



# ICSE 99

## 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.*

*Corporate Gold Sponsors: EDS, Telcordia (an SAIC Company), and TRW*

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# ICSE Committee Members

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Ralph Johnson (U Illinois, USA)  
Kumiyo Nakakoji (NAIST, Japan)  
Axel van Lamsweerde (U Catholique de Louvain, Belgium)  
Daniel Le Metayer (IRISA/INRIA, France)  
Nicole Levy (U Henri Poincare, France)  
Jeffrey N. Magee (Imperial College, UK)  
Aloysius K. Mok (U Texas at Austin, USA)  
Gail Murphy (U British Columbia, Canada)  
David Notkin (U Washington, USA)  
Bashar Nuseibeh (Imperial College, UK)  
Harold Ossher (IBM, USA)  
Mike Papazoglou (Tilburg U, Netherlands)  
Shari Lawrence Pfleeger (System/Software Inc, USA)  
Adam Porter (U Maryland, USA)  
Spencer Rugaber (Georgia Inst of Tech, USA)  
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Mary Shaw (CMU, USA)  
Kevin Sullivan (U Virginia, USA)  
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Michal Young (U Oregon, USA)  
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## Case Studies

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Will.Tracz@lmco.com

## Industry Presentations

Larry Bernstein (Have Laptop, Will Travel, USA)  
lbernstein@worldnet.att.net  
Stuart Feldman (IBM, USA)  
Chris Haynes (ATT ISTEEL, 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 Madhavji (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

Al Aho (Lucent, USA)  
Lewis Johnson (USC, USA)

## 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

Gregory Abowd (Georgia Inst of Tech, USA)  
Alfonso Fuggetta (Politecnico di Milano, Italy)  
Katsuro Inoue (Osaka U, Japan)  
Mary Shaw (CMU, USA)

## Exhibits

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

## Publicity

Dewayne Perry (Bell Labs, USA)  
dep@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 Derniame (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 Marlin (Flinders U, Australia)  
Kumiyo Nakakoji (NAIST, Japan)  
Elisabetta di Nitto (Politecnico di Milano, Italy)  
Danny Poo (National U of Singapore, Singapore)  
Hong Zhu (Nanjing U, China)

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jazayeri@tuwien.ac.at

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hal.hart@acm.org

## Document Consultant

Robert DeLine (CMU, USA)

## Welcome to the 1999 International Conference on Software Engineering.



*Barry Boehm, General Chair*

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 architecting, 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 techni-

cal 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 Salasin (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

### 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 on-going 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

#### 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****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  
**Imperial Ballroom Suite B**

**TMF2 Overview of Practical Software Measurement**

Joyce Statz, TeraQuest Metrics, Inc., statz@teraquest.com  
Monday 17 May, 8:30 am - 5:00pm  
**Scottsdale**

**TMF3 Introduction to Personal Software Engineering Project Management Process**

A. Winsor Brown, University of Southern California, awbrown@sunset.usc.edu  
Monday 17 May, 8:30 am - 5:00pm  
**Saddlebrook**

**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  
**New Orleans**

**TMA2 Defining Families - Commonality Analysis**

Mark A. Ardis, Lucent Technologies, maa@lucent.com  
David A. Cuka, Bell Laboratories, dcuka@lucent.com  
Monday 17 May, 8:30 am - 12:30pm  
**Houston**

**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  
**New Orleans**

**TMP2 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  
**Houston**

**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  
**Scottsdale**

**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  
**Saddlebrook**

**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  
**Houston**

**TTF4 Round-Trip Engineering with Design Patterns, UML, Java and C++**

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  
**Boston**

**TTA1 Adaptable Components**

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

**TTA2 Using Subject-Oriented Programming to Overcome Common Problems in Object-Oriented Software Development and Evolution**

Harold Ossher and Peri Tarr, IBM T.J. Watson Research Center, tarr@watson.ibm.com  
ossher@watson.ibm.com  
Tuesday 18 May, 8:30 am - 12:30 pm  
**Philadelphia**

**TTP1 Quick Introduction To Software Reliability Modeling**

Jarrett Rosenberg, Sun Microsystems, Jarrett.Rosenberg@Sun.COM  
Tuesday 18 May, 1:30 pm - 5:30 pm  
**Philadelphia**

**TTP2 Modeling and Analyzing Software Architectures**

Bob Monroe, Carnegie Mellon University, bmonroe@cs.cmu.edu  
Tuesday 18 May, 1:30 pm - 5:30 pm  
**Chicago**

# 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@les.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**



Imperial Ballroom A-D



Imperial Ballroom E-F

9:00–10:30

OPENING SESSION AND KEYNOTE ADDRESS

**1. William A. Wulf: Are We "Inventing the Future" or "Fumbling" It?**

Chair: Barry Boehm

10:30–11:00

Break

11:00–12:30

INVITED INDUSTRY PRESENTATIONS

**2A. Rapid Application Development**

Chair: Joyce Fitzpatrick

Speakers: Arnold Pittler (Motorola, USA), Charles Leinbach (C-Bridge, USA)

Discussant: Joyce Fitzpatrick (EDS, USA)

TECHNICAL PAPERS

**2B. Architectures: Composition Techniques**

Chair: Jeff Magee

Using Off-The-Shelf Middleware to Implement Connectors in Distributed Software Architectures: Eric M. Dashofy (Univ. of California, Irvine, USA), Nenad Medvidovic (Univ. of Southern California, USA), Richard N. Taylor (Univ. of California, Irvine, USA)

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

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

12:30–2:00

Lunch

2:00–3:30

INVITED INDUSTRY PRESENTATIONS

**3A. Software Engineering and Money**

Chair: Tim Pauling

Speakers: Jim Horning (Intertrust, USA), Richard Selby (Pacific Investment Management, USA)

Discussant: Tim Pauling (Pricewaterhouse Coopers, USA)

TECHNICAL PAPERS

**3B. Architectures: Development Techniques**

Chair: Gregory Abowd

A Systematic Approach to Derive the Scope of Software Product Lines: Jean-Marc DeBaud (Bell Labs, Lucent, USA), Klaus Schmid (IESE, Germany)

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

Experience with Performing Architecture Tradeoff Analysis: Rick Kazman, Mario Barbacci, Mark Klein, S. Jeromy Carrière, Steven G. Woods (CMU, USA)

3:30–4:00

Break

4:00–5:30

INVITED INDUSTRY PRESENTATIONS

**4A. COTS Integration**

Chair: Tricia Oberndorf

Speakers: Dorothy McKinney (Lockheed Martin, USA), Marie Silverthorn (Texas Inst., USA)

Discussant: Tricia Oberndorf (CMU-SEI, USA)

TECHNICAL PAPERS

**4B. Widescale Computing**

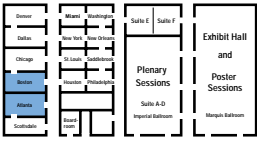
Chair: Bashar Nuseibeh

Exploiting Smalltalk Modules In A Customizable Programming Environment: Mark Woodman, Rob Griffiths, Malcolm Macgregor, Simon Holland, Hugh Robinson (The Open Univ, UK)

Software Engineering Issues for Ubiquitous Computing: Gregory D. Abowd (Georgia Inst. of Technology, USA)

Splitting the Organization and Integrating the Code:

Conway's Law Revisited: James D. Herbsleb, Rebecca E. Grinter (Bell Labs, Lucent, USA)



Atlanta/Boston



Chicago/Dallas

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)

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 Wiecezorek (Fraunhofer Institute, Germany)  
An Assessment and Comparison of Common Software Cost Estimation Modeling Techniques: Lionel C. Briand, Khaled El Emam, Dagmar Surmann, Isabella Wiecezorek (Fraunhofer Institute, Germany), Katrina D. Maxwell (DATA MAX, France)

FORMAL RESEARCH DEMONSTRATIONS

**3C. Formal Research Demos**

*Chair: Gail Kaiser*

Win Win: 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

**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  
Saida 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. Ikonovski, Hakim Lounis (Centre de Recherche Informatique de Montréal, Canada)

FORMAL RESEARCH DEMONSTRATIONS

**4C. Formal Research Demos**

*Chair: Jean-Claude Derniame*

Software Process Support over the Internet  
F. Maurer, G. Succi (University of Calgary, Canada), H. Holz, B. Kötting, S. Goldmann, B. Dellen (University of Kaiserslautern, Germany)  
The RMT (Recursive Multi-Threaded) Tool: A Computer Aided Software Engineering Tool for Monitoring and Predicting Software Development Progress: Arturo I. Concepcion, Sunny Lin (California State Univ., USA), Scott J. Simon (Environmental Systems Research Institute, USA)

TECHNICAL PAPERS

**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  
May20



Imperial Ballroom A-D



Imperial Ballroom E-F

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)

TECHNICAL PAPERS

**6B. Program Composition**

Chair: Joanne Atlee

Avoiding Packaging Mismatch with Flexible Packaging

Robert DeLine (Carnegie Mellon University, USA)

N Degrees of Separation: Multi-Dimensional Separation of

Concerns: Peri Tarr, Harold Ossher, William Harrison

(IBM, USA), Stanley M. Sutton, Jr. (EC Cubed, USA)

An Initial Assessment of Aspect-oriented Programming

Robert J. Walker, Elisa L.A. Baniassad, Gail C. Murphy

(University of British Columbia, Canada)

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)

TECHNICAL PAPERS

**7B. Reuse & Browsing**

Chair: Gail Murphy

Reusing Single System Requirements from Application Family

Requirements: Mike Mannion, Barry Keepence (Napier Univ.,

UK), Hermann Kaindl (Siemens AG Österreich, Austria), Joe

Wheadon (European Space Operations, Germany)

Assessing Software Libraries by Browsing Similar Classes,

Functions, and Relationships: Amir Michail, David Notkin

(University of Washington, USA)

CHIME: Customizable Hyperlink Insertion and Maintenance

Engine for Software Engineering Environments: P. Devanbu

(Univ. of California, Davis, USA), Y-F. Chen, E. Gansner

(AT&T Labs, USA), H. Müller, J. Martin (University of Victoria, Canada)

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)

TECHNICAL PAPERS

**8B. Distributed Systems**

Chair: Richard Taylor

Dynamic Layout of Distributed Applications in FarGo

Ophir Holder, Israel Ben-Shaul, Hovav Gazit

(Technion Institute, Israel)

A Cooperative Approach to Support Software Deployment Using

the Software Dock: Richard S. Hall, Dennis

Heimbigner, Alexander L. Wolf (Univ. of Colorado, USA)

Information Survivability Control Systems

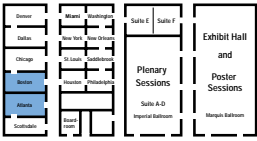
Kevin Sullivan, John C. Knight, Xing Du, Steve Geist

(University of Virginia, USA)

6:00–9:00

Poolside Southwest Fiesta Reception





Atlanta/Boston



Chicago/Dallas

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, Borris Lavva (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 Flow- 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: Gleb 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)

**8C. 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)



Imperial Ballroom A-D



Imperial Ballroom E-F

8:00–9:30

INVITED INDUSTRY PRESENTATIONS

**9A. Software Process Maturity: Is Level Five Enough?**

Chair: Rick Hefner

Speakers: Tom DeMarco (Atlantic Systems Guild, USA),  
Roger G. Fordham (Motorola, USA)

Discussant: Rick Hefner (TRW, USA)

CASE STUDIES

**9B. Case Studies**

Chair: Will Tracz

Haemo Dialysis Software Architecture Design Experiences  
PerOlof Bengtsson, Jan Bosch (University of  
Karlskrona/Ronneby, Sweden)

Architectural Framework Modeling in Telecommunication  
Domain: Giulio Fregonese, Alessandro Zorer, Giovanni  
Cortese (Sodalìa SpA, Italy)

Baseball Seasons and Dog Years

David R. Barstow (TeraQuest Metrics Inc & Instant  
Sports Inc., USA)

9:30–10:00

Break

10:00–12:00

CASE STUDIES

**10A. Case Studies**

Chair: Anthony Finkelstein

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

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

An Architectural Style for Multiple Real-Time Data Feeds: Neil  
Roodyn (Cognitech Ltd., UK), Wolfgang Emmerich  
(Univ. College London, UK)

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

STATE OF THE ART REPORT

**10B. State of the Art of Software Model Checking**

Chair: Lori Clarke

A Practical Method for Verifying Event-Driven Software  
Gerard J. Holzmann, Margaret H. Smith (Bell Labs, USA)

PANEL

**10B. Issues in Software Engineering for Survivable Systems**

Chair: Nancy R. Mead

Panelists: John C. Knight (University of Virginia, USA),  
Richard C. Linger (CMU-SEI, USA),  
Robyn R. Lutz (Jet Propulsion Laboratory/CIT, USA),  
Jeffrey Voas (Reliable Software Tech., USA)

12:00–1:00

Lunch

1:00–2:15

KEYNOTE ADDRESS

**11. Butler Lampson: How Software Components Grew Up and Conquered the World**

Chair: David Garlan

2:15–2:30

Break

2:30–4:30

PANEL AND CLOSING

**12. Future Computer Systems and Software Engineering**

Chair: David Garlan

Panelists:

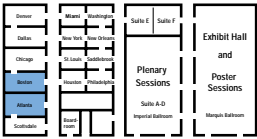
- Steve Cross (CMU-SEI, USA)
- Anita Jones (University of Virginia, USA)
- Butler Lampson (Microsoft, USA)
- David Barnes (McMaster Univeristy, Canada)
- Walker Royce (Rational, Inc., USA)

ICSE 1999 Summary: Barry Boehm, David Garlan,  
Jeff Kramer

ICSE 2000 Prospects: Carlo Ghezzi, Kevin Ryan

ICSE 2001: Hausi Muller, Mary Jean Harrold





Atlanta/Boston



Chicago/Dallas

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)

TECHNICAL PAPERS

**9D. Agents, Mobility & Interoperability**

*Chair: Mary Shaw*

- Agent System Development Method Based on Agent Patterns  
Yasuyuki Tahara, Akihiko Ohsuga, Shinichi Honiden (Toshiba Corporation, Japan)
- LIME: Linda Meets Mobility  
Gian Pietro Picco, Amy L. Murphy, Gruiá-Catalin Roman (Washington University, USA)
- Adding more "DL" to IDL: towards more knowledgeable component inter-operability: Alex Borgida (Rutgers University, USA), Prem Devanbu (University of California, Davis, USA)

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. Ouabdesselam, 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)

TECHNICAL PAPERS

**10D. Inspections, Debugging, & Prototyping**

*Chair: J. Hook*

- Prototyping Real-Time Vision Systems: An Experiment in DSL Design: Alastair Reid, John Peterson, Greg Hager, Paul Hudak (Yale University, USA)
- Generalizing Perspective-based Inspection to handle Object-Oriented Development Artifacts: Oliver Laitenberger, Colin Atkinson (Fraunhofer Institute, Germany)
- Coca: An automated Debugger for C  
Mireille Ducassé (IRISA/INSA, France)

FRIDAY - SUNDAY 21-23 MAY

1999

**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

	SUNDAY 16-MAY	MONDAY 17-MAY	TUESDAY 18-MAY							
8AM										
9AM	<b>Full-day Workshop</b>  <b>WSM1-Chicago</b> Web Engineering	<b>Full-day Workshops:</b>  <b>WSM1</b> Web Engineering (continued)  <b>WM1-Atlanta</b> Principles of Software Change and Evolution (SCE'99)  <b>WM2-Philadelphia</b> Software Engineering over the Internet  <b>WM3-Boston</b> Testing Distributed Component-based Systems  <b>WM4-Suite A</b> First Workshop on Economics-Driven Software Engineering Research(EDSER-1)  <b>WM5-St. Louis</b> Software Transformation Systems  <b>WMT1-Dallas</b> Software Engineering for Parallel and Distributed Systems  <b>WMT2-Suite F</b> Engineering Distributed Objects  <b>WMT3-Suite E</b> Constructing Software Engineering Tools (CoSET'99)  <b>WMT4-Denver</b> CBSE - Component-based Software Engineering	<b>Full-day Tutorials:</b>  <b>TMF1-Suite B</b> Distributed Objects  <b>TMF2-Scottsdale</b> Overview of Practical Software Measurement  <b>TMF3-Saddlebrook</b> Introduction to Personal Software Engineering Project Management Process	<b>Morning Tutorials:</b>  <b>TMA1-New Orleans</b> Inquiry Driven Requirements Analysis  <b>TMA2-Houston</b> Defining Families-Commonality Analysis	<b>Full-day Workshops:</b>  <b>WMT1</b> Software Engineering for Parallel and Distributed Systems (Continued from Monday)  <b>WMT2</b> Engineering Distributed Objects (Continued from Monday)  <b>WMT3</b> Constructing Software Engineering Tools (CoSET'99) (Continued from Monday)  <b>WMT4</b> CBSE - Component-Based Software Engineering (Continued from Monday)  <b>WT1-Atlanta</b> Empirical Studies of Software Development and Evolution  <b>WT2-Suite B</b> Recognition of Dr. Harlan Mills' Legacy  <b>DW</b> Doctoral Workshop	<b>Full-day Tutorials:</b>  <b>TTF1-Scottsdale</b> Managing By The Numbers: Quantitative Measurement and Control of Software Projects  <b>TTF2-Saddlebrook</b> Risk Management in Software Development: A Technology Overview and the RiskIT Method  <b>TTF3-Houston</b> Failure and Success Factors in Reuse Programs: A Synthesis of Industrial Experiences  <b>TTF4-Boston</b> Round-Trip Engineering with Design Patterns, UML, Java and C++	<b>Morning Tutorials:</b>  <b>TTA1-Chicago</b> Adaptable Components  <b>TTA2-Philadelphia</b> Using Subject-Oriented Programming to Overcome Common Problems in Object-Oriented Software Development			
10AM										
11AM										
NOON									<b>Tutorial &amp; Workshop Lucheon</b>	<b>Tutorial &amp; Workshop Lucheon</b>
1PM										
2PM		<b>Afternoon Tutorials:</b>  <b>TMP1-New Orleans</b> Verification and Validation of Requirements for Mission Critical Systems  <b>TMP2-Houston</b> Software Interoperability: Principles and Practice	<b>Afternoon Tutorials:</b>  <b>TTP1-Philadelphia</b> Quick Introduction to Software Reliability Modeling  <b>TTP2-Chicago</b> Modeling and Analyzing Software Architectures							
3PM										
4PM			<b>ICSE 99 Exhibit</b> 3:00 - 7:00 pm							
5PM				<b>Opening Reception</b> 5:00 - 7:00 pm						
6PM										
7PM										
8PM										

WEDNESDAY 19-MAY	THURSDAY 20-MAY	FRIDAY 21-MAY	SATURDAY 22-MAY	
	<b>Technical Program: Session 5</b> 8-9:15 am <b>Keynote Address:</b> Dr. Alan Kay VP and Disney Fellow Walt Disney Imagineering 9:30- 10:30 <b>Awards Presentations and Best Paper from ICSE-11</b>	<b>Technical Program: Session 9</b> A. IIP: Software Process Maturity: Is Level Five Enough? B. Case Studies C. Reverse Engineering D. Agents, Mobility & Interoperability	<b>Symposium on Software Reusability SSR'99</b> This program continues on Sunday 23 May from 8:00 am to 3:00 pm as well.	
<b>Technical Program: Session 1</b> <b>Keynote Address:</b> Dr. William A. Wulf President U.S. National Academy of Engineering	<b>ICSE 99 Exhibit, Informal Demonstrations &amp; Poster Sessions</b> 10:00 am - 4:00 pm	<b>Technical Program: Session 10</b> A. Case Studies B. Model Checking Talk and Trustworthy Systems Panel C. Testing D. Inspections, Debugging, & Prototyping	<b>Full-day Workshop</b> <b>WSa1-Scottsdale</b> Ensuring Successful COTS Development See <a href="http://ssr99.ifi.uni-klu.ac.at/ssr99/">http://ssr99.ifi.uni-klu.ac.at/ssr99/</a> for information. or <a href="http://csalpha.unomaha.edu/~ssr99/">http://csalpha.unomaha.edu/~ssr99/</a>	
<b>Technical Program: Session 2</b> A. IIP: Rapid Application Development B. Architectures: Composition Techniques C. Intellectual Property Issues D. Metrics: Cost Estimation		<b>Technical Program: Session 6</b> A. IIP: Software/System Definition and Architecting B. Program Composition C. Formal Research Demos D. Program Analysis		
<b>Technical Program: Session 3</b> A. IIP: Software Engineering and Money B. Architectures: Development Techniques C. Formal Research Demos D. Metrics: Tools & Design		<b>Technical Program: Session 7</b> A. IIP: Software and System Safety B. Reuse & Browsing C. Formal Research Demos D. Specification & Verification	<b>Technical Program: Session 11</b> <b>Keynote Address:</b> Dr. Butler Lampson Architect Microsoft Corporation	
<b>Technical Program: Session 4</b> A. IIP: COTS Integration B. Widescale Computing C. Formal Research Demos D. Evolution		<b>Technical Program: Session 8</b> A. IIP: Software Reuse & Product Line Management B. Distributed Systems C. Formal Research Demos D. Model Checking	<b>Technical Program: Session 12</b> <b>Panel:</b> Future Computer Systems and Software Engineering <b>Closing:</b> ICSE Summary and Prospects	
	<b>Poolside Southwestern Fiesta Reception</b> 6:00 to 9:00 pm	<b>Symposium on Software Reusability SSR'99</b> 6 concurrent Professional Development Seminars (PD1 - PD6) See <a href="http://ssr99.ifi.uni-klu.ac.at/ssr99/">http://ssr99.ifi.uni-klu.ac.at/ssr99/</a> for information. or <a href="http://csalpha.unomaha.edu/~ssr99/">http://csalpha.unomaha.edu/~ssr99/</a>		
		<b>SSR'99 Reception</b> 8 - 9pm		



# 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 discussion 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, or 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.



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## Accommodations and Attractions



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.

*salutes*

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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.

In the process, we provide our people with more opportunity to realize their personal aspirations. With hundreds of programs across our market sectors – commercial, defense, intelligence, energy, and public sector – you can choose a challenge that brings out your best work and rewards it. Want to capitalize on network-based technologies? Re-invent legacy systems? Engineer new hardware and software architectures? Capture and secure data?

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](mailto: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](mailto:steve.jacobs@trw.com)**

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### 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 traditional 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.

### Birds-of-Feather Sessions & Side Meetings

#### Monday 17 May

6:00 p.m. - 8:00 p.m.: ICSE 2001 Planning Meeting,  
**Scottsdale Room**

#### Tuesday 18 May

3:00 pm. - 5:00 p.m.: ICSE 2000 Executive Committee,  
**Saddlebrook Room**  
 7:00 p.m. - 9:00 p.m.: Joint L.A. ACM/SIGAda/SIGPLAN Meeting  
**Atlanta/Boston Room**  
 7:00 p.m. - 11:00 p.m.: ICSE Steering Committee,  
**Scottsdale Room**

#### Wednesday 19 May

1:00 p.m. - 5:00 p.m.: ICSE 2000 Organizing Committee,  
**Saddlebrook Room**  
 5:30 p.m. - 6:00 p.m.: TCSE Annual Meeting,  
**St. Louis Room**  
 5:30 p.m. - 6:30 p.m.: SIGSOFT Meeting,  
**Scottsdale Room**  
 6:30 p.m. - 9:30 p.m.: SIGSOFT Executive Committee,  
**Boardroom**  
 7:00 p.m. - 9:00 p.m.: Software Engineering Education BOF,  
**Atlanta/Boston Rooms**

#### Thursday 20 May

Noon - 1:30 p.m.: Software Engineering Education Meeting,  
**St. Louis Room**  
 5:30 p.m. - 6:30 p.m.: ICSE 2000 Program Committee,  
**Scottsdale Room**

### 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/](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://tgs77.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.*





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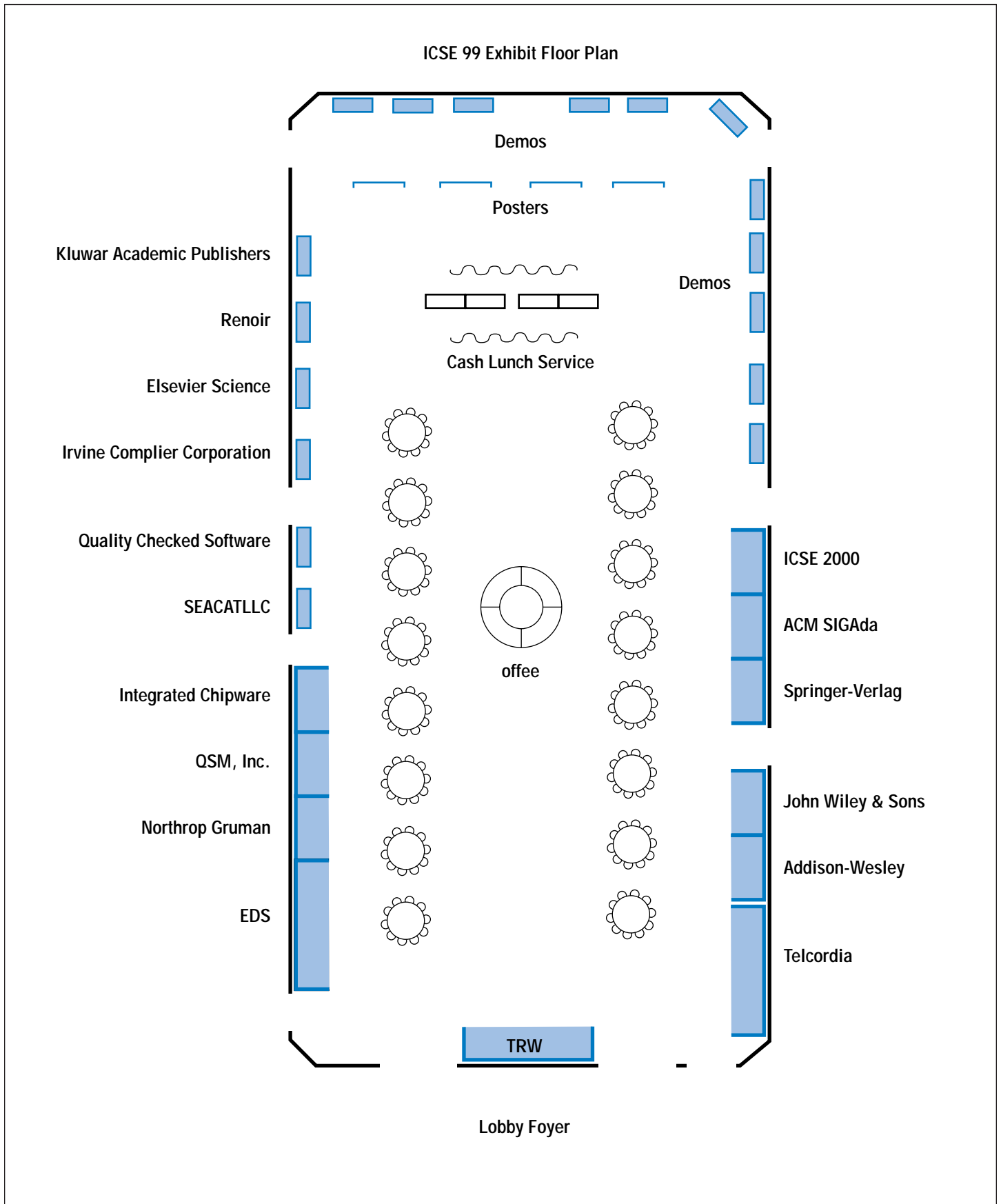
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# Exposition Floorplan & Exhibitor Directory



## 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 Guoqing*  
wgq@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

COCOTS Software Integration Cost Model: An Overview  
*Chris Abts*  
cabts@sunset.usc.edu

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  
*Gulden 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*  
kwangjun@gwis2.circ.gwu.edu

Dali: 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 Specifican (SRS) During Requirements Analysis  
*Brian C. McCurtis*  
bmccurti@uci.edu

Knowledge Depot Project Awareness  
*Michael Kantor*  
mkantor@ics.uci.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 Brosgol Chair, ACM SIGAda  
Brosgol@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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Phone: (781) 944-3700  
Fax: (781) 942-3076  
Web: <http://www.awl.com/cseng/>

### EDS

EDS will showcase examples of technology products delivered to customers in the airline and government industries. Specialists will be present to discuss our achievements with SEI/CMM. Staffing repr

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### Integrated Chipware

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Reston, VA 20190  
Phone: (703) 736-3500  
1-888 430-CHIP  
Fax: (703) 736-3556  
Web: <http://www.chipware.com>



## Exhibitor Descriptions

### Irvine Compiler Corporation

ICC offers the best of both worlds. ICC has developed the Ada compiler technology to integrate with existing embedded tools such as C cross compilers, symbolic debuggers, emulators, simulators and real time operating systems at the Ada Level.

ICC Ada for 83/95 supports the following Host (Native), Embedded target Processors and Real-Time Ada and the third party debuggers, emulators, simulators, real-time O/S, at Ada level.

- *Embedded Target Processors:* PowerPC series, X-86 series, Analog Devices SHARC 210X0, and Intel i960 family of processors.
- *Hosts:* Sun Solaris, SGI-IRIX, HP-UX, DECAalpha/OSF, PC-Linux, PC-Windows NT, VAX/VMX.
- *Real Time Ada for:* HP-RT with 744 rt board hosted on HP-UX 10.2+, Lynx-O/S, Vxworks.
- *Supports the technology of the following companies at Ada level:* CAD-UL Diab Data, SDSI . Lynx, Wind-River, Hitex, ISI and other embedded toll vendors.

Irvine Compiler Corporation is providing quality Ada tools since 1981. Our Ada is used by the Army, Air Force, Navy and Commercial aviation for embedded, real time and Native Ada applications.

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Irvine, CA 92614  
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Fax: (949) 250-0676  
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### John Wiley & Sons

Founded in 1807, John Wiley & Sons, Inc. is an independent, global publisher of print and electronic products. Wiley specializes in scientific and technical books, journals, textbooks and education materials for colleges and universities, and professional and consumer books and subscription services. Wiley's Internet Site can be accessed at <http://www.wiley.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>

### Quality Checked Software, Ltd.

Quality Checked Software (QCS) is an independent firm devoted of sales of software testing and evaluation tools in the Workstation and Personal Computer marketplace. QCS provides real-world testing solutions that are proven tools and techniques to save money and shorten testing time while improving product quality. These tools have been shown to fill a need for a growing number of firms looking for practical and cost effective methods to improve software test and measurement.

Address: P.O. Box 6656  
Beaverton, OR 97007-0656(503) 645-5610  
Fax: (503) 645-5075  
Web: <http://www.qcsltd.com>

### Quantitative Software Management, Inc.

*QSM tools help Project Managers manage better!*

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Address: 2000 Corporate Ridge, Suite 900  
McLean, VA 22102  
Phone: 1-800-424-6755  
Fax: (703) 749-3795  
Web: <http://www.qsm.com>

### 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 medua???

And infrastructure for research in requirements engineering.

In this booth we present RENOIR, its objectives, and some of the research that has been done by its members.

Address: Department of Computer Science  
University College London, Gower Street  
London, WC1E 6BT, UK  
Phone: +44-171-4193713  
Fax: +44-171387-1397  
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### Telcordia Technologies

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:

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

### TRW

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Redondo Beach, CA 90277  
E-Mail: [it-ts.recruiting@TRW.COM](mailto:it-ts.recruiting@TRW.COM)  
Website: <http://www.trw.com>



# ICSE 2000

The 22nd International Conference on Software Engineering  
Limerick, Ireland

## 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

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  
alw@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.

<http://www.ul.ie/~icse2000>

# ICSE 2001

## 23rd International Conference on Software Engineering

May 2001  
Toronto, Ontario, Canada  
[www.csr.uvic.ca/icse2001](http://www.csr.uvic.ca/icse2001)

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University of Victoria, Canada  
hausi@scr.uvic.ca

Program Chairs:

**Mary Jean Harrold**

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harrold@cis.ohio-state.edu

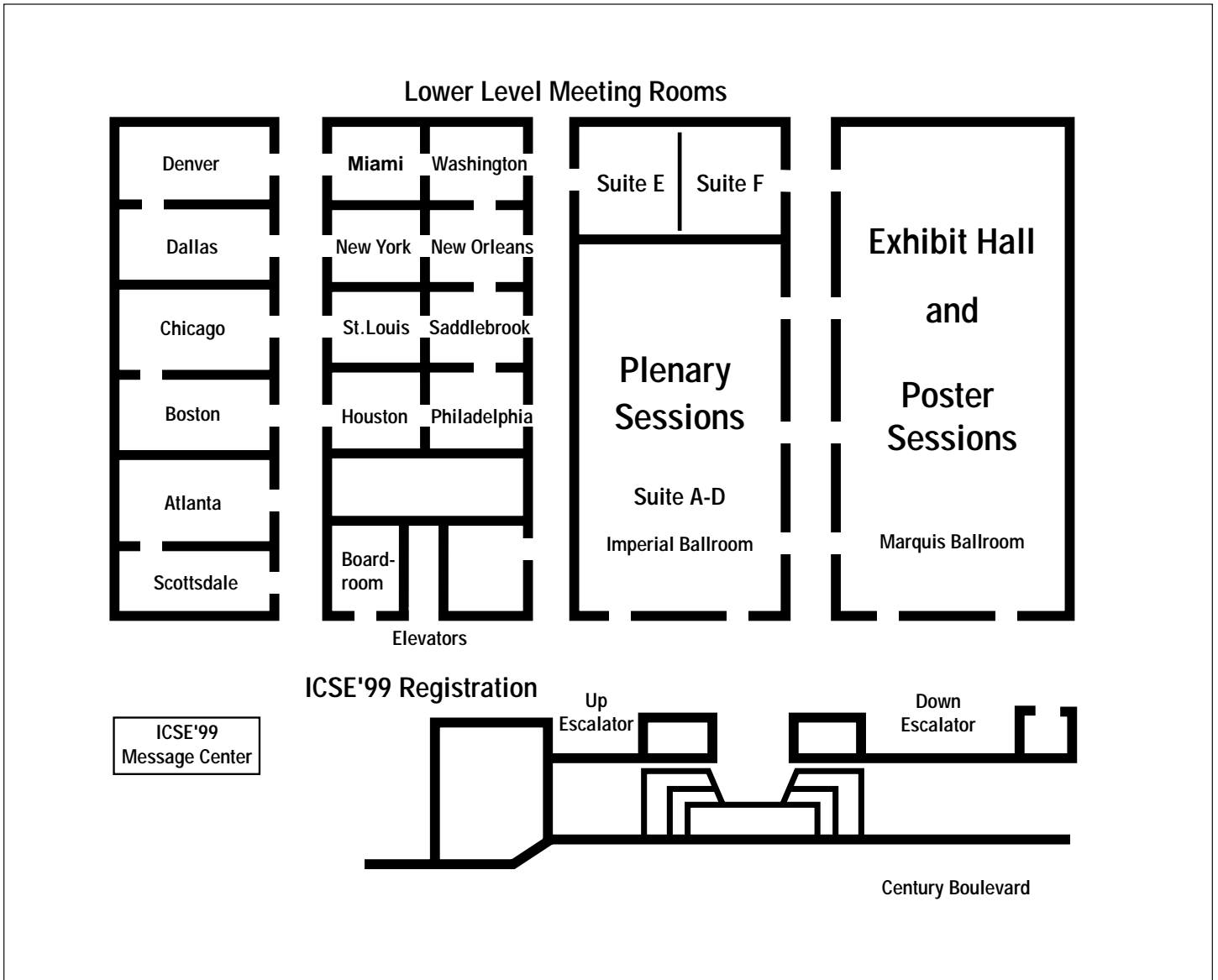
**Wilhelm Schaefer**

Universität-GH Paderborn, Germany  
wilhelm@uni-paderborn.de





# Hotel Floor Plan



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