

HOT RESEARCH

Applying ISR's Interactive and Collaborative Technologies Expertise

ISR is well known for its expertise in several realms of software research, including software engineering, software testing and analysis, and interactive and collaborative technologies (ICT). Our ICT group of researchers has grown in numbers and stature over the past few years, and includes **Mark Ackerman, Paul Dourish, Alfred Kobsa, Gloria Mark, Bonnie Nardi, and David Redmiles**. As an exemplar of this group, we feature Gloria Mark's research, which focuses on the "human side of computing." (For more glimpses of ISR ICT research, see the article introducing new faculty member Bonnie Nardi on p. 2 and the articles on ICT graduate student Danyel Fisher on pp. 2 and 6.)

As with other ICT faculty, Mark studies the use of computer and information technologies in real-life situations, including their organizational and societal impact, and how technologies can be better designed to support human needs. Her specific interests are in distributed and collaborative technology-aided work, and how technologies can support large scale



team-to-team collaborations. She has done several studies of collocated and distributed software design teams, including several studies at Boeing. Gloria is one of eight ISR faculty researchers currently examining

distributed software development as part of our \$1.8 million NSF Information and Technology Research grant (see article in the Fall/Winter 2002 *ISR Connector*).

In her studies of distributed and collaborative technology-aided work, Mark has found that people face difficulties when collaborating at a distance, which have resulted in costs ranging from time-to-market delays to the

RESEARCH BRIEFS

New ISR Awards include NSF grants for: "Usable Security: Towards a Trustable Information Infrastructure" (\$600,000, **Paul Dourish** and **David Redmiles**), "Privacy-enabling Design of Personalized Websites" (\$360,000, **Alfred Kobsa**), "Research Directions for Continuous Design in Free/Open Source Software Systems" (\$245,000, **Walt Scacchi** and **Les Gasser**), "Dynamic Process Enactment, Discovery, and Recovery" (\$445,000, **Walt Scacchi** and **John Noll**) as well as a grant from Intel for "Trustable Technology: Balancing Privacy and Accessibility in Mobile, Ad Hoc Networks" (\$280,000, **Paul Dourish** and **David Redmiles**).

Bonnie Nardi has been invited to give several invited talks: the opening keynote at The Colston Research Symposium at the University of Bristol, England in the Graduate School of Education and Department of Computer Science conference on March 22, 2004; an invited talk on March 23 at the Symposium on Learning and Technology at Work, at the Institute of Education, University of London; and an invited talk at the University of Washington at the Walter Chapin Simpson Center for the Humanities on June 4. For more information on Bonnie Nardi, see Focus on Faculty, page 2.

Paul Dourish recently gave two keynote presentations: 2003 Usability Professionals Association (UPA) conference (with Dan Russell, IBM) and OzCHI (Australia CHI) 2003. He will also give an invited talk at the IEEE Symposia on Human Centric Computing (HCC 2004) in September 2004.

Paul Dourish's research in awareness was covered in the Danish engineering press *Ingeniøren*, September issue. <http://www.ing.dk/awareness>. *Ingeniøren* is widely circulated in Denmark, reaching every practicing engineer in the country.

Alfred Kobsa received one of the two Best Paper Awards for his paper on "Performance Evaluation of User Modeling Servers Under Real-World Workload Conditions" presented at the 9th International Conference on User Modeling, Johnstown, PA, in June 2003. The article is available online at <http://www.ics.uci.edu/~kobsa/papers/2003-UM-kobsa.pdf>

André van der Hoek and his student **Chris Lüer** presented a paper entitled "Architecture-Based Program Compaction" at the Workshop on Reuse in Constrained Environments at OOPSLA 2003 in November.

Challenger disaster. Remote collaborators suffer from limited social information in the communication process, as well as differing underlying meanings normally built over time among face-to-face ("collocated") team members. Mark's research suggests there are ways to mitigate the "space between" differences on both sides of the human-computer interaction divide.

On the computer side of that divide, informing technology improvement is one goal of Mark's research. The research finding that technology should convey more social information has been addressed by newer technologies such as HDTV video conferencing, room-sized real-time video displays, and grid technologies. Conveying larger views of people and data, however, has not closed the "space between." By studying how technology supports disparate team cultures in developing common meanings, Mark and her students have found an additional technological need for making underlying meanings more visible to all collaborators.

On the human side of the "space between," Mark's studies of warroom environments, in which teams work together synchronously in all phases of the project, have shown that

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specially chosen facilitators can double project productivity. By continually monitoring the collaboration landscape visually and aurally, picking out important activity foci and trouble spots, and providing resources as needed, facilitators keep teams from bogging down. Dubbing the resulting dynamic “extreme collaboration,” Mark found the combination electronic-and-social environment maximized communication and information flow among synchronously working project teams for super-fast project completion. For example, NASA/JPL’s facilitated Team X can design a new space mission proposal within a week, defining all aspects of the mission in just three sessions of three hours each (with some pre and post work).

A recent Wall Street Journal article (November 10, 2003, p. B1) features another of Mark’s research projects exploring the human side of computing. With her student **Victor Gonzalez**, Mark has found that technologies and the current pace of life have pushed multi-tasking to the point where people are choosing to task switch on the average of every three minutes, if not interrupted otherwise. This research promises to inform technology design regarding how to keep people’s thoughts straight while multi-tasking across different projects and tools.

Much of Mark’s research has resonated with individuals and companies trying to reconcile a shrinking world with technologies unequal to new needs. Effective virtual collocation—being in the “global room” by way of technology, if not physically in the same location—has become a necessity for international, multinational, and global companies conducting distributed operations across distance. Her research has been applied in diverse companies that depend on distributed communications, including Boeing, Intel, NASA/JPL and State Street. We look to Mark and other ICT researchers to inform new technologies on better ways to communicate and share information in the global room.

Gloria Mark can be reached at (949) 824-5955, gmark@uci.edu.

FOCUS ON FACULTY

Meet Bonnie Nardi

Bonnie Nardi (<http://darrouzet-nardi.net/bonnie>), Associate Professor of Information and Computer Science at UC Irvine, is a noted anthropologist specializing in the study of technology. She’s put her

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Affiliate—Visiting	\$40,000	Host Faculty’s research area.
Affiliate—Grad Student	\$60,000	Graduate Student fellowship.
Partner	\$100,000 or more	Large-scale research project.

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Dr. Susan J. Knight
 sknight@uci.edu
 (949) 824-5927

expertise to good use at Agilent, Apple and AT&T, helping software designers create people-friendly tools that promote interpersonal relationships. She holds several patents for such tools with former colleagues at Apple, Hewlett-Packard and AT&T.



With an undergraduate anthropology degree from UC Berkeley and a Ph.D. from UC Irvine’s School of Social Science under her belt, Bonnie spent a year doing postdoctoral research in Samoa

and has since done field work from New Guinea to Silicon Valley. Her research interests are user interface design, collaborative work, computer-mediated communication, and theoretical approaches to technology design and evaluation.

Bonnie is currently doing studies on blogging (weblogs, or *blogs*, are online journals) and on scientific collaborations across organizational, distance and other boundaries. The blogging study examines personal communications of “ordinary bloggers” and their motivations for creating and maintaining blogs. Blogs, a series of archived Internet postings for a targeted audience, have gained enormous popularity and attention recently, impacting social groups ranging from close-knit friends to anonymous Western world news watchers.

Widely published in the field of human-

computer interaction (HCI) and computer-supported cooperative work, Bonnie is currently working on a co-authored book for MIT press, *Acting with Technology: Activity Theory and Interaction Design*, one in a series exploring the rich social and physical contexts of technology. This book continues Bonnie’s extensions of activity theory, a philosophical framework developed by a group of Russian psychologists that lends itself well as a framework for understanding HCI. Bonnie is largely responsible for spreading the term “information ecology” with her co-authored book, *Information Ecologies: Using Technology with Heart*. She is on the editorial board of *First Monday*, a peer-reviewed online journal devoted to the Internet.

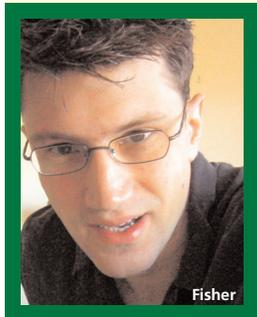
Bonnie can be reached at nardi@ics.uci.edu, (949) 824-6534.

Making Computers Work Better for People

“People,” says graduate student **Danyel Fisher (Paul Dourish, advisor)**, “are everywhere.” He’s referring to the tracks and traces of individuals and their relationships that are embedded in every computer system, but whose richness has previously been underutilized. Fisher’s people orientation comes naturally. Fisher, who expects to complete his Ph.D. next summer, is a Human-Computer Interaction (HCI) researcher in the Information & Collaborative Technologies (ICT) group at ISR.

Fisher’s research examines the traces people

leave behind in all computer systems. Email address books, PDA address books, client databases, shared drives and scheduling programs all house data that comes from people. More subtly, so do email files, instant messages, and other communications that signal people are interacting. Together the underlying communications patterns speak untold volumes about a computer user's social networks. Fisher is capturing this data, studying it, and putting it to optimum use in new tools for computer users.



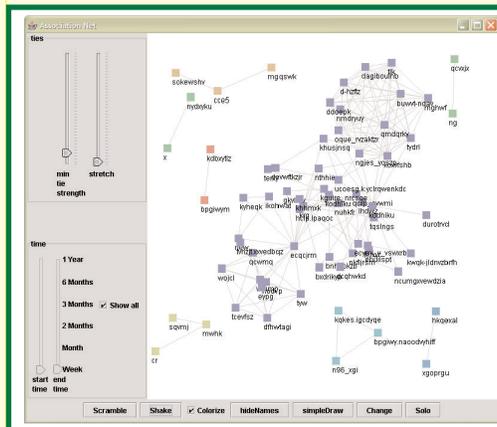
One of a suite of developing tools, Fisher's tool Soylent (homage to the movie *Soylent Green*) applies a deep understanding of how single-user computer experiences carry interactive information. This data is integrated to reveal col-

lective activities of the user within his larger overlapping social work- and leisure-scapes. Harnessing this "everyday collaboration" helps people coordinate their work and other activities with others. Using highly selective information from email archives, Soylent ties messages into a social network and orders them into a timeline chart. It uses this organized data to provide value-added email system information automatically. If you see yourself in any of the following problem scenarios, Soylent and other tools being developed by Fisher can provide solutions.

- A call comes in from a potential client whose name you don't immediately recognize. While conversing, you realize you'd been in touch several months ago, so you quickly skim through email records on the client's name. Nothing surfaces because the mail client is poor at checking carbon-copied names.
- You need to refer to a document prepared a few months ago and emailed to a colleague, but it's tucked away somewhere on your hard drive. You locate it through an inbox search by skimming through several alternative files, subfiles, and document versions. For your current project, you save the document to disk for the umpteenth time.
- Having recently been laid off, you prepare for a job search. Knowing it's a good time for social network maintenance, you start to catch up on old mail. Unfortunately, you don't remember an old friend, now a recruiter in your field, with whom you've fallen out of touch.

- A manager, preparing for an end-of-week report, once again spends an hour skimming email from the past week, trying to remember the week's full set of projects. The week's big crisis has masked a number of accomplishments which don't make it into the report.
- A team member, trying to track down a decision made several months ago, can't quite remember who was involved in the team at the time. Was that when the consultant was involved? It takes some time to dig through the mass of old messages and documents to figure out who was involved.

Fisher's visualization expertise lends itself to user-friendly enhancements in his novel tools. Information is conveyed to the user on screen through diagrams. The diagram below shows the Soylent network view, which quickly reveals different groups with different roles.



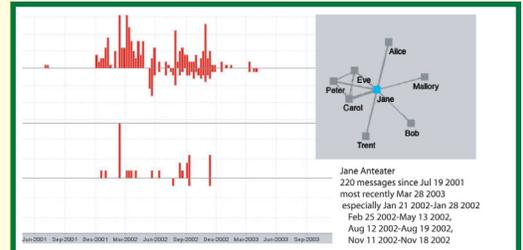
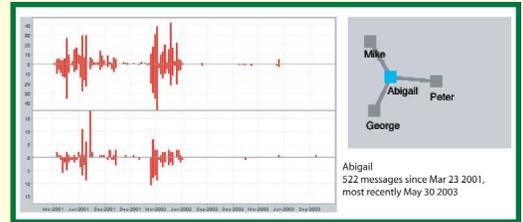
The upper bar in the first chart, top right, shows the number of incoming/outgoing email messages between the user (the central blue box) and one correspondent within a social network, while the bottom bar shows the number of associated incoming/outgoing attachments. The second chart, top right, highlights a different set of connections between the user and another correspondent within a different social network.

You can try Soylent for yourself, using the visualizations and tools available at <http://www.isr.uci.edu/projects/soylent/>.

Fisher has had several opportunities to work in industry while developing his interests in online social spaces. As an information

DID YOU KNOW?

ISR's xADL software architecture technology has been adopted by U.S. and European space agencies.



design consultant, he has evaluated user interfaces, business strategies and security systems for small business software distribution and adoption. He has also interned at two major research laboratories, IBM Almaden and Lotus, designing and implementing a variety of software projects.

At IBM, Fisher worked with the USER group at Almaden Research on a web-based interface for electronic social interaction. WebPlaces, as it is called, follows users' movements to understand their interests, and allows users doing similar projects to communicate. In 2000, Fisher designed and implemented a distributed online survey and analysis tool at Lotus Research. The Java applet for Lotus Notes allowed users to learn about email use patterns, including folders, threads and social network participation. In 2002, he was invited to work at IBM Research (formerly Lotus) in Cambridge, Massachusetts, following up on workspace research (see UCI-ISR Tech Report 02-2).

Fisher received a BS in Computer Science and BA in Philosophy from Washington University St. Louis in Spring 1997, and an M.S. in Computer Science from UC Berkeley in May 2000. He subsequently transferred to UCI to complete his graduate education.

How did Fisher get to UCI? While at UC Berkeley, Fisher took a course with visiting sociologist Barry Wellman (U. Toronto). "Barry is responsible for giving me a new way of looking at the world," said Fisher. Fisher later heard a talk by Paul Dourish, then at Xerox PARC. The rest, as they say, is history—Dourish left PARC to join the ICT group at ISR/UCI, and Fisher soon followed.

More about Fisher's research at <http://www.isr.uci.edu/~danyelf>. He can be reached at (949) 824-1338; danyelf@uci.edu.

ISR STUDENT NEWSBRIEFS

Anita Sarma (A. van der Hoek, advisor) was accepted to the doctoral symposium at ESEC/FSE 2003 in Helsinki, Finland in September. Her



paper was titled "Configuration Management Workspace Awareness for Distributed Software Development." Sarma will also present at the Association for Configuration and Data Management

(ACDM) Symposium on SCM, in January 2004. Sarma was a recipient of a 2003 ICS Summer Fellowship.

Emily Oh Navarro (A.v.d. Hoek, advisor), was awarded the Achievement Rewards for College Scientists (ARCS)



Fellowship for 2003-04 and 2004-05. This fellowship is granted to academically outstanding United States citizens studying to complete their degrees in science, medicine and engineering.

Scott Hendrickson, Eric Dashofy, John Georgas (R. Taylor, advisor) and **Ping Chen, Chris van der Westhuizen, Matt Critchlow** (A. v.d. Hoek advisor) participated in the poster session at the NASA/JPL Space Mission Challenges for Information Technology (SMC-IT) 2003. Their posters included "A Tool Set for Change Management and Feature Propagation within a Product Family Architecture", "Distributed Architecture-Based Run-Time Evolution", and "An Approach for Tracing and Understanding Asynchronous Architectures".

Chris Van der Westhuizen (A. van der Hoek, advisor) gave a presentation on Ménage at ICSM 2003 (Int'l Conf. on Software Maintenance). As a result,

ISR EVENTS SCHEDULE

Mark your calendars now!

September 19, 2003

UCI ISR - NSF Workshop on Continuous Software Design in Open Source Software Communities

Faculty Host: Walt Scacchi
ICS2 136



November 7, 2003

Distinguished Speaker: Anthony Finkelstein

University College London
"Check - Report - Repair"
2:00-3:30 p.m., McDonnell Douglas Auditorium

December 16-18, 2003

Int'l Workshop on Community-Driven Evolution of Knowledge Artifacts

Faculty Host: David Redmiles
ICS2 136

January 16, 2004

Distinguished Speaker: James A. Landay

University of Washington
"Using Design Patterns to Create Cross-Platform Web Sites"
2:00-3:30 p.m., McDonnell Douglas Auditorium



January 30, 2004

Distinguished Speaker: Mary Jean Harrold

Georgia Institute of Technology
"Testing and Analysis of Next Generation Software"
2:00-3:30 p.m., McDonnell Douglas Auditorium

February 13, 2004

Distinguished Speaker: Judy Olson

University of Michigan
"What is the Cost (Benefit) of Being Remote: Organizational Simulation as a Tool for Studying Team Work"
1:30-3:00 p.m., McDonnell Douglas Auditorium

May 7, 2004

Distinguished Speaker: Susan Leigh Star

University of California, San Diego
"Residual Categories: A Challenge for Ethics, Information Systems, and Communication"
2:00-3:30 p.m., McDonnell Douglas Auditorium

June 2004

2004 ISR Research Forum

Look for more information online and in the next issue of the *ISR Connector*.

For more information: <http://www.isr.uci.edu/events.html>

he and van der Hoek are examining potential collaborations with the Vrije Universiteit in Amsterdam and UFRJ, a

Brazilian University.

For more information on students:
<http://www.isr.uci.edu/people.html>

ISR ALUMNI NEWSBRIEFS

David Hilbert, Ph.D. 1999, (D. Redmiles, advisor), has been promoted to Senior Scientist at FX Palo Alto Laboratory, Inc. (FXPAL).

Hadar Ziv, Ph.D. 1997, (D. Richardson, advisor), was a School of ICS Award Honoree in the 2003 10th Annual Celebration of Teaching. Ziv is a Lecturer in SICS and a Senior Software Engineer at eBuilt, Inc.

ISR Technical Reports Available Online

ISR technical reports present information resulting from student and faculty research carried out under the auspices of the Institute. They showcase early results not available in print elsewhere. ISR technical reports are available on the ISR Web site in PDF for easy download and printing. Recent reports include:

“Use Case, Goal, and Scenario Analysis of the Euronet System: Comparing Methods and Results”

Thomas A. Alspaugh and Annie I. Antón, UCI-ISR-03-12

“User Experiments with Tree Visualization Systems”

Alfred Kobsa, UCI-ISR-03-11

“Decentralized Software Evolution”

Peyman Oreizy and Richard N. Taylor, UCI-ISR-03-10

“PACE: An Architectural Style for Trust Management in Decentralized Applications”

Girish Suryanarayana, Justin Erenkrantz, Scott Hendrickson, and Richard N. Taylor, UCI-ISR-03-9

“Extending the REpresentational State Transfer (REST) Architectural Style for Decentralized Systems”

Rohit Khare and Richard N. Taylor, UCI-ISR-03-8

“An Empirical Study of Scenario Similarity Measures”

Thomas A. Alspaugh, Annie I. Antón, and Laura J. Davis, UCI-ISR-03-7

“Free Software: A Case Study of Software Development in a Virtual Organizational Culture”

Margaret S. Elliott and Walt Scacchi, UCI-ISR-03-6

“Security Day-to-Day: User Strategies for Managing Security as an Everyday, Practical Problem”

Paul Dourish, Rebecca E. Grinter, Brinda Dalal, Jessica Delgado de la Flor, and Melissa Joseph, UCI-ISR-03-5

“Supporting Distributed and Decentralized Projects: Drawing Lessons from the Open Source Community”

Justin R. Erenkrantz and Richard N. Taylor, UCI-ISR-03-4

All ISR technical reports are available at: <http://www.isr.uci.edu/tech-reports.html>

For more information, contact:

Debra A. Brodbeck

Technical Relations Director
brodbeck@uci.edu, (949) 824-2260

ISR STUDENT NEWSBRIEFS

Rohit Khare (R. Taylor, advisor) received his Ph.D. in December 2003.



His dissertation is titled “Extending the REpresentational State Transfer (REST) Architectural Style for Decentralized Systems”. Read about Khare’s research in ISR Technical Report UCI-ISR-03-8. Khare is now a consultant at 4K

Associates, <http://www.4k-associates.com/>, and was a founder of KnowNow, <http://www.knownow.com/>

Mark Bergman (G. Mark, advisor) received his Ph.D. in August 2003.

His dissertation is titled “Understanding Ecologies of Large Scale System Requirements using the Authority-Activity Model: *In Situ* Requirements Analysis of the New Millennium Program.” Bergman is currently an ISR Post-Doctoral Researcher.
<http://www.isr.uci.edu/~mbergman>

Sameer Patil (A. Kobsa, advisor) worked with a team of researchers at IBM T.J. Watson Research Center during his summer internship. He explored improving the user experience for performing search on IBM’s corporate Web site (<http://www.ibm.com/>).

John Georgas (R. Taylor, advisor) spent his summer at The Aerospace Corp. on a project introducing Grid services to a satellite analysis tool. Offloading heavy-duty computation to a large cluster will hopefully increase performance, and allow more complex analyses to be delivered sooner.

Scott Hendrickson, Eric Dashofy and Richard Taylor’s (advisor) paper “An Approach for Tracing and Understanding Asynchronous Architectures” was accepted as a short paper to the 18th IEEE Int’l Conf. on Automated Software Engineering (ASE 2003) held in October.

For information on graduate student internships, contact **Dr. Susan J. Knight**, sknight@uci.edu, (949) 824-5927.

2003 ISR Research Forum: When Research Met the Real World

The Institute's biggest annual event, held this year at UCI on June 17, 2003, featured IBM Research's **Alfred Spector**, VP Services and Software, showcased ISR's newer faculty research, and emphasized real world issues. Registrants lauded the quality of the research represented, as exemplified by comments from **Jim Swanek** of The Aerospace Corporation. "I enjoyed the ISR Research Forum. The technical quality of the research and mastery of subject matter by the researchers with whom I spoke was excellent. I particularly impressed with the quality of the students I had the opportunity to meet at the poster and demonstration sessions. I look forward to future ISR events."



Panelists Frystyk Nielsen, Khare, and Thomsen

- Complementary talks by an ISR-Aerospace Corporation aspect-oriented collaboration team;
- A talk about how alternative scenarios can inform software specifications;
- A talk on extrapolating and using people's computer- and real-life-evidenced relationship patterns to reconfigure computer tools; and
- The keynote speaker on creating new computer application domains by optimizing computer-supported functions.

As expected, the panel, entitled, "Web Services vs Distributed Objects: Architectures for Decentralized Applications," generated some heat about the SOAP—CORBA controversy from both the audience and panelists. Three basic issues were addressed by panelists **Rohit Khare** (advisor **Richard Taylor**), Microsoft's **Henrik Frystyk Nielsen** and Alodar Systems' **Mark Thomsen**: appropriateness of alternative programming models, semantic issues, and service quality. There was some consensus: both protocols have the same goals and very different engineering approaches. Lively audience feedback included ISR Director Richard Taylor's comment that although SOAP can be used to expose and cope with transient network failures better than CORBA can, neither approach fully lives up to their touted benefits — particularly CORBA's claim of providing transparency. Keynote speaker Alfred Spector weighed in from the audience on the trade-off between performance and extensibility, pointing out that extensibility is far more important than performance in web services. At the end of the day there may have been few converts, one way or another, but a better understanding of the ideal solution was gained by all.

There was ample evidence that the Forum achieved its goal of bringing academia and industry together for mutually beneficial exchanges. A full third of registrants were

from industry. One industry attendee said, "Interaction between the University and industry is a good idea—keep up the initiative." **John VanZandt** of the international software development firm CEO Consultancy went further to explain the benefits of academia-industry interactions. He appreciated the opportunity to see that academic research is actually being tested in real world applications, as well exemplified by ISR. He planned to pass on insights gained to his clients.

The surprise hit of the event was the presentation by graduate student **Danyel Fisher** (**P. Dourish**, advisor). Described by one industry attendee as "eloquent!", Fisher showed how social networks can be traced and tracked in computer systems. He advocates using this information to better advantage, elevating social relationship information to its rightful place in importance—and as readily accessible—in computer systems as documents and databases. For more information on Danyel Fisher, see article on p. 2.

For more detailed information about the 2003 Forum, including presentation slides and poster abstracts, please go to <http://www.isr.uci.edu/events/Research-Forum-2003/>.

If you missed this stimulating and productive exchange of cutting-edge ideas and business solutions, be sure you don't miss next year's Forum, which will build on this year's successes. The next ISR Research Forum will be held in June 2004 at UCI. Look for more information online and in the next issue of the *ISR Connector*.



Speaker Phil Schmidt, The Aerospace Corp.

"An excellent mix of talks—very worthwhile," said another industry attendee. The program mix included:

- A mixed academic-industry panel addressing the controversial applications question, Is SOAP really the magic bullet to overcome CORBA's limitations for distributed application development?

SPECIAL THANKS

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The Boeing Company
NASA Jet Propulsion Laboratory**

Nebula photo courtesy of the
NASA National Space Science Data Center.

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For more information, contact:

Dr. Susan J. Knight
Corporate Relations Officer
sknight@uci.edu, (949) 824-5927

or
Debra A. Brodbeck
Technical Relations Director
brodbeck@uci.edu, (949) 824-2260

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