach (LGB) - 20 miles southeast of hotel: Take 405 Freeway North to the Century Blvd. Exit. Go west 3/4 mile to hotel located on the right.

ICSE 99 Registration & Information Desk Hours
Marriott Imperial Ballroom Foyer (Conference Level)

Sunday 16 May...........7:30 a.m. to 7:00 p.m.
Monday 17 May............7:00 a.m. to 5:00 p.m.
Tuesday 18 May.............7:00 a.m. to 7:00 p.m.
Wednesday 19 May...........7:00 a.m. to 4:00 p.m.
Thursday 20 May.............7:00 a.m. to 4:00 p.m.
Friday 21 May..............7:00 a.m. to 7:00 p.m.

SSR'99 Program
Saturday 22 May...........7:00 a.m. to 5:00 p.m.
Sunday 23 May.............7:00 a.m. to 1:00 p.m.

Opening Reception
Tuesday 18 May, 5 to 7 p.m., Exhibit Hall
Plan to attend the Opening Reception in the Exhibit Hall Tuesday evening from 5 to 7 p.m.
Renew acquaintances and make new ones while viewing the exhibits and enjoying refreshments. All attendees are requested to wear their conference registration badges.

Poolside Southwestern Fiesta Reception
Thursday Evening 20 May, 6 to 9 p.m., Marriott Poolside, 1st Floor. Come hear the mariachi band play while enjoying the traditional Mexican-style fare that Southern California is so well known for. Attendees are asked to wear their registration badges.

Conference Management Logistics
R. E. Abraham & Associates is the registration, meeting, exhibit management firm contracted for ICSE 99. Questions about registration should be directed to Ashley Queen, Registration Manager at: 1-919-419-8242 X17, (ashleyqueen@mindspring.com). Questions about the exhibit should be directed to Brian Abraham, 919-419-8242, (brianabraham@mindspring.com.) Questions about on-site logistics, meeting space, and AV should be directed to the ICSE 99 meeting manager, Corbin Ball, 1-360-734-8756, (corbin@corbinball.com).

Committees
Request for committee rooms should also be directed to Corbin Ball (corbin@corbinball.com). Please indicate preferred date(s), preferred time(s), length of meeting, any special set up requirements, meeting name, and anticipated number of people no later than 2 April 1999.

LA Links
Los Angeles music, arts, dining, shopping, outdoors, visiting LA, community, media: http://www.losangeles.com/

Los Angeles attractions and information hierarchically organized: http://www.at-la.com/

Los Angeles travel info: http://www.city.net/countries/united_states/california/los_angeles/

Entertainment in the greater Los Angeles area: http://losangeles.sidewalk.msn.com/entertainment

Los Angeles weather: http://tgsv7.nws.noaa.gov/weather/current/KLAX.html

Or visit the ICSE 99 Web site and click on the 'Los Angeles in May' and 'Things to do in and around Los Angeles' links to visit these and many specific event/destination web pages.
Hotel Reservation Form

Los Angeles Airport Marriott Hotel
Los Angeles, CA 16-23 May 1999

RESERVATIONS MUST BE RECEIVED NO LATER THAN 18 APRIL 1999 IN ORDER TO RECEIVE DISCOUNTED ROOM RATES.

TO RECEIVE THESE RATES, YOU MUST INFORM THE HOTEL THAT YOU ARE ATTENDING THE ICSE CONFERENCE.

First Name______________________________________________________

Last Name______________________________________________________

Title_______________________________________________

Affiliation________________________________________

Dept./MS________________________________

Address__________________________________________________________________________________________________________________

City____________________________________

State/Province___________

Country___________________

Zip/Postal Code_____________________

Telephone______________________________________________________

Fax_______________________________________________________

Arrival Date_______________________________

Departure Date_____________________________

Arrival Time_____________________________

☐ Single or double (one or two persons): $119  ☐ Additional persons: $10

☐ Concierge Level (one or two persons): $139  ☐ Additional persons: $10

☐ Government rate (single or double): Prevailing govt. rate at the time of the conference.

*Limited availability, must show government ID upon check-in and identify upon making reservation.

All rates are subject to state and local taxes (currently 14%) at the time of check-in.

☐ I desire a wheelchair accessible room.  ☐ I prefer a non-smoking room.

Payment

☐ Check for first nights deposit and tax enclosed or

☐ Charge my credit card first night’s deposit /tax

Please mail, fax, or telephone the

Los Angeles Airport Marriott Hotel

5855 West Century Blvd.

Los Angeles, CA 90045, USA

Tel: +1-800-228-9290 (toll free) or +1-310-641-5700

Fax: +1-310-337-5329

Cancellations will be accepted up until 48 hours prior to arrival.

To obtain discounted airfares, call United Airlines, 1-800-521-4041

Mention Meeting ID Code 559DE -- See page 17, for more details.
## ICSE 99 Conference Registration Form

### Rate Schedule

<table>
<thead>
<tr>
<th></th>
<th>Member Rates*</th>
<th>Nonmember Rates</th>
<th>Student Rate**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICSE 99</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before 18 April</td>
<td>$300</td>
<td>$375</td>
<td>$75</td>
</tr>
<tr>
<td>After 18 April</td>
<td>$360</td>
<td>$450</td>
<td>$90</td>
</tr>
<tr>
<td>Tutorial Full Day or 2 Half Days</td>
<td>$200</td>
<td>$250</td>
<td>$50</td>
</tr>
<tr>
<td>After 18 April</td>
<td>$250</td>
<td>$300</td>
<td>$60</td>
</tr>
<tr>
<td>Tutorial 1 Half Day</td>
<td>$450</td>
<td>$565</td>
<td>$100</td>
</tr>
<tr>
<td>After 18 April</td>
<td>$525</td>
<td>$665</td>
<td>$120</td>
</tr>
<tr>
<td>Conference</td>
<td>$390</td>
<td>$485</td>
<td>$75</td>
</tr>
<tr>
<td>After 18 April</td>
<td>$490</td>
<td>$610</td>
<td>$90</td>
</tr>
<tr>
<td>Conference 1 Day</td>
<td>$225</td>
<td>$225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$225</td>
<td>$225</td>
<td></td>
</tr>
</tbody>
</table>

|                      | Before 18 April | After 18 April |
| Exhibit Hall Only    | $15            | $15            |
|                      | $15            | $15            |
| Workshops            | $120           | $120           |
|                      | $120           | $120           |
| Harlan D. Mills’ Legacy Workshop | $200 | $300 | $120 |
| Doctoral Workshop    | $0             | $0             |
| Additional Thurs. Fiesta Tickets | $30 | $30 | $30 |
|                      | $30            | $30            |
|                      | $30            | $30            |

| **SSR’99**            |               |                 |                |
| Conference Registration | $275          | $300            | $150           |
| Professional Development Seminars | $130 | $150 | $100 |

**Total Enclosed** $________________

### Payment Options

Please make all checks payable in US dollars to **ICSE 99** and mail to:

ICSE 99 c/o R.E. Abraham and Associates  
3717-B University Drive, Durham, NC 27707, USA  
For more information call +1-919-419-8242  
Fax: +1-919-490-0663

Cancellation policy: Confirmed registrants who cannot attend and who do not send a substitute are entitled to a refund of paid fees (less a $50 processing charge) if a request is received in writing on or before 18 April 1999. Registrants are liable for their full fees after that date. All ICSE 99 attendees registered before 18 April 1999 will receive confirmation and preliminary registration information materials by mail.

- [ ] Do you have any special needs? Please specify:
- [ ] Check here if you do NOT want your address distributed.
- [ ] MasterCard  
- [ ] Visa  
- [ ] American Express  
- [ ] Government PO  

Cardholder: ___________________________  
Exp. Date: ___________________________  
Signature: ___________________________

Cardholder Address: ___________________________
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