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

Final Program

Sponsored by ACM SIGSOFT and the IEEE Computer Society Technical Council on Software Engineering in cooperation with ACM SIGAda and ACM SIGPLAN.

Hosted by the Los Angeles Chapters of ACM, SIGSOFT, SIGPLAN, and SIGAda.

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Corporate Silver Sponsor: Northrop Grumman
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jk@doc.ic.ac.uk

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Carlo Ghezzi (Politecnico di Milano, Italy)
Martin Griss (HP Labs, USA)
Mary Jean Harrold (Ohio State U, USA)
James Hook (Oregon Graduate Inst, USA)
Stefan Jaehnichen (Techn U Berlin, Germany)
Gregory F. Johnson (Northrop-Grumman, USA)
Ralph Johnson (U Illinois, USA)
Kumiyo Nakakoji (NAIST, Japan)
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Daniel Le Metayer (IRISA/INRIA, France)
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Jeffrey N. Magee (Imperial College, UK)
Aloyous K. Mok (U California at Davis, USA)
Gail Murphy (U British Columbia, Canada)
David Notkin (U Washington, USA)
Harold Ossher (IBM, USA)
Mike Papazoglou (Tilburg U, Netherlands)
Shari Lawrence Pfleeger (System/Software Inc, USA)
Spencer Rugaber (Georgia Inst of Tech, USA)
David Schmidt (Kansas State U, USA)
Mary Shaw (CMU, USA)
Kevin Sullivan (U Virginia, USA)
Richard N. Taylor (U Calif at Irvine, USA)
Michal Young (U Oregon, USA)
Alexander L. Wolf (U Colorado, USA)

Case Studies
Anthony Finkelstein (Univ College London, UK)
aowf@cs.ucl.ac.uk
Will Tracz (Lockheed Martin, USA)
Will.Tracz@imco.com

Industry Presentations
Larry Bernstein (Have Laptop, Will Travel, USA)
lbernstein@worldnet.att.net
Stuart Feldman (IBM, USA)
Chris Haynes (ATT ISTEI, UK)
Donald Reifer (RCI, USA)
John Salasin (DARPA, USA)

Workshops
Wilhelm Schaefer (U Paderborn, Germany)
wilhelm@uni-paderborn.de
Sergio Bandinelli (ESI-European Software Institute, Spain)
Gregor Engels (U Paderborn, Germany)
Nazim Madhavi (McGill U, Canada)
Maria Penedo (TRW, USA)
Jim Welsh (U Queensland, Australia)

Tutorials
Kevin Ryan (U Limerick, Ireland)
kevin.ryan@ul.ie
Anthony Finkelstein (Univ College London, UK)
Hans-Jürgen Kugler (Q-Labs, Sweden)
Bashar Nuseibeh (Imperial College, UK)
Debra Richardson (U Calif at Irvine, USA)

Research Demos
Gail Kaiser (Columbia U, USA)
icse@cs.columbia.edu

Posters & Informal Demos
David Redmiles (U Calif at Irvine, USA)
redmiles@ics.uci.edu

Doctoral Symposium
William Griswold (U Calif at San Diego, USA)
wgg@cs.ucsd.edu

Exhibits
Don Reifer (RCI, USA)
d.reifer@ieee.org

Publicity
Dewayne Perry (Bell Labs, USA)
derp@research.bell-labs.com

Robert Biddle (Victoria U of Wellington, New Zealand)
Pere Botella (U Politecnica de Catalunya, Spain)
Shing-Chi Cheung (Hong Kong U of Science & Technology, Hong Kong)
Jean-Claude Demriame (CRIN Bat LORIA, France)
Wolfgang Emmerich (Univ College London, UK)
John Grundy (U of Waikato, New Zealand)
Ric Holt (U of Waterloo, Canada)
KyoChul Kang (Pohang U of Science & Technology, Korea)
Udo Kelter (U Seigen, Germany)
Reino Kurki-Suonio (Tech U Tampere, Finland)
Chris Marin (Flinders U, Australia)
Kumiyo Nakakoji (NAIST, Japan)
Elisabetta di Nitto (Politecnico di Milano, Italy)
Danny Pue (National U of Singapore, Singapore)
Hong Zhu (Nanjing U, China)

Technical Liaison
Mehdi Jazayeri (TU Vienna, Austria)
jazayeri@tuwien.ac.at

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neno@sunset.usc.edu
Alexander Egyed (USC, USA)
Dan Port (USC and Columbia U, USA)

Local Arrangement & Treasurer
Hal Hart (TRW, USA)
hal.hart@acm.org

Document Consultant
Robert DeLine (CMU, USA)
Welcome to the 1999 International Conference on Software Engineering.

ICSE 1999 comes at a very opportune time. In the U.S., the President's Information Technology Advisory Committee (PITAC) has recently completed a major study which concludes that:

- Information technology research is significantly underfunded;
- Software is the most critical area needing further research;
- The demand for software exceeds our ability to produce it;
- The software that is produced today is fragile, unreliable, and difficult to design, test, maintain, and upgrade.

Similar concerns are being expressed elsewhere around the world as well. In response, the U.S. fiscal year 2000 President's Budget proposes a 28% increase in the government's investment in information technology research. Software technology is the highest priority in the new initiative, called Information Technology for the 21st Century.

Does this mean that a lot of research must be done before any software can be done well? Not at all. A great deal of very sophisticated software is being done very well. But for some emerging areas (e.g., heterogeneous COTS integration, systems of systems, agent technology, rapid application development), traditional software approaches are not likely to succeed. These represent challenge areas in which some good solutions are emerging, but in which the critical success factors are still not well understood.

ICSE 99 provides a number of linked forums for bringing together software engineering practitioners and researchers to present experience on the best current solutions, and to discuss the most promising approaches for meeting the outstanding 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 influence of software component technologies for 21st Century software practice, 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). In addition, ICSE 1999 has added a special session in which two of the leaders in formulating the software portion of the Information Technology for the 21st Century initiative, Dr. Michael Evangelist (NSF) and Dr. John Salasim (DARPA), will summarize and discuss its objectives and strategies.

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: EDS, Telcordia (an SAIC Company), and TRW; Silver Sponsor: Northrop Grumman.

We look forward to your participation in a landmark conference for the software engineering field.

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

Conference at a Glance

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

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

**Tuesday 18 May**
8:30 AM - 5:00 PM ICSE Tutorials (See page 4)
8:30 AM - 5:00 PM ICSE Workshops (See page 5)
3:00 PM - 7:00 PM Exhibits (See page 20)
5:00 PM - 7:00 PM Opening Reception (See page 18)

**Wednesday 19 May**
9:00 AM - 5:30 PM ICSE Technical Sessions (See pages 6-7)
10:00 AM - 4:00 PM Exhibits (See page 20)

**Thursday 20 May**
8:00 AM - 5:30 PM ICSE Technical Sessions (See pages 8-9)
10:00 AM - 4:00 PM Exhibits (See page 20)
6:00 PM - 9:00 PM Poolside Southwestern Fiesta Reception (see page 18)

**Friday 21 May**
8:00 AM - 4:00 PM ICSE Technical Sessions (See pages 10-11)
4:15 PM - 7:45 PM SSR Professional Development Seminars (See page 11)

**Saturday 22 May**
8:00 AM - 5:00 PM SSR Technical Sessions (See page 11)
8:30 AM - 5:00 PM ICSE Workshop (See page 5)

**Sunday 23 May**
8:00 AM - 3:00 PM SSR Technical Sessions (See page 11)
### Tutorial Program

#### MONDAY 17 MAY 1999

<table>
<thead>
<tr>
<th>TMF1</th>
<th>Distributed Objects</th>
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<tbody>
<tr>
<td>Wolfgang Emmerich, University College London, <a href="mailto:we@acm.org">we@acm.org</a></td>
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<tr>
<td>Neil Roodyn, Cognitech Ltd., City Cloisters, <a href="mailto:Neil@cognitech.co.uk">Neil@cognitech.co.uk</a></td>
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<tr>
<td>Monday 17 May, 8:30 am - 5:00pm</td>
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<tr>
<td>Imperial Ballroom Suite B</td>
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<thead>
<tr>
<th>TMF2</th>
<th>Overview of Practical Software Measurement</th>
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<tr>
<td>Joyce Statz, TeraQuest Metrics, Inc., <a href="mailto:statz@teraquest.com">statz@teraquest.com</a></td>
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<td>Monday 17 May, 8:30 am - 5:00pm</td>
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<tr>
<th>TMF3</th>
<th>Introduction to Personal Software Engineering Project Management Process</th>
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<tr>
<td>A. Winsor Brown, University of Southern California, <a href="mailto:awbrown@sunset.usc.edu">awbrown@sunset.usc.edu</a></td>
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<td>Monday 17 May, 8:30 am - 5:00pm</td>
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<td>Saddlebrook</td>
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#### TUESDAY 18 MAY 1999

<table>
<thead>
<tr>
<th>TTF1</th>
<th>Managing By The Numbers: Quantitative Measurement and Control of Software Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard E. (Dick) Fairley, Oregon Graduate Institute, <a href="mailto:dfairley@cse.ogi.edu">dfairley@cse.ogi.edu</a></td>
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<td>Tuesday 18 May, 8:30 am - 5:00pm</td>
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<tr>
<th>TTF2</th>
<th>Risk Management in Software Development: A Technology Overview and the Riskit Method</th>
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<tbody>
<tr>
<td>Jyrki Kontio, Nokia Telecommunications, <a href="mailto:jyrki.kontio@ntc.nokia.com">jyrki.kontio@ntc.nokia.com</a></td>
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<tr>
<th>TTF3</th>
<th>Failure and Success Factors in Reuse Programs: A Synthesis of Industrial Experiences</th>
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<tbody>
<tr>
<td>Michel Ezran, Valtech, France, <a href="mailto:me@valtech.fr">me@valtech.fr</a></td>
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<tr>
<td>Maurizio Morisio, Politecnico di Torino, Italy, <a href="mailto:morisio@polito.it">morisio@polito.it</a></td>
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<tr>
<td>Colin Tully, European Software Process Improvement Foundation, <a href="mailto:colint@espi.co.uk">colint@espi.co.uk</a></td>
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<td>Tuesday 18 May, 8:30 am - 5:00pm</td>
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<th>TTF4</th>
<th>Round-Trip Engineering with Design Patterns, UML, Java and C++</th>
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<tbody>
<tr>
<td>Wilhelm Schaefer and Albert Zuendorf, Dept. of CS, University of Paderborn</td>
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<td><a href="mailto:wilhelm@uni-paderborn.de">wilhelm@uni-paderborn.de</a> and <a href="mailto:zuendorf@uni-paderborn.de">zuendorf@uni-paderborn.de</a></td>
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<td>Tuesday 18 May, 8:30 am - 5:00pm</td>
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<tr>
<th>TTA1</th>
<th>Adaptable Components</th>
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<tr>
<td>Grady H. Campbell, Prosperity Heights Software, <a href="mailto:gradycampbell@acm.org">gradycampbell@acm.org</a></td>
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<tr>
<td>Tuesday 18 May, 8:30 am - 12:30 pm</td>
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<th>TTA2</th>
<th>Using Subject-Oriented Programming to Overcome Common Problems in Object-Oriented Software Development and Evolution</th>
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<tbody>
<tr>
<td>Harold Ossher and Peri Tarr, IBM T.J. Watson Research Center, <a href="mailto:tarr@watson.ibm.com">tarr@watson.ibm.com</a></td>
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<td><a href="mailto:ossher@watson.ibm.com">ossher@watson.ibm.com</a></td>
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<td>Tuesday 18 May, 8:30 am - 12:30 pm</td>
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<tr>
<th>TTP1</th>
<th>Quick Introduction To Software Reliability Modeling</th>
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<tr>
<td>Jarrett Rosenberg, Sun Microsystems, <a href="mailto:Jarrett.Rosenberg@Sun.COM">Jarrett.Rosenberg@Sun.COM</a></td>
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<td>Tuesday 18 May, 1:30 pm- 5:30 pm</td>
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<tr>
<th>TTP2</th>
<th>Modeling and Analyzing Software Architectures</th>
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<tr>
<td>Bob Monroe, Carnegie Mellon University, <a href="mailto:bmonroe@cs.cmu.edu">bmonroe@cs.cmu.edu</a></td>
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<td>Tuesday 18 May, 1:30 pm - 5:30 pm</td>
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<td>Chicago</td>
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</table>
Workshop Program

**SUNDAY-MONDAY 16-17 MAY 1999**

WSM1  Web Engineering
Chicago
San Murugesan,
Department of Computing and Information Systems,
University of Western Sydney Macarthur, Australia
s.murugesan@uws.edu.au
Yogesh Deshpande,
Department of Computing and Information Systems,
University of Western Sydney Macarthur, Australia
y.deshpande@uws.edu.au
Sunday-Monday, 16-17 May, 8:30 am- 5:00 pm

**MONDAY 17 MAY 1999**

WM1  Principles of Software Change and Evolution (SCE’99)
Václav Rajlich, Wayne State University, USA  vtr@CS.Wayne.EDU
Monday 17 May, 8:30 am- 5:00 pm
Atlanta

WM2  Software Engineering over the Internet
Frank Maurer. Dept. of Computer Science, University of Calgary,
Canada maurer@cpsc.ucalgary.ca
Monday 17 May, 8:30 am- 5:00 pm
Philadelphia

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
Boston

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
Suite A

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
St. Louis

**MONDAY-TUESDAY 17-18 MAY 1999**

WMT1  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
Dallas

WMT2  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
Suite F

WMT3  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
Suite E

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
Denver

**TUESDAY 18 MAY 1999**

WT1  Empirical Studies of Software Development and Evolution
Rachel Harrison, University of Southampton, UK,
rh@ecs.soton.ac.uk
Tuesday 18 May, 8:30 am- 5:00 pm
Atlanta

WT2  A Recognition of Harlan D. Mills’ Legacy
Ali Mili, Institute for Software Research, Fairmont, WV 26554, USA
amili@csee.wvu.edu
Tuesday 18 May, 8:30 am- 5:00 pm
Imperial Ballroom Suite B Workshop
Imperial Ballroom Suite A WT2 Luncheon

**SATURDAY 22 MAY 1999**

WSa1  Ensuring Successful COTS Development
John Dean, NRC Canada, John.Dean@nrc.ca
Saturday 22 May, 8:30 am- 5:00 pm
Scottsdale
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>9:00–10:30</td>
<td>OPENING SESSION AND KEYNOTE ADDRESS</td>
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<tr>
<td></td>
<td>1. William A. Wulf: Are We &quot;Inventing the Future&quot; or &quot;Fumbling&quot; It?</td>
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<td>Chair: Barry Boehm</td>
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<tr>
<td>10:30–11:00</td>
<td>Break</td>
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<tr>
<td>11:00–12:30</td>
<td>INVITED INDUSTRY PRESENTATIONS</td>
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<td></td>
<td>2A. Rapid Application Development</td>
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<td>Chair: Joyce Fitzpatrick</td>
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<td></td>
<td>Speakers: Arnold Pittler (Motorola, USA), Charles Leinbach (C-Bridge, USA)</td>
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<td>Discussant: Joyce Fitzpatrick (EDS, USA)</td>
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<td>TECHNICAL PAPERS</td>
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<td>2B. Architectures: Composition Techniques</td>
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<td>Chair: Jeff Magee</td>
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<td></td>
<td>Using Off-The-Shelf Middleware to Implement Connectors in Distributed Software Architectures</td>
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<tr>
<td></td>
<td>Eric M. Dashofy (Univ. of California, Irvine, USA), Nenad Medvidovic (Univ. of Southern</td>
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<td>California, USA), Richard N. Taylor (Univ. of California, Irvine, USA)</td>
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<td>Exploiting ADLs to Specify Architectural Styles Induced by Middleware Infrastructures:</td>
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<td>Elisabetta Di Nitto (CEFRIEL, Italy), David Rosenblum (University of California, Irvine, USA)</td>
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<td>A Flexible Approach to Alliances of Complex Applications: David J. Kasik, Conrad E. Kimball,</td>
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<td>Jimmie L. Felt, Kenneth B. Frazier (Boeing, USA)</td>
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<td>12:30–2:00</td>
<td>Lunch</td>
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<td>2:00–3:30</td>
<td>INVITED INDUSTRY PRESENTATIONS</td>
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<td>3A. Software Engineering and Money</td>
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<tr>
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<td>Chair: Tim Pauling</td>
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<td>Speakers: Jim Horning (Intertrust, USA), Richard Selby (Pacific Investment Management, USA)</td>
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<td>Discussant: Tim Pauling (Pricewaterhouse Coopers, USA)</td>
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<td>TECHNICAL PAPERS</td>
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<td>3B. Architectures: Development Techniques</td>
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<td>Chair: Gregory Abowd</td>
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<td>A Systematic Approach to Derive the Scope of Software Product Lines: Jean-Marc DeBaud</td>
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<td></td>
<td>(Bell Labs, Lucent, USA), Klaus Schmid (IESE, Germany)</td>
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<td>A Language and Environment for Architecture-Based Software Development and Evolution:</td>
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<td></td>
<td>Nenad Medvidovic (Univ. of Southern California, USA), David S. Rosenblum, Richard N. Taylor</td>
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<td>(Univ. of California, Irvine, USA)</td>
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<td>Experience with Performing Architecture Tradeoff Analysis: Rick Kazman, Mario Barbacci,</td>
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<td>Mark Klein, S. Jerome Carrière, Steven G. Woods (CMU, USA)</td>
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<td>3:30–4:00</td>
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<tr>
<td>4:00–5:30</td>
<td>INVITED INDUSTRY PRESENTATIONS</td>
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<td>4A. COTS Integration</td>
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<td>Chair: Tricia Oberndorf</td>
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<td>Speakers: Dorothy McKinney (Lockheed Martin, USA), Marie Silverthorn (Texas Inst., USA)</td>
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<td>Discussant: Tricia Oberndorf (CMU-SB, USA)</td>
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<td>4B. Widescale Computing</td>
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<td>Chair: Bashar Nuseibeh</td>
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<td>Exploiting Smalltalk Modules In A Customizable Programming Environment: Mark Woodman, Rob</td>
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<td>Griffiths, Malcolm Macgregor, Simon Holland, Hugh Robinson (The Open Univ., UK)</td>
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<td>Software Engineering Issues for Ubiquitous Computing: Gregory D. Abowd (Georgia Inst. of</td>
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<td>Technology, USA)</td>
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<td>Splitting the Organization and Integrating the Code: Conway’s Law Revisited: James D.</td>
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<td>Herbsleb, Rebecca E. Grinter (Bell Labs, Lucent, USA)</td>
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</tbody>
</table>
Panel

2C. Intellectual Property Issues for Software
Chair: David Notkin
Panelists: Greg Kirsch (Needle & Rosenberg, P.C., USA), Yannis Skulikaris (European Patent Office, The Netherlands)

Formal Research Demonstrations

3C. Formal Research Demos
Chair: Gail Kaiser
WinWin: A System for Negotiating Requirements
Ellis Horowitz, Joo H. Lee, June Sup Lee (U.S.C., USA)
MoCHA-Java: A Tool for C++ to Java Conversion Support
Scott Malabarba, Premkumar Devanbu, Aaron Stearns (University of California, Davis, USA)

Technical Papers

2D. Metrics: Cost Estimation
Chair: Adam Porter
Software architecture classification for estimating the cost of COTS integration: Daniil Yakimovich (University of Maryland, USA), James M. Bieman (Colorado State University, USA), Victor R. Basili (Univ. of Maryland, USA)
Explaining the Cost of European Space and Military Projects
Lionel C. Briand, Khaled El Emam, Isabella Wieczorek (Fraunhofer Institute, Germany)
An Assessment and Comparison of Common Software Cost Estimation Modeling Techniques: Lionel C. Briand, Khaled El Emam, Dagmar Surmann, Isabella Wieczorek (Fraunhofer Institute, Germany), Katrina D. Maxwell (DATA MAX, France)

3D. Metrics: Tools & Design
Chair: Kevin Sullivan
Using Version Control Data to Evaluate the Impact of Software Tools: David Atkins, Thomas Ball, Todd Graves, Audris Mockus (Bell Labs, Lucent, USA)
Polymorphism Measures for Early Risk Prediction
Saïda Benlarbi (Cistel Technology, Canada), Walcelio L. Melo (Oracle Brazil, and Catholic University of Brazil)
Investigating Quality Factors in Object-Oriented Designs: an Industrial Case Study: Lionel C. Briand, Jürgen Wüst (Fraunhofer Institute, Germany), Stefan V. Ikonomovski, Hakim Lounis (Centre de Recherche Informatique de Montréal, Canada)

4D. Evolution
Chair: Harold Ossher
Lightweight Extraction of Object Models from Bytecode
Daniel Jackson, Allison Waingold (MIT, USA)
Highly Reliable Upgrading of Components
Jonathan E. Cook, Jeffrey A. Dage (New Mexico State University, USA)
Dynamically Discovering Likely Program Invariants to Support Program Evolution: Michael D. Ernst, Jake Cockrell (Univ. of Wash., USA), William G. Griswold (Univ. of California, San Diego, USA), David Notkin (Univ. of Wash., USA)
Thursday
May 20

8:00–9:15  Keynote Address
5. Alan Kay: The Computer Revolution Hasn’t Happened Yet
  Chair: Jeff Kramer

9:30–10:30  Awards Presentations
IEEE Software Process Achievement Awards: Bill Riddle
ACM SIGSOFT Awards: David Notkin
Distinguished Service Award: Bill Riddle
  Outstanding Research Award: Niklaus Wirth and Harlan Mills (posthumous)
  Best Paper of ICSE-11: Dewayne Perry

10:30–11:00  Break

11:00–12:30  Invited Industry Presentations
6A. Software/System Definition and Architecting
  Chair: Anthony Finkelstein
  Speakers: Peter Hantos (Xerox, USA), Eberhardt Rechtin (President Emeritus, Aerospace, USA)
  Discussant: Anthony Finkelstein (University College, London, UK)

12:30–2:00  Lunch

2:00–3:30  Invited Industry Presentations
7A. Software and System Safety
  Chair: Art Pyster
  Speakers: Jack Janelle (Honeywell Air Transport Sys., USA),
  David MacKenzie (Microsafe Sys., USA)
  Discussant: Art Pyster (FAA, USA)

3:30–4:00  Break

4:00–5:30  Invited Industry Presentations
8A. Software Reuse and Product Line Management
  Chair: Jim Neighbors
  Speakers: Ted Biggerstaff (Microsoft Research, USA),
  Martin Griss (Hewlett Packard, USA)
  Discussant: Jim Neighbors (Bayfront Technologies, USA)

6:00–9:00  Poolside Southwest Fiesta Reception
FORMAL RESEARCH DEMONSTRATIONS

6C. Formal Research Demos
Chair: Wolfgang Emmerich
Behavioral Analysis of Software Architectures using LTSA
Jeff Magee (Imperial College, UK)
FarGo: A System for Mobile Component-Based Application Development: Israel Ben-Shaul, Hovav Gazit, Yoad Gidron, Ophir Holder, Boris Laava (Technion-Israel Institute of Technology, Israel)

TECHNICAL PAPERS

6D. Program Analysis
Chair: Laura Dillon
Call-Mark Slicing: An Efficient and Economical Way of Reducing Slice: Akira Nishimatsu (Osaka University, Japan), Minoru Jihira (NAIST, Japan), Shinji Kusumoto, Katsuro Inoue (Osaka University, Japan)
System-Dependence-Graph-Based Slicing of Programs With Arbitrary Interprocedural Control Flow: Saurabh Sinha, Mary Jean Harrold (Ohio State University, USA), Gregg Rothermel (Oregon State University, USA)
An Incremental Row- and Context-sensitive Pointer Aliasing Analysis: Jyh-shiarn Yur, Barbara G. Ryder (Rutgers University, USA), William A. Landi (Siemens, USA)

FORMAL RESEARCH DEMONSTRATIONS

7C. Formal Research Demos
Chair: Ellis Horowitz
OU Learning Works: A Customized Programming Environment for Smalltalk Modules: Mark Woodman, Rob Griffiths, Malcolm Macgregor, Simon Holland (The Open Univ., UK)
Leap: A "Personal Information Environment" for Software Engineers: Philip M. Johnson (Univ. of Hawaii, USA)

TECHNICAL PAPERS

7D. Specification & Verification
Chair: Axel Van Lamsweerde
A Specification Matching Based Approach to Reverse Engineering: Gerald C. Gannod (Arizona State Univ., USA), Betty H.C. Cheng (Michigan State Univ., USA)
Data Flow Analysis for Checking Properties of Concurrent Java Programs: Geb Naumovich, George S. Avrunin, Lori A. Clarke (Univ. of Massachusetts, Amherst, USA)
Patterns in Property Specifications for Finite-State Verification Matthew B. Dwyer (Kansas State Univ., USA), George S. Avrunin (Univ. of Mass., Amherst, USA), James C. Corbett (Univ. of Hawaii, USA)

FORMAL RESEARCH DEMONSTRATIONS

8C. Formal Research Demos
Chair: Martin Griss
INSIGHT – Reverse Engineer Case Tool
Norman Rajala, Djenana Campara (NORTEL, Canada), Nikolai Mansurov (Inst for System Prog., Russia)

SPECIAL SESSION (4:45–6:00)

8B. The PITAC Software Challenge
Chair: Sol Greenspan
A New Century, A New Focus on Software Research at NSF
CISE Michael Evangelist (NSF, USA)
Very Large Software/System Engineering
John Salasin (DARPA, USA)

TECHNICAL PAPERS

8D. Model Checking
Chair: Michal Young
Using the ASTRAL Model Checker to Analyze Mobile IP
Zhe Dang, Richard A. Kemmerer (University of California, Santa Barbara, USA)
Decoupling Synchronization from Logic Control for Efficient Symbolic Model Checking of Statecharts: William Chan, Richard J. Anderson, Paul Beame (Univ. of Wash., USA), David H. Jones (Boeing, USA), David Notkin (Univ. of Wash., USA), William E. Warner (Boeing, USA)
Analysis of a Scheduler for a CAD Framework
David S. Keyes (Picker International, Inc, USA), Laura K. Dillon, Moon Jung Chung (Michigan State Univ., USA)
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<td>8:00–9:30</td>
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<td>Chair: Rick Hefner</td>
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<td>Speakers: Tom DeMarco (Atlantic Systems Guild, USA),</td>
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<td>Roger G. Fordham (Motorola, USA)</td>
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<td>Discussant: Rick Hefner (TRW, USA)</td>
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<td>9:30–10:00</td>
<td><strong>Break</strong></td>
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<td>10:00–12:00</td>
<td><strong>CASE STUDIES</strong></td>
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<td>10A. Case Studies</td>
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<td>Product-Line Architectures in Industry: A Case Study</td>
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<td>Jan Bosch (University of Karlskrona/Ronneby, Sweden)</td>
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<td>Linux as a Case Study: Its Extracted Software Architecture:</td>
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<td>Ivan T. Bowman, Richard C. Holt (University of Waterloo, Canada),</td>
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<td>Neil V. Brewster (University of Toronto, USA)</td>
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<td>An Architectural Style for Multiple Real-Time Data Feeds:</td>
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<td>Neil Roodyn (Cognitech Ltd., UK), Wolfgang Emmerich (Univ. College London, UK)</td>
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<td>Supporting Industrial Hyperwebs: Lessons in Scalability:</td>
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<td>Kenneth M. Anderson (University of Colorado, Boulder, USA)</td>
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<td>12:00–1:00</td>
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<td>2:15–2:30</td>
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<td>2:30–4:30</td>
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<td>12. Future Computer Systems and Software Engineering</td>
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<td>Steve Cross (CMU-SEI, USA)</td>
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<td>Anita Jones (University of Virginia, USA)</td>
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<td>Butler Lampson (Microsoft, USA)</td>
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<td>David Barnes (McMaster University, Canada)</td>
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<td>Walker Royce (Rational, Inc., USA)</td>
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<td>ICSE 1999 Summary: Barry Boehm, David Garlan, Jeff Kramer</td>
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<td>ICSE 2001: Hausi Muller, Mary Jean Harrold</td>
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**BE SURE TO VISIT THE EXHIBIT HALL FOR THE LATEST ON VENDOR PRODUCTS AND SERVICES!**
**TECHNICAL PAPERS**

**9C. Reverse Engineering**
**Chair:** Spencer Rugaber

- **Pattern-Based Reverse-Engineering of Design**
  Components: Rudolf K. Keller, Reinhard Schauer, Sébastien Robitaille, Patrick Pagé (University of Montreal, Canada)

- **Automatic Method Refactoring Using Weighted Dependence Graphs:**
  Katsuhisa Maruyama, Ken-ichi Shima (NTT Software Labs, Japan)

- **Identifying Objects using Cluster and Concept Analysis**
  Arie van Deursen, Tobias Kuipers (CWI, The Netherlands)

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**TECHNICAL PAPERS**

**10C. Testing**
**Chair:** Mary Jean Harrold

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

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

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

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

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**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 Professional Development Seminars and SSR'99 Conference require separate sign up on the registration form.

Final program and registration details are available at ICSE 99 Registration.
### Summary Conference Schedule

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<td>WSM1 Web Engineering (continued)</td>
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<td>WSM1 Atlanta Principles of Software Change and Evolution (SCIE’99)</td>
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<td>WSM2-Philadelphia Software Engineering over the Internet</td>
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<td>WSM3-Boston Testing Distributed Component-based Systems</td>
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<td>WSM4-Suite A First Workshop on Economics-Driven Software Engineering Research (EDSER-1)</td>
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<td>TMF1-Suite B Distributed Objects</td>
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<td>TMF2-Scottsdale Overview of Practical Software Measurement</td>
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<td>TMF3-Saddlebrook Introduction to Personal Software Engineering Project Management Process</td>
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<td>WMT1-Atlanta Empirical Studies of Software Development and Evolution</td>
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<td>WMT2-Suite B Recognition of Dr. Harlan Mills’ Legacy</td>
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<td>WMT3-Atlanta Software Interoperability: Principles and Practice</td>
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<td>WMT2 Engineering Distributed Objects (Continued from Monday)</td>
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<td>WMT3 Constructing Software Engineering Tools (CoSET’99) (Continued from Monday)</td>
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<td>WMT1 Atlanta Empirical Studies of Software Development and Evolution</td>
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<td>WMT2 Suite B Recognition of Dr. Harlan Mills’ Legacy</td>
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<td>WMT3 Quick Introduction to Software Reliability Modeling</td>
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<td>WMT4 Round-Trip Engineering with Design Patterns, UML, Java and C++</td>
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<td>WMT1 Software Engineering for Parallel and Distributed Systems</td>
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<td>WTP1-Philadelphia Using Subject-Oriented Programming to Overcome Common Problems in Object-Oriented Software Development</td>
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<td>WTP2-Chicago Modeling and Analyzing Software Architectures</td>
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<td>8PM</td>
<td>Opening Reception</td>
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<td>ICSE 99 Exhibit 3:00 - 7:00 pm</td>
<td>Opening Reception 5:00 - 7:00 pm</td>
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### ICSE 99 Exhibit
3:00 - 7:00 pm

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### Opening Reception
5:00 - 7:00 pm

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Technical Program:
Session 1
Keynote Address:
Dr. William A. Wulf
President
U.S. National Academy
of Engineering
ICSE 99
Exhibit,
Informal
Demonstrations
& Poster Sessions
10:00 am - 4:00 pm
Technical Program:
Session 2
A. IIP: Rapid Application Development
B. Architectures:
Composition Techniques
C. Intellectual Property Issues
D. Metrics:Cost Estimation
Technical Program:
Session 3
A. IIP: Software Engineering and Money
B. Architectures:
Development Techniques
C. Formal Research Demos
D. Metrics:Tools & Design
Technical Program:
Session 4
A. IIP: COTS Integration
B. Widescale Computing
C. Formal Research Demos
D. Evolution
Technical Program:
Session 5
8-9:15 am
Keynote Address:
Dr. Alan Kay
VP and Disney Fellow
Walt Disney Imagineering
9:30 - 10:30
Awards Presentations and Best Paper from ICSE-11
Technical Program:
Session 6
10:00 am - 4:00 pm
A. IIP: Software/System Definition and Architecting
B. Program Composition
C. Formal Research Demos
D. Program Analysis
Technical Program:
Session 7
A. IIP: Software and System Safety
B. Reuse & Browsing
C. Formal Research Demos
D. Specification & Verification
Technical Program:
Session 8
A. IIP: Software-Reuse & Product Line Management
B. Distributed Systems
C. Formal Research Demos
C. PITAC Software Challenge
D. Model Checking
Technical Program:
Session 9
A. IIP: Software Process Maturity: Is Level Five Enough?
B. Case Studies
C. Reverse Engineering
D. Agents, Mobility & Interoperability
Technical Program:
Session 10
A. Case Studies
B. Model Checking Talk and Trustworthy Systems Panel
C. Testing
D. Inspections, Debugging, & Prototyping
Technical Program:
Session 11
Keynote Address:
Dr. Butler Lampson
Architect
Microsoft Corporation
Technical Program:
Session 12
Panel:
Future Computer Systems and Software Engineering
Closing:
ICSE Summary and Prospects
Symposium on Software Reusability SSR’99
6 concurrent Professional Development Seminars (PD1 - PD6)
or http://csalpha.unomaha.edu/~ssr99/
SSR’99 Reception
8 - 9pm

IIP: = Invited Industry Presentations
Special Attractions

Keynote Addresses
Imperial Ballroom Suite A-D
Wednesday, 19 May, 9:00 to 10:30 a.m.
Dr. William A. Wulf, President, U.S. National Academy of Engineering, "Are We 'Inventing the Future' or 'Fumbling' It?"

Thursday, 20 May, 8:00 to 9:15 a.m.
Dr. Alan Kay, Vice President and Disney Fellow, Walt Disney Imagineering, "The Computer Revolution Hasn't Happened Yet"

Friday, 21 May, 1:00 to 2:15 p.m.
Dr. Butler Lampson, Architect, Microsoft Corporation, "Computer systems Research: Past and Future"

Invited Industry Presentations
Wednesday-Friday, 19-21 May
Imperial Ballroom Suite A-D
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?
See pages XX for further details.

Case Studies
Friday 20 May
Chicago/Dallas Room
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. See pages XX for further details.

Formal Research Demonstrations
Wednesday-Thursday, 19-20 May
Atlanta/Boston Rooms
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, tables are provided in the exhibition hall 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."

Exhibits
Tuesday 18 May, 3-7 p.m. Wednesday and Thursday 19-20 May, 10 a.m. to 4 p.m.
Marquis Ballroom
Plan to attend the ICSE99 Exhibit in the Marquis Ballroom. It 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.

Posters and Informal Research Demonstrations
Wednesday-Thursday, 19-20 May, In Exhibit Hall during Exhibit Hours
Poster and Demo Chair:
David Redmiles
Stop by for opportunity to see late-breaking research results at the ICSE Posters and Informal Research Demonstrations open during exhibition hours.

Posters are open to all types of work in software engineering. Informal Research Demonstrations tables are intended for selected work that is very new, in a prototype stage, otherwise not as fully developed as a formal research demonstration.

Doctoral Workshop
Tuesday 18 May
St. Louis Room
The Doctoral Workshop is a forum for graduate students to present and discuss their dissertation research objectives, approaches, and preliminary results.

It 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.
Belcore has become Telcordia Technologies. And the stripes of today’s communication networks will never be the same. We’re creating the Next Generation Network to converge voice and data technologies and open amazing capabilities for everyone, everywhere. We started it. We’ll finish it.
The Los Angeles Marriott hotel concierge, located on the lobby level and in the concierge lounge can help you with dining recommendations and tours to the greater Los Angeles area's attractions. These include the original Disneyland, Universal Studios, 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. Your registration packet includes summaries of available tours.
Customer solutions from TRW are powered by people with high expectations – of themselves, their teammates, and their company. We shape information technology and engineering in ways that address and overcome critical business and operational challenges, and we deliver results.

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The following challenges – and many more listed on our web site – are available now at our Redondo Beach and Carson facilities in California:

**SOFTWARE DEVELOPERS**
TRW has numerous positions available for developers proficient in Ada, C/C++ and object-oriented software development. UNIX, FORTRAN, database, networking and GUI openings are also available.

**INTEGRATION AND TEST**
Several positions available for Software I&T professionals proficient in the testing of C/C++ and object-oriented software systems.

Many positions require US Citizenship and an active EBI.

For the above positions, please forward resumes to: TRW Systems & Information Technology Group, One Space Park, Redondo Beach, CA 90278. Attn: TS/ICSE, Mail Stop: R2/1044. E-mail: iit-ts.recruiting@trw.com

**ORACLE SOFTWARE ENGINEERS**
TRW also has challenging opportunities developing and implementing Oracle Financials and Process Manufacturing database applications using Oracle tools. 5+ years of IT experience preferred. Experience required in SQL/PLUS, Oracle Forms, Oracle Reports and Developer 2000. OPM 11/GEMMS experience a plus. Excellent written/verbal skills required.

Many positions require US Citizenship.

For the ORACLE POSITIONS ONLY, please forward resumes to: TRW Systems & Information Technology Group, Attn: Steve Jacobs, M/S DH6/2774, 1760 Glenn Curtiss St., Carson, CA 90746. Fax: (310) 764-7059. E-mail: steve.jacobs@trw.com

TRW, a family-friendly company, offers competitive compensation and a wide range of benefits including medical, dental, vision, 401(k), and educational reimbursement. On-site fitness center and day care available at both our Redondo Beach and Carson facilities.

TRW is an Equal Opportunity Employer. Principals only and no phone calls, please.

Visit us at: [http://www.trw.com/careers](http://www.trw.com/careers)
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 6:00 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 tra-
ditional Mexican-style fare that Southern California is so well
know for. Attendees are asked to wear their registration badges.

ICSE 99 Air Carrier United Airlines has been
selected as the official air carrier for ICSE 99.

Restaurants, Attractions
Please see the Hotel Concierge in the Lobby for up-to-date
information on area restaurants and attractions. Also, see the
web links listed below.

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.
Around the world, EDS is helping clients harness Internet technology to capitalize on new opportunities. With unmatched experience in end-to-end electronic business, we can leverage client investments in existing systems to make them work with new technologies. To streamline entire supply chains. Open new distribution channels. Outmaneuver competition and more. To learn more about the team that’s changing the way the world works, call 1-800-566-9337. Email info@eds.com. Or visit www.eds.com.

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**Posters and Informal Demos**

- Semiautomatic Development of Object-Oriented Banking-Domain Frameworks
  - Yadran Eterovic
  - yadran@ing.puc.cl

- Model checking The SCR-Style Requirements Specifications
  - Wu Guqing
  - wq@whu.edu.cn

- QARCC and S-COST: Aids for Conflict Identification and Resolution among Software Quality Requirements
  - Hoh In
  - hohin@sunset.usc.edu

- Software Process Support over the Internet
  - F. Maurer
  - maurer@cpsc.ucalgary.ca

- Applying Formal Methods to a Telecommunications System in a Commercial Setting
  - Andre Wong
  - andre@cs.toronto.edu

- Pattern-Oriented Analysis and Design (POAD)
  - Sherif Yacoub
  - yacoub@csee.wvu.edu

- A Debug Support System Using Program Slicing Techniques
  - Shinji Kusumoto
  - kusumoto@ics.es.osaka-u.ac.jp

- Agent Assisted Cooperative Requirements Specification Development
  - Guiden Uchyigit
  - gu1@doc.ic.ac.uk

- OU Learningworks: A Customised Programming Environment of Smalltalk Modules
  - Mark Woodman
  - m.woodman@open.ac.uk

- Software Effort and Schedule Estimation Using the Constructive Cost Model: COCOMO II
  - Jongmoon Baik
  - jobaik@sunset.usc.edu

- Pattern-Based Reverse-Engineering of Design Components
  - Rudolf K. Keller
  - keller@iro.umontreal.ca

- COPROMO
  - A. Winsor Brown
  - awbrown@sunset.usc.edu

- CORADMO
  - A. Winsor Brown
  - awbrown@sunset.usc.edu

- A Component Based Java Framework for Distributed Evaluation of SPARC Scientific Libraries
  - Kwangwoo Nam
  - kwangwoo@circ.gwu.edu

- Dalì: A Workbench for Software Architecture Reconstruction
  - S. Jeremy Carriere
  - sjc@sei.cmu.edu

- Costs and benefits of Applying Formal Methods to Refine an IEEE-Recommended Practice Software Requirement Specifian (SRS) During Requirements Analysis
  - Brian C. McCurtis
  - bmccurti@uci.edu

- Knowledge Depot Project Awareness
  - Michael Kantor
  - mkantor@ics.ucl.edu

**Exhibitor Descriptions**

**ACM SIGAda**

Ada is alive and well. As the first internationally standardized OO language, Ada is prospering on its merits “after the mandate” with steadily increasing commercial usage. Ada is recognized as the best choice for high-reliability, real-time, & distributed systems and all serious software engineering. The SIGAda booth has available the current Walnut Creek Ada CD with Ada95 compilers, reusable components, 60 sets of OO & SE courseware, bindings, dozens of Ada “Success Stories” in all complex domains, and much more. And, ask us for the free “Discovering Ada” CD with the Ada 95 tutorial.

To contact SIGAda:
- Dr. Benjamin Brosigol Chair, ACM SIGAda
- Brosigol@Aonix.COM
- www.acm.org/sigada
- c/o ACM SIGAda, 1515 Broadway, New York, NY 10036

**Addison-Wesley**

Addison-Wesley, a division of Pearson Education, is a leading publisher of high-quality and timely information for programmers, developers, engineers, and system administrators. Our mission is to provide educational materials about new technologies and new approaches to current technologies written by the leading authorities. Please visit our booth to browse and purchase the latest titles in software engineering. Addison-Wesley's readers and authors benefit from the company's global resources.

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- Reading, MA 01867

- Phone: (781) 944-3700
- Fax: (781) 942-3076
- Web: http://www.awl.com/cseng/

**EDS**

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**Address:**
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- Fax/email: info@eds.com
- Web: www.eds.com

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- Fax: (703) 736-3556
- Web: http://www.chipware.com
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Phone: (212) 850-6000
Fax: (212) 850-6088
Web: http://www.wiley.com

Northrop Grumman

Northrop Grumman is a proven leader in advanced software engineering technologies. Their booth will contain information on B-2 Bomber, Open Skies Management and Planning System (OSMAPS), and Evolutionary Design of Complex Systems (EDCS).

Address: 1 Hornet Way
El Segundo, CA 90245
Phone: (310) 779-8598
Web: http://www.northgrum.com

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Fax: (503) 645-5075
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Phone: 1-800-424-6755
Fax: (703) 749-3795
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RENOIR

(REquirements Engineering Network of International Co-operating Research)

RENOIR is a network of excellence established within the Fourth Framework Programme of the European Union. It is a network of research groups, each with established excellence in the area of Requirements Engineering.

The general purpose of RENOIR is to develop coordination medu???

Telcordia Technologies invites you to learn about new ways to calm your rough software seas with three of our software quality engineering tools. Visit our booth to see demonstrations of these systems:
- xSuds, a program understanding and visualization system for C, C++ and soon - Java.
- AETG Web, a web-based service for generating compact, efficient test suites from requirements and user-level documentation.
- EDA Web, a system that uncovers opportunities for improvement by analyzing software defect patterns.

Address: 445 South St
Morristown, NJ 07960
Phone: Deborah Schmitt: 973-829-4389
Fax: 973-829-2645
Web: http://www.telcordia.com

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TRW ushered in the space age in the 1950's and has since pioneered first-of-a-kind software and systems technologies for commercial, defense, intelligence, energy, transportation, and public sectors. Today, customer solutions from TRW are powered by our people with their high expectations – of themselves, their teammates, and their company. We shape information technology and engineering to address and overcome critical business and operations challenges, and we deliver results. In the process, we provide our people with diverse opportunities to realize their personal aspirations. To learn about some of TRW's exciting technologies or explore our numerous job opportunities, stop by the TRW booth or contact us.

Contact:
TRW Systems & Information Technology Group
Attn: TS/ICSE, Mail Stop: R2/2133
One Space Park
Redondo Beach, CA 90277
E-Mail: ilt-ts.recruiting@TRW.COM
Website: http://www.trw.com
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 4, 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

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Program Chairs

Mehdi Jazayeri, Technische Universität Wien, Austria
jazayeri@infosys.tuwien.ac.at
Alexander Wolff, 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 'The 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.
