

Sudha Ram

McClelland Professor of MIS
Professor of Computer Science
Member, BIO5 Institute and Institute of the Environment
Director, Advanced Data Management Research Group
Director, INSITE: Center for Business Intelligence and Analytics
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Education

1982-1985: University of Illinois at Urbana-Champaign, Urbana, IL.
Ph.D., Management Information Systems

1979-1981: Indian Institute of Management, Calcutta, India
MBA, emphasis in Management Information Systems

1976-1979: University of Madras, India
BS, Chemistry (with Physics, Mathematics)

Employment

February 2012 -Present: Director, INSITE: Center for Business Intelligence and Analytics, University of Arizona.

August 2006-Present: McClelland Professor of MIS, The University of Arizona, Tucson, AZ
Eller Professor, Department of Management Information Systems, Eller College of Management.

August 2008-Present: Professor of Computer Science, University of Arizona.

August 2007- Present: Member, Bio5 Institute University of Arizona.

August 2006 - Present: Member, Institute for the Environment, University of Arizona.

August 2001- 2006: Eller Professor of MIS, The University of Arizona, Tucson, AZ
Eller Professor, Department of Management Information Systems, Eller College of Management.

Aug. 1996 - 2001: Professor, The University of Arizona, Tucson, AZ
Eller Professor, Department of Management Information Systems, College of BPA

Aug. 1991 - Jul. 1996: The University of Arizona, Tucson, AZ
Associate Professor, Department of Management Information Systems, College of BPA

Aug. 1985 - Jul. 1991: The University of Arizona, Tucson, AZ
Assistant Professor, Department of Management Information Systems, College of BPA

1984 – 1985: University of Illinois at Urbana-Champaign, Illinois
Research Assistant, Department of Computer Science

1984 – 1985: University of Illinois at Urbana-Champaign, Illinois
Research Assistant, Department of Natural History

1982 – 1984: University of Illinois at Urbana-Champaign, Illinois
Research Assistant, Department of Planning and Budgeting

1983 – 1985: University of Illinois at Urbana-Champaign, Illinois
Teaching Assistant, College of Commerce and Business Administration

1981 – 1982: Tata Consultancy Services, Bombay, India
Assistant Systems Analyst

Research Interests

Enterprise Data Management and Business Intelligence

Web and Data Analytics/ Business Intelligence
Social Media Analytics
Semantic Interoperability among Heterogeneous Data Sources

Honors and Awards

- IBM Faculty Award, September 2012.
- Nominated for Regent's Professor award, 2011, 2012.
- WITS Best Paper award, December 2009.
- IBM Faculty Development Award, July 2007.
- UA Leading Edge Innovator in Research Award, March 2007.
- Received "Advisor of the Year Award" from the University of Arizona, Graduate and Professional Students Council, March 2006.
- Best Paper Nomination, WITS 2005
- Science Direct: Top 25 Hottest Papers, 2005 for Information Systems Paper
- MISQ paper by ISI Essential Science Indicators as the October 2005 Fast Breaking Paper in the field of Economics and Business
- Received Eller Professorship, 2001.
- Nominated for University of Arizona graduate Education and Mentoring Award in 2001- Honorable Mention Awarded.
- Andersen Consulting Professor of the Year Award, March 2000.
- Nominated, University of Arizona Graduate Education and Mentoring Award, Spring and Fall 2000
- Recipient, Joseph Peggs and Margie Peggs Kault Award for Mentoring and Doctoral Placement, 1999.
- Nominated, MBA Faculty of the Year, 1998.
- Recipient, Joseph Peggs and Margie Peggs Kault Award for Mentoring and Doctoral Placement, 1998.
- General Chair for 1997 ACM SIGMOD Conference, Tucson.
- General Chair for 1996 DKSME Conference, Phoenix.
- Appeared numerous times on the Dean's list of Excellent Teachers.

- Nominated for Best Paper Award at the 1995 Hawaii International Conference on System Sciences - HICSS95.
- Recipient of International Travel Grant from the Office for International Programs, University of Arizona, March 1992, 1995.
- Appointed Guest Editor for a special issue on “Heterogeneous Distributed Database Systems”, of the Journal IEEE Computer, Dec. 1991.
- Finalist in award for Best Paper at the International Conference on Systems Sciences, Kona, HI, Jan., 1990.
- Appointed member of editorial board for Journal of Database Administration, 1990.
- Recipient of the International Travel Grant from the Office of International Programs, University of Arizona, Dec. 1990.
- Recipient of the Stella Maris medal awarded by the University of Madras for obtaining first position in the university in the B.S. Degree, 1979.
- Recipient of the National Science Talent Scholarship from the National Science and Technology Division of the Indian Government, 1976-1979.

Publications

Refereed Journals

1. Paolo Atzeni, David W. Cheung, Sudha Ram (Eds.): Conceptual Modeling - 31st International Conference ER 2012, Florence, Italy, October 15-18, 2012. Proceedings. *Lecture Notes in Computer Science 7532*, Springer 2012, isbn 978-3-642-34001-7.
2. V. Khatri, Sudha Ram, R. Snodgrass, P Terenziani, “Differentiating Telic-Atelic Data Semantics in Conceptual Design”, forthcoming, *IEEE Transactions on Knowledge and Data Engineering*, 2013.
3. W. Wei and S. Ram, “Using a Network Analysis Approach for Organizing Social Bookmarks and Enabling Web Content Discovery”, forthcoming, *ACM Transactions on MIS*, 2013.
4. S. Ram and J. Liu, “A Semantic Foundation for Provenance Management”, *Journal on Data Semantics*, Vol 1, No. 1, May 2012, pp. 11-17.
5. F. Currim and S. Ram, “Modeling Spatial and Temporal Set-Based Constraints During Conceptual Database Design”, *Information Systems Research*, March 2012, Vol 23, pp. 109-128.
6. J. Liu and S. Ram, “Who Does What: Collaboration Patterns in the Wikipedia and their impact on Article Quality”, *ACM Transactions on MIS*, Vol. 2, No. 2, Article 11, June 2011.
7. A. Olive, S. Ram, J. Parsons, G. Wagner, Y. Wand, and E. Yu, “New Directions for Conceptual Modeling”, *Lecture Notes in Computer Science 6998* Springer 2011, ISBN 978-3-642-24605-0, pp. 524-525.
8. X. Zheng, G. Keng, D. Zeng and S. Ram, “Towards the Next Generation Team Science Enabling Platform for Understanding and Managing Scientific Collaboration”, *IEEE Intelligent Systems*, Vol. 26, No. 6, 2011, pp. 72-76, (with).
9. S. Goff, D. Stanzione, and S. Ram, “The iPlant Collaborative: Cyberinfrastructure for Plant Biology”, *Frontiers in Plant Sciences*, Vol. 2, No. 0, July 2011.
10. Y.Liu, S. Ram, R. Lusch and M. Brusco, “MultiCriterion Market Segmentation: A new Model, Implementation and Evaluation”, *Marketing Science*, Vol. 29, No. 5, September-October 2010, pp. 880-894.
11. S. Ram and J. Liu, “Provenance management in BioSciences”, CMLSA 2010, LNCS: *Lecture Notes in Computer Science 6413*, Springer ISBN 978-3-642-16384-5, 2010 pp. 54-64.
12. F. Currim and S. Ram, “When Entities are Types: Effectively Modeling Type-Instantiation Relationships”, *Lecture Notes in Computer Science 6413*, 2010, pp. 138-147.

13. Y. Liu, S. Ram, T. Lin, and X. Su "A Non-Invasive Software Architecture Style for RFID Data Provisioning", *International Journal of Applied Logistics*, Vol.1, No. 1, January 2010, pp. 1-15.
14. W. Wei and S. Ram, "FASTS: FACets Structured Tag Space - A Novel Approach to Organize and Reuse Social Bookmarking Tags", *Lecture Notes in Computer Science 6105* Springer 2010, pp. 426-438..
15. F. Currim and S. Ram, "Conceptually Modeling Windows and Bounds for Space and Time in Database Constraints", *Communications of the ACM*, Vol 55, No. 11, pp. 125-129, November 2008.
16. S. Ram, W. Wei and K.P. Zhang, "Linking Biological Databases Semantically for Knowledge Discovery", *Lecture Notes in Computer Science 5232*, Springer 2008, pp. 22-32.
17. H. Zhao, and S. Ram, "Entity matching across heterogeneous data sources: An approach based on constrained cascade generalization", *Data and Knowledge Engineering*, Vol. 66, No. 3, September, 2008, pp. 368-381.
18. J. Liu and S. Ram, "A Semiotics Framework for Analyzing Data Provenance Research", *Journal of Computing Science and Engineering*, Vol. 2, No. 3, September 2008, pp. 221-248.
19. F. Currim and S. Ram, "Survey of Cardinality Constraints for Snapshot, Temporal and Spatio-temporal Semantic Models", in *Systems Analysis and Design for Advanced Modeling Methods: Best Practices*, April 2010.
20. Rafik Bouaziz, Salem Chakhar, S. Ram, Vincent Mousseau, and Abdelkader Telmo "Database design and querying within the fuzzy semantic model", *Information Sciences*, . Volume 177, No. 21, 2007, pp. 4598-4620.
21. D. Embley, A. Olive and S. Ram, "Conceptual Modeling: a 25 Year history", Springer Verlag, LNCS 4215, November 2006, pp. V-VI.
22. V. Khatri and S. Ram, "Defining, Eliciting and Using Data Semantics for Emerging Domains", *Journal of Database Management*", pp. 1-3 2008.
23. A. Bajaj and S. Ram, "A Comprehensive Framework Towards Information Sharing Among Government Agencies", *International Journal of E-Government Research*, Vol. 3, No. 2, April-June 2007, pp. 29-44.
24. A. Bajaj, G. Allen, V. Khatri, S. Ram, and K. Siau "Advances in Data Modeling Research", *Communications of the AIS*, Vol 17, Article 30, April 2006.
25. V. Khatri, S. Ram and R. Snodgrass, "On augmenting database design-support environments to capture the geo-spatio-temporal data semantics", *Information Systems*, Vol. 31, No. 2, 2006, pp. 98-133.
26. H. Zhao and S. Ram, "Combining Schema and Instance Information for combining Heterogeneous Data Sources, *Data and Knowledge Engineering*, 61, No. 2, 2007, pp. 281-303.
27. H. Zhao, S. Ram and A. Sinha, "Elitist and Ansemble Strategies for Cascade Generalization", *Journal of Database Management*, Vol. 17, Issue 3, 2006, pp. 92-107.
28. V. Khatri, I. Vessey, S. Ram and V. Ramesh "Cognitive Fit between Conceptual Schema and Internal Problem Representation: The case of geospatio temporal conceptual schema comprehension", *IEEE Transactions on Professional Communication*", Vol. 49, No. 2, June 2006, pp. 109-127.
29. D. Liginlal, S. Ram and L. Duckstein "A Fuzzy Measure-Theoretical Framework for Screening Product Innovations", *IEEE Transactions on Systems Man and Cybernetics, Part A: Systems and Humans*, Vol. 36, No. 3, May 2006, pp. 577-591.
30. V. Khatri and S. Ram, "A Comprehensive Framework for Modeling Set-Based Business Rules during Conceptual Design", *Information Systems*, Vol. 30, No. 2, April 2005, pp. 89-118. **(This paper is in the Science Direct Top 25- list of Hottest papers).**
31. H. Zhao and S. Ram, "Entity Identification for Heterogeneous Database Integration - A Multiple Classifier System Approach and Empirical Evaluation", *Information Systems*, Vol. 30, No. 2, April 2005, pp. 119-132.
32. J.Liu and S. Ram, "An Agent Based Approach for Sourcing Business Rules in Supply Chain Management", Vol. 1, No. 1, *International Journal of Intelligent Information Technologies*, January-March 2005, pp. 1-16.

33. H. Zhao and S. Ram, "Constrained Cascade Generalization of Decision Trees: How deep to go?", *IEEE Transactions on Knowledge and Data Engineering*, Vol 16, No. 6, June 2004, pp. 727-739.
34. J. Park and S. Ram, "Information Systems Interoperability: What Lies Beneath?", *ACM Transactions on Information Systems*, Vol. 22, No. 4, October 2004, pp. 595-632.
35. V. Khatri, S. Ram, and R. Snodgrass, "Augmenting a Conceptual Model with Spatio-Temporal Annotations", *IEEE Transactions on Knowledge and Data Engineering*, Vol. 16, No. 11, November 2004, pp. 1324-1338.
36. H. Zhao and S. Ram, "Clustering Schema Elements for Semantic Integration of Heterogeneous Data Sources. *Journal of Database Management*", 15(4), October – December 2004, pp. 88-106.
37. A. Hevner, S. March, J. Park. S. Ram "Design Science in Information Systems Research", *MIS Quarterly*, Volume 28, No. 1, March 2004, pp. 75-105. **Selected by ISI Essential Science Indicators as the October 2005 Fast Breaking Paper in the field of Economics and Business. See <http://www.esi-topics.com/fbp/2005/october05-AlanRHevner.html>**
38. S. Ram and J. Park, "Semantic Conflict Resolution Ontology (SCROL): An Ontology for Detecting and Resolving Data- and Schema-Level Semantic Conflicts", *IEEE Transactions on Knowledge and Data Engineering*, Volume 16, No. 2, February 2004, pp. 189-203.
39. S. Bajaj and S. Ram, "Using XML Repositories to Support EGovernment", *Journal of Database Management*, Vol.14, No.4, Oct-Dec 2003, pp.59-80.
40. A. Bajaj and S. Ram, "SEAM: A State Entity Activity Model for a Well defined Workflow Development Methodology", *IEEE Transactions on Knowledge and Data Engineering*, Vol. 14, No. 2, March/April 2002, pp. 415-431.
41. V. Khatri, S. Ram, and R. Snodgrass "Supporting User-Defined Granularities and Indeterminacy in a Spatiotemporal Conceptual Model", *Annals of Mathematics and Artificial Intelligence*, Vol. 36, 2002, pp. 195-232.
42. V. Khatri, Y. Hwang, S. Ram and S. Yool "Semantic Modeling and Decision Support in Hydrology", Special issue on Remote Sensing and Decision Support Systems of *Journal of Photogrammetric Engineering and Remote*, Vol. 66, No.10, October 2000..
43. S. March, A. Hevner and S. Ram, "An Agenda for Information Technology Research in Heterogeneous and Distributed Environments", *Information Systems Research*, Vol. 11, No. 4, December 2000, pp. 327-34.
44. B. Hutchinson, J. Henzel, S. Ram and B. Timmermann "Managing Information Products for the BioActive Agents from Drylands Biodiversity of Latin America Project", *IAALD Quarterly Bulletin*, Vol. XLIV, No. ¾, 2000, pp. 163-172.
45. S. Ram and S. Venkarasubramanian, "Intelligent Agents and the World Wide Web: Fact or Fiction", Vol. 12, No. 1, Jan- Mar 2001, *Journal of Database Management*, pp. 46-47.
46. T. W. Ling and S. Ram, "Research Directions in Conceptual Modeling", (Guest Editorial), *Data and Knowledge Engineering*, Vol. 31, No. 3, Nov. 1999, pp. 225-227.
47. J. Park, S. Ram and D. Lee "Digital Libraries in the Next Millennium: State of the Art and Research Directions", *Information Systems Frontiers*, Vol. 1, No. 1, pp. 75-94.
48. A. Bajaj and S. Ram, "Evaluating Completeness of Conceptual Business Process Models: A Metric Based on Case Studies", *Journal of Information Technology Cases and Applications*, Vol. 1, No. 4, 1999, pp. 5-30.
49. S. Ram, J. Park and G. Ball "Semantic Model Support for Geographic Information Systems", *IEEE Computer*, Vol. 32, No. 5, May 1999, pp. 74-81.
50. P. Konana and S. Ram, "Transaction Processing Mechanisms for Active and Real-Time Databases: A Comprehensive Protocol and a Performance Study", *Journal of Systems and Software*, Vol. 42, No. 3, Sept. 1998, pp. 288-305.
51. D. Olsen and S. Ram, "An Empirical Analysis of the Object-Oriented Database Concurrency Control Mechanism O2C2", *Journal of Database Management*, April-June 1999, pp. 14-26.
52. B. Timmermann, B.Hutchinson, S. Ram, J. Henzel, and F. Currim "The Latin American ICBG: The First Five Years", Vol. 37, Supplement, *Journal of Pharmaceutical Biology*, 2000, pp. 35-54.
53. V. Ramesh and S. Ram "Integrity Constraint Integration in Heterogeneous Databases: An Enhanced Methodology for Schema Integration", *Information Systems*, Vol.22, No. 8, pp. 423-446, 1997.

54. A. Tamhankar and S. Ram, "Database Fragmentation and Allocation: An Integrated Methodology and Case Study", *IEEE Transactions on Systems, Man and Cybernetics*, Vol. 28, No. 3, May 1998, pp. 288-305.
55. V. Ramesh and S. Ram, "Collaborative Conceptual Schema Design: A Process Model and a Prototype Systems", *ACM Transactions on Information Systems*, Vol. 16, No. 4, Oct. 1998, pp. 347-371.
56. P. Konana and S. Ram, "Semantics based transaction processing for real-time databases: A case of Automated Stock Trading", *INFORMS Journal on Computing*, Vol. 11, No. 3, 1999, pp. 299-315.
57. P. Konana, S. Ram and J. Lee "Updating Timestamp Interval for Dynamic Adjustment of Serialization Order in Optimistic Concurrency Control-Time Interval (OCCTI) protocol", *Information Processing Letters*, Vol. 63, 1997, pp. 54-65.
58. A. Bajaj and S. Ram, "A Content Specifications for Business Process Models", *Australian Journal of Information Systems*, Vol. 4, No. 1, Sept 1996, pp. 22-31.
59. J. Choobineh and S. Ram, "Practical Aspects of Teaching and Applied database Course", *Database*, Vol. 27, No. 3, Summer 1996, 15-33.
60. S. Ram, "Deriving Functional Dependencies from the Entity Relationship Model", *Communications of the ACM*, Vol. 38, No. 9, Sept 1995, pp. 95-107.
61. S. Ram and S. Narasimhan, "Incorporating the Majority Consensus Concurrency Control Mechanism into the Database Allocation Problem", *INFORMS Journal on Computing*, Vol. 7, No. 3, Summer 1995, pp. 244-256..
62. S. Ram and V. Ramesh, "A Blackboard Architecture for Schema Integration", *IEEE Expert*, Vol. 10, No. 3, June 1995, pp. 56-62.
63. S. Ram and S. Ram, "Design and Validation of a Knowledge Based System for Screening Product Innovations", *IEEE Transactions on Systems, Man and Cybernetics*, Vol.26, No.2, March 1996, pp. 213-221.
64. S. Ram, and S. Narasimhan, "Database Allocation in a Distributed Environment: Incorporating Concurrency Control and Queuing Costs", *Management Science*, Vol. 40, No. 8, August 1994, pp. 969-983.
65. V. Storey, C. Thompson and S. Ram, "Understanding Database Design Expertise", *Data and Knowledge Engineering*, Vol.16, 1995, 97-124.
66. Dave Olsen and S. Ram, "Towards a Comprehensive Concurrency Control Mechanism for Object Oriented Databases", *Journal of Database Management*, Vol.6, No.4, 1995, pp. 24-34.
67. S. Ram and S. Ram, "Screening Products for International Markets: An Expert Systems Application", forthcoming, *New Review of Applied Expert Systems*, 1996, 45-57.
68. R. Blanning S. Ram, and R. Wang "Information Technologies and Systems", *Decision Support Systems*, Vol. 13, 1995, pp. 4-7.
69. S. ram and S. Ram, "Validation of Expert Systems for Innovation Management: Issues, Methodology and Empirical Assessment", *Journal of Product Innovation Management*, Vol. 13, No.1, Jan. 1996, pp. 89-98.
70. S. Ram, "Intelligent Database Design Using the Unifying Semantic Model", *Information & Management*, Vol. 42, No. 8, 1995, pp. 191-206.
71. S. Hayne and S. Ram, "Group Database Design: View Modeling and Integration", *Journal of Systems and Software*, Vol. 28, No. 2, Feb. 1995, pp. 97-116.
72. S. Hayne, D. Carlson and S. Ram, "Integrating Information Systems Technologies to Support Consultation in an Information Center", *Information and Management*, Vol. 23, 1992, pp. 331-343.
73. D. Carlson and S. Ram, "A Knowledge Representation for Modeling Organizational Productivity", *Journal of Organizational Computing*, Vol. 2, No. 2, 1992, pp. 155-180.
74. S. Ram, "Heterogeneous Distributed Database Systems", *IEEE Computer*, Vol. 24, No. 12, pp 7-12, Dec. 1991.
75. S. Ram and R. Marsten, "A Model for Database Allocation Incorporating A Concurrency Control Mechanism", *IEEE Transactions on Knowledge and Data Engineering*, Sept. 1991, pp. 389-395.
76. S.. Ram and S. M. Curran, "The Synthesis Approach for Relational Database Design", *Information Sciences*, Vol. 52, No. 3, Oct. 1990, pp. 134-149.
77. D. Carlson and S. Ram, "HyperIntelligence: The Next Frontier", *Nikkei Artificial Intelligence Journal*, Nikkei Business Publications, 1990, pp. 51-67.

78. D. Carlson and S. Ram, "An Architecture for Distributed Knowledge Based Systems", *Database*, Vol. 22, No. 1/2, Winter/Spring 1991, pp. 11-21.
79. A. Dennis, S. Ram, T. Abens, and J.F. Nunamaker). "Communication Requirements and Network Evaluation within a GDSS Environment", *Journal of Decision Support Systems*, Vol. 7, 1991, pp. 13-31.
80. S. Ram and S. Ram, "Screening Financial Innovations: An Expert Systems Approach", *IEEE Expert*, Vol. 5, No. 4, Aug. 1990, pp. 20-28.
81. C. Chastain and S. Ram, "Architecture of Distributed Data Base Systems", *Journal of Systems and Software*, Vol. 10, No. 2, Sept. 1989, pp. 77-95.
82. S. Ram, "A Model for Designing Distributed Database Systems", *Information & Management*, Vol. 17, 1989.
83. S. Ram and S. M. Curran "An Automated Tool for Relational Database Design", *Information Systems*, Vol. 14, No. 3, 1989, pp. 247-259.
84. S. Ram and S. Ram, "Expert Systems: An Emerging Technology for Selecting New Product Winners", *Journal of Product Innovation Management*, Vol. 6, No. 2, June 1989, pp. 89-98.
85. S. Ram and S. Ram, "Innovator: An Expert System for New Product Launch Decisions", *Applied Artificial Intelligence*, Vol. 2, No. 2, 1988, pp. 129-148.

Books and Chapters In Books

1. "Survey of Cardinality Constraints for Snapshot, Temporal and Spatio-temporal Semantic Models", in *Systems Analysis and Design for Advanced Modeling Methods: Best Practices* (edited by A. Bajaj and S. Wrycza), IGI Global, ISBN 978-1-60566-344-9, April 2009 (with F. Currim), pp. 25-41.
2. "Understanding the Semantics of Data Provenance to Support Active Conceptual Modeling", forthcoming, in P. P. Chen and L. Y. Wong, (Eds): *Proc. of the 1st International Workshop on Active Conceptual Modeling of Learning*, LNCS 4512. Springer-Verlag, 2007 (with J. Liu).
3. David W. Embley, Antoni Olivé, Sudha Ram (Eds.): *Conceptual Modeling - ER 2006*, 25th International Conference on Conceptual Modeling, Tucson, AZ, USA, November 6-9, 2006, Proceedings. *Lecture Notes in Computer Science 4215* Springer 2006, ISBN 3-540-47224-X, 588 pages.
4. "Clustering Similar Schema Elements across Heterogeneous Databases-a First Step in Database Integration" *Advanced Topics in Database Research -- Vol. 5*, Edited by K. Siau, Idea Group Publishing, PA, ISBN: 1537-9299 Idea Group Publishing, PA, 2006, pp. 227-248.
5. "Enabling Information Sharing Across Government Agencies", in *Advanced Topics in Database Research*, Edited by Keng Siau, Idea Group Publishing, Hershey, PA, ISBN: 1-59140-471-1, 2005, pp. 341-366 (with A. Bajaj).
6. "Towards Semantic Interoperability of Heterogeneous Biological Data Sources", in Oscar Pastor, João Falcão e Cunha (Eds.): *Advanced Information Systems Engineering*, 17th International Conference, CAiSE 2005, Porto, Portugal, June 13-17, 2005, Proceedings. *Lecture Notes in Computer Science 3520* Springer 2005, ISBN 3-540-26095-1.
7. "Modeling the Semantics of 3D Protein Structures", in *Lecture Notes on Computer Science 3288*, P. Atzeni, W. Chu, H. Lu, S. Zhou, and T.K. Ling (eds.) 2004, pp. 696-708 (with W. Wei).
8. "DISTIL: A Design Support Environment for Conceptual Modeling of Spatio Temporal Requirements", in *Lecture Notes in Computer Science 2224*, Hideko S. Kunii, Sushil Jajodia, and Arne Solvberg (eds.), 2001, pp. 70-83 (with V. Khatri, R. Snodgrass, and Y. Hwang).
9. "GeoCosm: A Semantics Based Approach for Information Integration of GeoSpatial Data", in *Lecture Notes in Computer Science 2465*, Hiroshi Arisawa, Yahiko Kambayashi, Vijay Kumar, Heinrich C. Mayr, and Ingrid Hunt (Eds.), 2002, pp. 152-165 (with V. Khatri, L Zhang, and D. Zeng).
10. "Schema Integration: Methodology and Tools", in *Heterogeneous Distributed Databases*, Sheth, Rusinkiewicz, and Elmagarmid (eds.), Morgan Kaufman, 1999, pp. 119-155. (with R. Venkataraman).
11. "Modeling Organizations as a Social Network of Distributed Knowledge Based Systems", in

- Artificial Intelligence in Organizational Design, Modeling and Control*, edited by R.W. Blanning and D.R. King, IEEE Computer Society Press, 1995 (with D. Carlson).
12. "An Object Oriented Design for Distributed Knowledge Based Systems", in *Object-Oriented Databases*, edited by Ez Nahouraii and Fred Petry, IEEE Computer Society Press, March, 1991 (with D. Carlson).
 13. "Crisis Support Systems: Recognizing and Managing Crisis", in *Readings in Decision Support and Executive Information Systems*, edited by Paul Gray, Prentice Hall, 1991 (with S. Weber and C.A.P. Smith).

Refereed Conference Proceedings

1. "News Article Propagation on Twitter based on Network Measures: An exploratory Analysis", forthcoming, Proceedings of WITS 2012 (with D. Bhattacharya).
2. "Sharing News Articles Using 140 Characters: A Diffusion Analysis on Twitter", Proceedings of IEEE Conference on Applications of Social Network Analysis (ASONAM 2012), August 2012 (with D. Bhattacharya).
3. "Exploring the Evolution of Lists using Lists in Twitter", Proceedings of IEEE Workshop on Business Applications of Social Network Analysis, 2011, Bangalore, India. (with M. Zhao).
4. "Common Citation Analysis and Technology Overlap Factor: An empirical study of Litigated Patents using Social Network Analysis", DESRIST, 2012 Proceedings, May 2012 (with S. Velichety).
5. "Internal Bonding, External Bridging and Functional Diversity: Impact of Social Capital on the Quality of Wikipedia Articles", Proceedings of Workshop on Information Technology and Systems, WITS 2011, Shanghai, December 2011.
6. "Organizing Social Bookmarking Tags Using a Network Analysis Approach", Proceedings of 20th Workshop on Information Technology and Systems (WITS2010), St. Louis, MO, December 2010 (with Wei Wei)
7. "How Social is Social Bookmarking", Proceedings of the IEEE Workshop on Business Applications of Social Networking (BASNA 2010), available from IEEE Xplore, Bangalore, India, Dec 2010 (with Wei Wei).
8. "Who Does What: Impact of Collaboration Patterns in the Wikipedia and their Impact on Data Quality", proceedings of the Workshop on Information technology and Systems, Phoenix, Dec. 2010 – **this paper received the "Overall best paper" award.**
9. "A New Perspective on Semantics of Data Provenance", Proceedings of the First International Workshop on the role of Semantic Web in Provenance Management (SWPM 2009), Washington DC, USA, October 25, 2009 (with J. Liu)
10. "BioSem: Biological Data Integration", Proceedings of the CMLSA workshop, Barcelona, November 2008. (with W.Weii and KP Zhang).
11. RFID Tagging at the Aggregate level: Implications for Using Groupings", SIGSAND proceedings, May 2008 (with F. Currim).
12. "RFID Data: A case for and of Types and Instances", proceedings of Workshop on Information Technology and Systems, December 2007 (with F. Currim).
13. "BIO-LINK: Using Semantics to Link Heterogeneous Biological Databases for Knowledge Discovery", Proceedings of 16th Workshop in Information Technology and Systems", Milwaukee, Dec. 2006 (with W. Wei).
14. "PROMS: A System for Harvesting and Managing Data Provenance", Proceedings of 16th Workshop in Information Technology and Systems", Milwaukee, Dec. 2006 (with J. Liu).
15. " A Non invasive Software Architecture Style for RFID Data Provisioning", Proceedings of 16th Workshop in Information Technology and Systems", Milwaukee, Dec. 2006 (With Y. Liu).
16. "Understanding the concept of 'Completeness' in Frameworks for Modeling Cardinality Constraints", Proceedings of 16th Workshop in Information Technology and Systems", Milwaukee, Dec. 2006 (with F. Currim).
17. "Making the Case for New Semantic Constructs to Model RFID Data", in Proceedings of SIGSAND, May 12, 2006, Vancouver, British Columbia.

18. S. Ram, Y Hwang and H. Zhao. "A Clustering Based Approach for Semantic Web Service Discovery", Proceedings of the 15th Workshop on Information Technology and Systems (WITS 2005), Las Vegas, Nevada, December 9-10, 2005.
19. L. Zhang, S. Ram and D. Zeng. "Contextual Web Search Based on Semantic Relationships", Proceedings of the 15th Workshop on Information Technology and Systems (WITS 2005), Las Vegas, Nevada, December 9-10, 2005.
20. S. Ram and W. Wei. "Understanding Semantic Links between Heterogeneous Biological Data Sources", Proceedings of the 15th Workshop on Information Technology and Systems (WITS 2005), Las Vegas, Nevada, December 9-10, 2005 (with W. Wei).
21. Ying Liu, S. Ram and R. Lusch. "A Unified Market Segmentation Method for Generating Pareto Optimal Sets", Proceedings of the 15th Workshop on Information Technology and Systems (WITS 2005), Las Vegas, Nevada, December 9-10, 2005 (**Nominated for Best Paper Award**).
22. Y. Liu, S. Ram and R. Lusch. "Multicriterion Market Segmentation Using Evolutionary Algorithms", Proceedings of the 2005 NYU International Workshop on Customer Relationship Management: Data Mining Meets Marketing", Nov. 18-19, 2005
23. S. Ram. Towards Semantic Interoperability of Heterogeneous Biological Data Sources", in Oscar Pastor, João Falcão e Cunha (Eds.): Advanced Information Systems Engineering, 17th International Conference, CAiSE 2005, Porto, Portugal, June 13-17, 2005, Proceedings. *Lecture Notes in Computer Science 3520* Springer 2005, ISBN 3-540-26095-1.
24. S. Ram and S. Currim, "Why do novices make errors in database conceptual modeling", Proceedings of SIGSAND, May 2005.
25. Toward Automated Integration of Heterogeneous Biological data Sources to discover new Biological Knowledge", WITS 2004, Washington DC, December 2004 (With W. Wei).
26. "Modeling the Semantics of Protein Structures", Proceedings of the 23rd International Conference on Conceptual Modeling" (ER2004), Shanghai, China, November 2004 (with W. Wei).
27. "Can expressiveness *and* simplicity be simultaneously achieved in conceptual modeling? Exploring the role of supplementary level of abstraction for spatio-temporal conceptual modeling", Proceedings of SIGSAND, June 2004. (with Khatri, V. Ramesh and I. Vessey)
28. "Semantic Modeling of Biological Sequences", Proceedings of the 13th Workshop on Information Technologies and Systems", Seattle, December 12-13, 2003, pp. 183-188 (With W. Wei).
29. Zeng, D., Wang, F.-Y., and Ram, S. (2003). "Storage Allocation in Prefetching Techniques of Web Caches (extended abstract)" Proceedings of the ACM Conference on Electronic Commerce (EC'03), San Diego, June 9--12.
30. "Efficient and Scalable Query Planning in Distributed Open Environments", Proceedings of the Workshop on Information Technology and Systems (WITS), 2001, pp. 187-192 (with V. Khatri, D. Zeng and L. Zhang).
31. "Detecting both Schema-Level and Instance Level Correspondences for the Integration of E-Catalogs", Proceedings of the Workshop on Information Technology and Systems (WITS), 2001, pp. 193-198, 2001 (W. H. Zhao).
32. GeoCosm: A Semantics Based Approach for Information Integration of GeoSpatial Data", Proceedings of the International Workshop on Data Semantics in Web Information Systems (DASWIS), Nov. 2001, (with V. Khatri, L. Zhang, D. Zeng).
33. "DISTIL: A Design Support Environment for Conceptual Modeling of Spatiotemporal Requirements", Proceedings of the 20th International Conference on Conceptual Modeling, Yokohama, Japan, November, 2001 (with V. Khatri, R. Snodgrass).
34. "Infomediatiion for E-business enabled Supply Chains: A Semantics Based Approach", Proceedings of DS-9 – Semantic Issues in Ecommerce Systems, Hong Kong, April 23-28, 2001 (with Yousub Hwang and Vijay Khatri).
35. "A Framework for Classifying Semantic Conflicts in Geographic Databases", *Proceedings of the Ninth International Workshop on information Technology and Systems*, North Carolina, Dec. 1999.
36. "Improvement Research Methods in MIS", *Proceedings of the Ninth International Workshop on information Technology and Systems*, North Carolina, Dec. 1999.

37. "An Intelligent Agent based toolkit Discovering and Accessing Distributed Earth Observing Data", in *Proceedings of EOGEO98*, Salzburg, Austria, Feb. 1998 (with S. Venkatasubramanian, S. Yool, S. Marsh, and J. Park).
38. "A Semantic Based Approach for Managing Remote Sensing Data in a Distributed Heterogeneous Environment", in *Proceedings of the ISPRS Workshop*, Boulder, CO, Oct 1997.
39. "Modeling Spatial and Temporal Semantic in a Large Heterogeneous GIS Database Environment", in *Proceedings of the 2nd Americas Conference on Information Systems(AIS'96)*, Phoenix, Arizona, Aug. 16-18, 1996 (with J. Park).
40. "Semantic Based Transaction Processing for Real Time Databases: A Protocol and Performance Evaluation", in *Proceedings of the INFORMS Conference on Information Systems and Technology*, Washington DC, May 1996 (with P. Konana).
41. "A Graph Theoretic Approach for Schema Evolution", in *Proceedings of the INFORMS Conference on Information Systems and Technology*, Washington DC, May 1996 (with G. Shankar).
42. "A Methodology for Interschema Relationship Identification in Heterogeneous Databases", in *Proceedings of the Twenty Eight Hawaii International Conference on System Sciences - HICSS-28*, Maui, HI, Jan. 1995 (with V. Ramesh).
43. "Integrity Constraint Integration in Heterogeneous Databases: An Enhanced Methodology for Schema Integration", in *Proceedings of the Workshop on Information Technology and Systems - WITS'95*, Vancouver, Canada, Dec.
44. "Screening Products for International Markets", in *Proceedings of the 23rd EMAC Conference*, Maastricht, The Netherlands, May 1994 (with S. Ram).
45. "Semantic Query Processing in large Scientific databases", *Massive Digital data Systems Workshop*, Reston, VA, Feb 1, 1994.
46. "Composite and Grouping: Extending the Realm of Semantic Modeling", in *Proceedings of the 26th Hawaii International Conference on System Sciences*, Jan 1993, Maui, HI, (with V.C. Storey).
47. "Heterogeneous Distributed Databases for Concurrent Engineering", in *Proceedings of the First Workshop on Enabling Technologies for Concurrent Engineering*, Morgantown, W. Virginia, March 1992.
48. "Schema Integration and Semantic Query Processing in a Heterogeneous Distributed Database System", in *Proceedings of the NSF Workshop on Heterogeneous Databases and Semantic Interoperability*, Boulder, CO, Feb 1992.
49. "A Unifying Semantic Model for Accessing Multiple Heterogeneous Databases in a Manufacturing Environment", in *Proceedings of the First International Workshop on Interoperability Among Databases - IMS91*, April 1991, Kyoto, Japan (with E. Barkmeyer), pp. 212-215.
50. "Allocation of Databases in a Distributed Database Systems", in *Proceedings of the Eleventh International Conference on Information Systems*, Copenhagen, Dec. 1990 (with S. Narasimhan).
51. "Distributed Knowledge Based Systems to Support Computer Integrated Manufacturing", in *Proceedings of CIMCON'90*, Gaithersburg, Washington DC., May 1990. (with D. Carlson and A. Jones).
52. "Using a Social Network to Integrate Distributed Knowledge Based Systems", in *Proceedings of the 23rd Hawaii International Conference on System Sciences*, Jan 1990 (with D. Carlson).
53. "Screening Innovations in the Telecommunications Industry: An Expert Systems Approach", in *Proceedings of the 23rd Hawaii International Conference on System Sciences*, Jan. 1990 (with S. Ram) {This paper was nominated for the Best Paper Award in the Expert Systems minitrack at the conference}.
54. "Multi-User View Integration System (MUVIS): An Expert System for View Integration", in *Proceedings of the IEEE International Conference on Data Engineering*, Feb. 1990 (with S. Hayne).
55. "Integration of Information Systems Technologies to Support Consultation in an Information Center", in *Proceedings of the International Conference on Information Systems*, Dec. 1989 (with S. Hayne, D. Carlson, and J.F. Nunamaker).
56. "Using Group Decision Support Tools for Knowledge Acquisition: An Information Center Application", *Transactions of DSS-89*, June 1989 (with I.Liou, S. Hayne, D. Carlson, and J.F. Nunamaker).
57. "An Object-Oriented Design for Distributed Knowledge Based Systems", in *Proceedings of Twenty Second Hawaii International Conference on System Sciences*, Jan. 1989 (with D. Carlson).

58. "An Architecture for Distributed Knowledge Based Systems", in *Proceedings of AAAI Workshop on Databases in Large AI Systems*, Minneapolis, Aug. 1988 (with D. Carlson).
59. "An Expert System for Screening Innovations in the Financial Services Industry", in *Proceedings of XV International Research Seminar in Marketing*, La Londe Les Maures, France, May, 1988 (with S. Ram).
60. "The Synthesis Approach to Relational Database Design: An Expanded Perspective", in *Proceedings of 21st Hawaii International Conference on System Sciences*, Jan. 1988 (with S.M. Curran).
61. "Design of Distributed Databases for An Automated Manufacturing Facility", in *Proceedings of ASME International Computers in Engineering Conference*, Aug. 1987 (with W. Davis).
62. "Crisis Support Systems: Tools for Action", in *Proceedings of the Seventh International Conference on Decision Support Systems*, June 1987 (with S. Weber and C. Smith).
63. "The File Allocation Problem - An Expanded Perspective", in *Proceedings of the Twentieth Hawaii International Conference on System Sciences*, Hawaii, Jan 6-9, 1987.
64. "Report Generation Facility: A High Level Interface for Coherent Access to Heterogeneous Database Systems", in *Proceedings of International Conference on Data Engineering*, Feb. 1986 (with G. Belford and J. Liu et. al.).
65. "Innovator: An Expert System for Screening New Products", presented at the *ORSA/TIMS Marketing Science Conference*, March 1988, Seattle (with S. Ram).
66. "The Entity Relationship Model versus the Relational Model", in *Proceedings of the Sixth International Conference on the Entity Relationship Approach*, New York, November, 1987.

Miscellaneous

1. "Introduction to Conceptual Modeling", *Data and Knowledge Engineering*, Vol. 31, No. 3, Nov. 1999 pp. 225-226 (with T.W. Ling)
2. "Data Management and Knowledge Discovery in Large Scientific Databases", in *Proceedings of the 27th Hawaii International Conference on System Sciences*, Maui, Jan. 1994.
3. "A Knowledge-Based Approach for Screening Product Innovations", Report No. 93-106, Marketing Science Institute, 1993, Boston, MA, 25 pp.
4. "Current Areas in Database Research", in *Proceedings of the 26th Hawaii International Conference on System Sciences*, Maui, Jan 1993.
5. "Integration of Heterogenous Databases Using the Unifying Semantic Model", Technical Report, National Institute of Standards and Technology, July 1991.
6. "A Unifying Semantic Model", Technical Report, National Institute of Standards and Technology, Sept. 1989.
7. "Emerging Areas in Database Research", an Introduction to the Software minitrack on "Database Formalisms, Software and Systems", in *Proceedings of the 22nd Hawaii International Conference on System Sciences*", Hawaii, Jan 1989.
8. "A Practical Approach to Database Design", *Journal of the Tucson Computer Societies*, Oct. 1987.
9. "Data Integration Strategies for Computer Integrated Manufacturing", Technical report, NIST IR-88-4002, National Institute of Standards and Technology, Gaithersburg, MD, Nov. 1988 (with A. Jones, and W. Davis).

Manuscripts under Review

1. S. Currim, S. Ram, F. Currim and A. Durcikova, "Using a Knowledge Learning Framework to Predict Errors in Database Design", invited for revision, *Information Systems*, December 2012
2. Limin Zhang, Sudha Ram and Daniel Zeng, "Web search context: Improving Web search effectiveness using semantic relationships", invited for revision to *MIS Quarterly*, May 2012.
3. J. Liu, S. Velichety and S. Ram, "Internal Bonding, External Bridging and Functional Diversity: Impact of Social Capital on the Quality of Wikipedia Articles", under review, *Management Science*, Sept 2012.
4. S. Velichety and S. Ram, "The Science of Twitter Lists: Understanding Membership and Subscription to Lists through Network Analysis", under review with KDD 2013.

5. D. Bhattacharya and S. Ram, "Examining News Propagation Network Measures", under review, "Social News on the Web" workshop for WWW 2013.

Work In Progress

1. Faiz Currim, Sudha Ram, "Toward Completeness in Rule Frameworks for Modeling Cardinality Constraints, to be submitted to *IEEE Transactions on Knowledge and Data Engineering*.
2. Jun Liu and Sudha Ram, "Social Network Analysis of Wikipedia Contributions", work in progress.
3. Jun Liu and Sudha Ram, "A model for Provenance management with applications to biosciences", work in progress.
4. Wei Wei and Sudha Ram, "How Social is Social Bookmarking", manuscript under preparation.
5. Chang Heon Lee, Sudha Ram, "Social Network analysis in Financial Forums", work in progress.
6. Devi Bhattacharya and Sudha Ram, "MyPlant: Social networking in Plant Biology", work in progress.
7. D. Bhattacharya and S. Ram, "Performance Analysis of News Article Propagation on Twitter", under preparation MIS Quarterly, December 2012.

Invited Presentations

1. "News Propagation Analysis on Twitter", Research presentation at Indian Institute of Management, Kolkata, February 2013
2. "Network Mining Techniques to examine Twitter News Propagation", Research Presentation at IIM Ranchi, February 2013.
3. "Social Network Mining", presentation to UA Analytics and Data Mining team, February 2013.
4. "How to Use Social Media Effectively", Presentation to UA Social Media and UA Marketing teams, November 2012.
5. "Social Media Analytics" presentation to UA Athletics Department, July 2012.
6. "Data Mining and Analytics", presentation to UA Analytics team, August 2012.
7. "Innovations in Business Models spawned by Social Media", presentation to Sigma Chi Alumni Chapter, February 2012.
8. "Role of Social Media Analytics for Health Care", Symposium on Predictive Analytics in Health Care, College of Pharmacy, University of Arizona, December 8, 2012.
9. "Social Media Analytics in Health care and Biomedicine", BIG Data Symposium, University of Arizona, July 2012
10. Presentations on Social Media Analytics at Walmart Research labs, Intuit Research labs, and SONY Entertainment May 2012.
11. "Wikipedia Collaboration Patterns and implications for the iPlant Collaborative", SUNY Buffalo, September 2011.
12. "Business Intelligence and Analytics", IBM Research Presentation, February 2011
13. "Business Intelligence and Analytics", HP Research labs Presentation, March 2011
14. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", AZ Tech Council, Phoenix, September 2010
15. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", AZ Tech Council, Tucson, November 2010
16. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", Yahoo Research Labs, India, December 2010

17. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", Infosys Research Labs, India, December 2010
18. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", IBM Global Research labs, December 2010
19. "Determining Data Quality Based on Provenance", Workshop on Data Quality in the DoD, October 2010.
20. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", University of Zurich, June 2010.
21. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", Seminar at University of Texas, Austin, February 2010.
22. "Data Access and sharing in the iPlant Collaborative", ASIST Research Data Access and Preservation Workshop, April 2010.
23. "Data Sharing and Collaboration: Lessons From Science and Industry Collaborations", , CSSA, and SSSA Annual Meetings, November 2010.
24. "Who Does What in the Wikipedia: Collaboration patterns and their impact on Data Quality", Seminar in SIE department, University of Arizona, September 30, 2010.
25. "Incorporating Provenance and Business Process semantics into Information Life Cycle Management", IBM Tucson, February 12, 2010.
26. "Who Does What: Collaboration Patterns in the Wikipedia and their impact on Data Quality", University of Texas research Seminar, February 5, 2010.
27. "Conceptual Modeling Value Assessment", invited talk at Ford Motor, September 2008
28. Keynote Address on the "iPlant Collaborative" at the Enterprise Integration Conference, Sydney, Australia, August, 2008.
29. Invited presentation, "MIS Research issues in the iPlant Collaborative", University of Sydney, August 2008.
30. Faculty Mentor at Young Faculty and Doctoral Consortium on Enterprise Information Integration, August 2008
31. Invited Presentation, "Data Provenance: What is it, why is it necessary, and how do we deal with it", Enterprise Information Integration Workshop, Kioloa, Australia, August 2008.
32. "Understanding Semantics of Data Provenance", Tsinghua University Research Seminar, Beijing, China, June 21, 2006.
33. "Data Provenance Semantics and Research Issues", University of British Columbia Research Seminar, April 7, 2006
34. Data Provenance in the Context of New Product Development", Information Technology Industry Research Council, Tucson AZ, November 16, 2005.
35. "Understanding and Representing Data Provenance", National Digital Information Preservation Partners Meeting, Berkeley, CA, January 9-12, 2006.
36. "Understanding Data Provenance", Ford Motor Co Seminar, Tucson, AZ 85721, November 2, 2005
37. "Using Semantics for Database Interoperability", National Institute of Standards and Technology, SIMA Technical Seminar, November 14 2005.
38. "Toward Semantic Interoperability of Heterogeneous Biological Data Sources", **Keynote Address**, CAISE 2005 Conference, Oporto, Portugal, June 2005.
39. "Data Provenance in the Context of New Product Development", NSF Workshop on Digital Archiving and Preservation", Atlanta, Georgia, May 17-18, 2005.
40. "Semantic Modeling and Enterprise Data Management", presented at Sanofi Aventis, October 2004.
41. "Data Management: Issues and Challenges", keynote address in Partners in Business Program, Utah State University, December 2, 2004.
42. "Dynamic Business Rule Sourcing", Presented at Intel Corp, July 2004.
43. "Security in databases", Arizona Health Sciences Seminar Series, University of Arizona, May 2003.
44. "A Semantics based Approach for Modeling Business Rules", Applied Technology in Business Workshop, Oakland University, October 2002.
45. "What is new about the New Economy", Tucson Link Forum, October 2000.

46. "Semantic Inter-operability and Data Warehouse Design", October 2000, Oakland University, Fall ATIB Conference.
47. "Evaluation of Agent Based Systems", Raytheon Corp., February 2000.
48. "The Saguaro Digital Library: Challenges for Research and Development", School of Renewable Natural Resources, Feb. 2000.
49. "Metrics for Evaluating Data Warehouse Implementations, Intel Corporation, April 1999.
50. "Technology for Intelligent Agents", Raytheon Corp, Dallas, October 1999.
51. "A Virtual Enterprise Model for Collaborating Intelligent Agents", Office of Advanced Analytical Tools", CIA, May 1999.
52. "Semantic Interoperability in Geographic Database Systems", Seminar, MIS department, University of Arizona, October 1999.
53. "Intelligent Agents: Myth or Reality", Office of Research and Development, CIA, May 1998
54. "Role of Cognition in Conceptual Modeling", *Workshop on Cognition and Conceptual Modeling (ER'97)*, UCLA, Los Angeles, November 1997.
55. "Intelligent Agents: Myth or Reality", Office of Research and Development, CIA, VA, May 1997.
56. "Intelligent Multimedia Data Management", Office of Research and Development of the CIA, October 1997.
57. "A New Paradigm for File Access", critique, presented at *International Conference on Information Systems*, Vancouver, Canada, Dec. 1994.
58. "The Role of Databases in Knowledge Discovery", presented at *Workshop in Information Technology and Systems - WITS'94*, Vancouver, Canada, Dec. 1994.
59. "Domain Knowledge in CASE Tools", presented at *Workshop on Information Technology and Systems - WITS-93*, Orlando, Dec. 1993.
60. "Database Tools and Techniques", presented at *ISECON - Information Systems Education Conference*, Phoenix, Nov 7, 1993.
61. "Semantic Integration of Heterogeneous Databases", presented at *ORSA/TIMS Meeting*, Phoenix, Nov 1-3, 1993.
62. "Extracting Information from Large Scientific Databases", presented at *ORSA/TIMS Meeting*, Phoenix, Nov. 1-3, 1993.
63. "Managing Heterogeneous Databases", presented at *Workshop on Management of Advanced Information Technologies*, Syracuse, Oct. 1993.
64. "Screening New Products: A methodology and system", presented at *Marketing Science Workshop*, Dallas, TX., Dec. 3, 1992.
65. "Heterogeneous Distributed Database Integration in a Manufacturing Environment", presented at *Honeywell Inc.*, Glendale, AZ., Nov. 12, 1992.
66. "A Framework for Conflict Identification and Resolution in a Heterogeneous Database Environment", presented at American Express Information Systems Division, Phoenix, AZ. Nov. 13, 1992.
67. "Object Oriented Information Engineering Systems", presented at *ORSA/TIMS Joint National Meeting*, Philadelphia, Oct. 1990.
68. "Integrating AI and Databases", presented at the Advanced Technologies Division of A.C. Nielsen, Chicago, August 20, 1990.
69. "An Object-Oriented Model for Distributed Database in Manufacturing", presented at the *TIMS/ORSA Joint National Meeting*, Las Vegas, May 1990.
70. "Communication among Distributed Knowledge Based Systems", presented at the *TIMS/ORSA Joint National Meeting*, Las Vegas, May 1990.
71. "Allocation of Databases in a Distributed Database System", presented at the *TIMS/ORSA Joint National Meeting*, Las Vegas, May 1990.
72. "Allocation of Databases in a Distributed Database System", presented at the *Information Systems Colloquium*, University of California, Los Angeles, April 5, 1990.
73. "Integration of Heterogeneous Distributed Databases for Computer Integrated Manufacturing", presented at Computer Science Department, University of Arizona, Nov. 1989.
74. "A Unifying Semantic Model", presented at the *14th Meeting of ANSI X3T2 Technical Committee for Data Interchange*, Albuquerque, Oct. 1989.

75. "Design of An Expert System for Screening New Products", presented at *ORSA/TIMS Meeting*, Vancouver, Canada, May 1989.
76. "An Expert System for Designing Object-Oriented Distributed Databases", presented at, *ORSA/TIMS Meeting*, Vancouver, Canada, May 1989 (with S. Hayne).
77. "Design of Distributed Knowledge Based Systems for Computer Integrated Manufacturing", to the National Institute of Standards and Technology, MD, January, 1989.
78. "An Architecture for Distributed Knowledge Based Systems", presented at the *TIMS/ORSA conference*, Denver, October, 1988 (with D. Carlson).
79. "Models for File Allocation in Distributed Database Systems", presented at the *Annual TIMS/ORSA Meeting*, Washington DC, May 1988.
80. "Effect of the Distributed Concurrency control on the File Allocation Problem", presented at the *TIMS/ORSA meeting*, New Orleans, May, 1987.
81. "A critique of Adaptive User Interface Design", presented at the *International Conference on Information Systems*, Pittsburgh, Dec. 1987
82. "Differences between the Entity Relationship Approach and the Relational Approach for Database Systems", panel discussion at the *Sixth International Conference on the Entity Relationship Approach*, New York, November, 1987.
83. "A Model for the Design of Distributed Databases", presented at the *ACM Computer Science Conference*, New Orleans, March 1985 (with G. Belford).

Research Grants Awarded and Under Review

1. "Information Lifecycle Management for BIG DATA", IBM, \$40,000.
2. "PharmacoVigilance and Safety Signals in large Clinical Trials Datasets", \$35,000 (PI: S. Ram), funded by C-Path Institute, September 2012.
3. "Data Net Federation Consortium", funded by National Science Foundation, \$300,000 (PI: Sudha Ram) – this is a sub-contract from a project (\$8 million grant proposal) in collaboration with the University of North Carolina, Chapel Hill, Sept 2013-2016.
4. "Asymmetric Threat Response and Analysis Program (ATRAP) IV", (Co-PI with Jerzy Rosenblit -ECE), funded by the US Army, \$1,790,664, September 2010-2012.
5. "The iPlant Collaborative: Enabling a New Plant Biology", (Co-PI), National Science Foundation, \$50,000,000, Feb 2008-2013.
6. "I/UCRC Planning Grant: INSITE: Center for Business Intelligence and Analytics", under review, NSF, \$11,500 (PI)
7. "Secure and Usable Provenance for Cloud based Documents", submitted to NSF, \$199,736, (co-PI with S. Debray and C. Colberg), Dec 2012.
8. "Enhancing Scientific collaboration using Web 2.0 technologies", submitted to HP research Labs, Sept. 2011.
9. "Secure Digital Provenance", BAA White paper submitted to Department of Homeland Security, \$1,749,960 (Co-Pi with S. Debray and C. Colberg), August 2011.
10. "Investigating Scientific Collaboration in the Age of Science 2.0", under preparation for NSF, \$389,702, 2011.
11. "Measuring Data Quality Using Provenance", Science Foundation of Arizona, \$540,000, October 2008-2012.
12. "Exploring the Strategic Impact of Universally Unique Identifiers on Enterprise Data Management and Semantic Interoperability", funded by SAP Global Research, \$175,000, (November 2006-2009).
13. "Multicriterion Market Segmentation Using Genetic Algorithms", funded by Duke Teradata center for Customer Relationship management, \$5000, August 2006-2008.

14. "Semantics Interoperability in a Manufacturing Environment, funded by the National Institute of Standards and Technology, \$150,000 August 2005-2008.
15. Semantics and Provenance of Bill of Materials, funded by Ford Motor Company, \$150,000, 2005- 2009.
16. "Investigating Data Provenance in the Context of New Product Design and Development", funded by NSF, May 2005 – 2008, \$244,401.
17. "Dynamic Storage Provisioning and Reclamation in support of Advanced Users", IBM SURGrant, \$1 million, July 2004-2005, (with M. Tanniru)
18. "Process and Data Management for BioInformatics", Aventis Corporation, \$50,000, (With M. Tanniru), April 2004-2006.
19. "Dynamic Sourcing of Business Rules, funded by Intel Corporation, \$30,000, October 2003-2005.
20. "Workflow Management at your Fingertips", \$5,000, funded by Proposition 301, ITCDI, March 2003-July 2004 (with Chris Impey)
21. "Data Management for the Human Subjects Protection Program", \$248,655, National Institutes of Health (NIH), Sept 2002-2005, (Co-Pis: R. Dahl, and R. Powell).
22. "INFOAGENTS: A Collaborative Intelligent Agent based Approach for Knowledge Management, funded by CIA and Raytheon, \$68500, May 1999-Dec 2000.
23. The NASA South West Earth Sciences Application Center", funded by NASA, \$1,499,981, February 1999-2002 (Co-PIs: R. Bales, S. Yool, C. Adams, J. Zehnder, S. Marsh et. al.).
24. "Improved Management of Public Land Grazing Allotment: An Information Resource", funded by *the International Arid Lands Consortium*, \$74,821, May 1999-July 2001, (with B. Hutchinson and G. Ruyle).
25. "HyDis: A Hydrology Data Distributed Information System", funded by NASA, \$1,550,000, July 1999-Aug 2003, (with S. Sorooshian, R. Bales and H. Gupta).
26. "The National Biological Information Infrastructure National Spatial Data Clearinghouse", funded by *US Department of Interior*, \$21,700, Sept 1998-Dec 2000.
27. "Information Management for BioActive Agents from Dryland Biodiversity of Latin America", funded by *National Institutes of Health*, \$37,500, Oct 1998-Sept 2001.
28. "Earth Observation Resources Infrastructure for Integrated Regional Assessments in the Sonoran Desert region", funded by NASA, (with Co-Is R. Schowengerdt, L. Graumlich, C. Hutchinson, and K. Thome), \$321,000, Dec 1997-1998.
29. "Integrating Geographic Information Systems with Databases", National Biological Survey, (through NBS at U of A), \$10,000, Sept 96-97.
30. "Semantic Model Based Access to Global Climate Change Data", funded by NASA (through Atmospheric Sciences, PI: Robert Dickinson), June 1996-open, \$30,000 plus equipment and software.
31. "Intelligent Multimedia Data Management", funded by Office of Research and Development, CIA, \$100,000, Sept 1997-2000.
32. "Intelligent Image Data Management", funded by Office of Research and Development, CIA, \$56,000, Sept 1996-1997.
33. "Heterogeneous Data Management for Arizona-Sonora Economic Development", funded by Arizona Department of Commerce, \$10,000, July 1994-July 1995.
34. "A Problem-Solving Environment for Simulation Based Ecological Systems- Analysis", (with G. Ball, B. Zeigler, R. Schlichting), funded by NSF, \$12,000, May 1995- July 1996.
35. "Scientific Data Management for Massive Digital Databases", funded by NASA (through Physics and Atm. Sciences and Hydrology), \$50,000, May 1994 - open. (with R. Dickinson).
36. "UNIBASE: A System for Accessing Heterogeneous Information Systems", funded by IBM Corporation, Dallas, \$237,000, Nov. 1991-Oct. 1993.
37. "Semantic Modeling in Distributed Database Systems", funded by National Institute of Standards and Technology, \$15,000, 1990-92.
38. "Telecommunication Strategy for Oro Valley", funded by The Town of Oro Valley, \$6,475, Oct. 1992-93.
39. "Conceptual Modeling in Database Systems", funded by National Institute of Standards and Technology, \$12,000, 1989-90.

40. "Distributed Databases for Administrative Computing: Strategic Directions for the Future", Provost's Office, University of Arizona, \$20,000, 1991.
41. "A Knowledge Based Approach for Screening Product Innovations", funded by Marketing Science Institute, \$5,000, 1989-1992.
42. "Allocation of Databases in a Distributed Database Systems", funded by Small Grants Award Program, University of Arizona, \$4,200, 1990-91.
43. "Knowledge Representation in Distributed Systems", funded by State Farm Foundation for Research, \$500, 1990.
44. "Design of Distributed Knowledge Based Systems", funded by Center for the Management of Information (CMI), University of Arizona, \$10,400, 1989.
45. "Object-Oriented Design for Knowledge Based Systems", funded by AIRMICS (US Army), \$44,750, 1989 (with J. Nunamaker).
46. "Knowledge Based Support for Information Centers", funded by IBM Corporation, Gaithersburg, \$98,980, 1987-89 (with J.F. Nunamaker).
47. "The Synthesis Algorithm for Relational Database Design", funded by CMI, University of Arizona, \$9,529, 1987.

Teaching

University of Illinois at Urbana Champaign

Courses taught at the Undergraduate Level:

- Database Systems
- Systems Analysis and Design

University of Arizona

Courses taught at the Undergraduate Level:

- Web and Social Media Analytics
- Database Systems

Courses taught at the Graduate Level:

- Business Intelligence: Web Analytics
- Enterprise Data Management
- Database Design and Development for Managers (Executive MBA)
- Quantitative Research Methods in MIS
- Data Structures
- Introduction to Database Systems
- Data and Computer Communications
- Operating Systems and Computer Architecture
- Office Automation
- Advanced Topics in Database Systems
- Database Development for Managers
- Global Electronic Commerce (Executive MBA – Telesuites)

Appeared more than 50 times on the Dean's List of Excellent Teachers

Doctoral Dissertation Committees

Dissertation Advisor for MIS Doctoral Students

Chang Heon Lee (Samsung Research Labs)
 Wei Wei (University of Houston)
 Jun Liu (North Dakota State University)
 Ying Liu (California State University, Long Beach)
 Yousub Hwang (University of Seoul, South Korea)
 Sabah Currim (Florida State University)
 Limin Zhang (North Dakota State University)
 Faiz Currim (University of Iowa)
 Vijay Khatri (Indiana University)
 Huimin Zhao (University of Wisconsin, Milwaukee)
 A. Bajaj (Carnegie Mellon University).
 G. Shankar (Boston University)
 V. Shailaja (Tulane University)
 Divakaran Liginlal (University of Wisconsin, Madison)
 Jinsoo Park (University of Minnesota)
 Prabhudev Konana (University of Texas at Austin)
 Ramesh Venkataraman (Indiana University)
 David Olsen (Utah State University)
 Stephen Hayne (Arizona State University - West)
 David Carlson (formerly at University of Colorado- Boulder)

Current MIS Doctoral Students

Zirun Qi
 Yun Wang
 Devi Bhattacharya
 Srikar Velichetty

In addition, serving on several other dissertation committees in MIS, CS, SIE, RNR, Bioinformatics.

MIS Minor doctoral students – Partial List

Melody Zhao (SIE)
 Bonnie Hurwits (Ecology and Evolutionary Biology)
 Meng Lin (Physics and Atm. Sciences)
 Michael Soo (Computer Science)
 Chao-Yen Wu (Systems Engineering)
 Jianyi Tao (Electrical Engineering)
 Jene Hendrickson (Hydrology)
 Eric Christensen (Electrical and Computer Engineering)
 Yung-Hsin Wang (Electrical and Computer Engineering)
 Chilgee Lee (Electrical and Computer Engineering)
 Mousa Mitwassi (Systems Engineering)
 Hans Demmel (Systems Engineering)

Master's Thesis Advising

Have chaired the Master's thesis committee for more than 100 students.

All theses topics have been in the area of database and knowledge base systems. Have also supervised more than 30 independent studies in the same areas.

Service

Departmental

- Chair, Recruiting Committee (2006-2011)
- Chair of Graduate Studies Committee and Director of Doctoral program (1992-1996, 2000- 2001)
- Graduate Committee (1996-2012)
- Promotion and Tenure Committee (1991-1996, 1999, 2000,2001-03, 2005-2010)
- Annual Performance Evaluation Committee (1991-1996, 1999, 2000,2001-03, 2005-2012)
- Recruiting Committee (1994-1996)

College

- Dean Review Committee (2009)
- Dean Search Committee (2010)
- MIS Department Head Search Committee (2001, 2007)
- Faculty Status Committee (2004,2008-09)
- Dean Search Committee (2004, 2010)
- Graduate Research and Doctoral Studies Committee (2000-2004, 2008-2012)
- College Advisory Committee (2000-2002)
- Economics Department Head Search Committee (2001)
- UA Entrepreneurship Program Business Plans Evaluation Team.
- Economics Department Review Committee (1998)
- Economics Department Head Search Committee (1997-1998)
- Business Plans Evaluation Team (1995, 2000)
- Research and Doctoral Program Committee (1994-1996)
- College Advisory Committee (1994-1996)
- Business Information Center Committee (1993-1997).

University

- University Promotion and Tenure Committee (2010-2012, Chair of this committee in 2011-12)
- Research Governance Committee (2010-present)
- Scientific Inquiry Committee (2010)
- Computation Biology Advisory Committee (2008-present)
- Plant Sciences Recruiting Committee (2010)
- Network Advisory Committee (2004)
- Graduate Council, 1995-2003
- Evaluation Committee, Small Grants Program (1999,2000).
- Information Technology Council (2000-2002)
- Chair, Graduate College Fellowships Committee (1998)
- Graduate College Fellowships Committee (1996, 1997)
- Search Committee Member for Metadata Librarian (1998)
- Faculty Search Committee, School of Renewable Natural Resources (1998)
- Graduate Council Executive Committee (1997-2000)
- Evaluation Committee for International Travel Grant (1992)
- Administrative Computing Advisory Committee (1992)
- Arizona-Sonora Technical Advisory Committee (1994-present)
- Tucson Economic Development Information Systems Committee (1992-present)
- BPA representative to the Graduate Council (1995 - present)

Professional Memberships

ACM (SIGMOD, SIGMIS)
 IEEE Computer Society
 INFORMS
 AIS

Editorial Boards and Committees

- AIS Leo Awards Selection Committee, 2010, 2011 - currently chair of this committee
- INFORMS Design Science Award Selection Committee, 2008-2010
- ICIS Dissertation Award Co-chair, 2010
- Advisory Board, Information Systems Research, 2010-present
- Co-Editor in Chief, Journal of Data Semantics, 2010-present
- Senior Editor, Information Systems Research, 2007-2010
- Chair, ER Steering Committee, 2007-2009
- Vice Chair, ER Conference Steering Committee, 2005-2007
- Senior Standing Advisor, WITS steering Committee, 2005-2007
- Associate Editor, Decision Sciences, 2004- 2010
- Associate Editor, International Journal of Intelligent Information Technologies, 2005-present
- Associate Editor, International Journal of Cooperative Information Systems, 2002-present
- Associate Editor: Information Systems Research 2000-2006
- Associate Editor, Journal of Database Management, 1998-present.
- Associate Editor, Journal of Information Technology Management, 1998-present.
- Associate Editor, Information Systems Frontiers, 1997-present.
- Associate Editor, Decision Support Systems Journal, 1999-present.
- Associate Editor, INFORMS Journal on Computing, 1995- 2000.
- Guest Editor, Data and Knowledge Engineering, Nov. 1999.
- Editor, IEEE Computer Society Press - Advances in Computer Science and Engineering, March 1993-2000.
- Associate Editor, Journal of Systems and Software, 1993-2010.
- Guest-Editor for special issue of Decision Support Systems, 1993.
- Editorial Board Member, Journal of Database Management 1989-1998.
- Guest Editor for special issue of IEEE Computer on "Heterogeneous Distributed Database Systems", published in December 1991.

Conferences Chaired and Program Committees

- AIS Doctoral Dissertation Awards Committee Co-Chair, 2010.
- ICIS Doctoral Consortium co-Chair, 2009
- Faculty mentor at the ER Doctoral Consortium, 2008, 2009, 2011.
- Faculty Mentor at Young Faculty and Doctoral Consortium on Enterprise Information Integration, August 2008,
- Program Co-Chair, AMCIS 2007.
- General Co-Chair, 25th International conference on Conceptual Modeling, Tucson, Nov. 2006.
- WITS program committee, 2004-present.
- Panels Chair, International Conference on Conceptual Modeling and the ER Approach, 2001, Japan
- Program Committee member MetaModeling conference 2001

- Program Committee member CODAS - 2001
- Program Committee member RIDE'2002
- Program Committee member INFORMS IST conference 2001
- Tutorials Chair, AIS Conference, 2000, Los Angeles.
- Steering Committee Member, ER Conference, 1998-present
- Program Committee Member, ICIS, 1999-2009.
- Program Committee Member, WITS, 1991-2011.
- Program Committee Member ER Conference 1999-2011.
- ICIS Doctoral Consortium Reviewer, 1999.
- Program Committee Member, Workshop on Process Modeling, 1998-2000.
- Program Co-Chair for ER conference, 1998, Singapore.
- Steering Committee Member, WITS (1991- present).
- General Conference Chair, International Conference on management of Data (SIGMOD97), Tucson, 1997.
- General Conference Chair for Fifth International Conference on Data and Knowledge Systems in Manufacturing and Engineering, Phoenix, AZ, 1996.
- Program Chair, International Conference on Data and Knowledge Systems in Manufacturing and Engineering, Hong Kong, 1995.
- Co-Chair for 1995 Workshop on Information Technology and Systems, Amsterdam, Dec. 1995.
- Member of DSI Elwood S. Buffa Doctoral Dissertation Competition, 1995.
- Chair for minitrack on "Information Sharing and Knowledge Discovery in Large Scientific Databases", at the 28th Hawaii International Conference on System Sciences, Maui, HI, Jan. 1995.
- Chair for minitrack on "Information Sharing and Knowledge Discovery in Large Scientific Databases", at the 27th Hawaii International Conference on System Sciences, Maui, HI, Jan. 1994.
- Program Chair for International Conference on Data and Knowledge Systems in Manufacturing and Engineering, Hong Kong, 1994.
- Program Committee Member, International Conference on the ER Approach, 1993, 1994, 1995.
- Member of Program Committee, Workshop on Information Technology and Systems, Dec. 1993.
- Chair of Minitrack on "Current Topics in Database Research", Hawaii International Conference on Systems Sciences, Maui, January 1993.
- Member of Program Committee, Conference on Management of Data, New Delhi, India, November 1995.
- Member of Program Committee, International Conference on Data and Knowledge Systems in Manufacturing and Engineering, Lyons, France, March 1992.
- Member of Program Committee, International Conference on Data Engineering, Karlsruhe, Germany, April 1993.
- Member of Program Committee, RIDE Workshop on Interoperability Among Systems, Karlsruhe, Germany, April 1993.
- Co-Chair of Workshop on Information Technology and Systems - WITS-91, Sloan School of Management, MIT, Dec 14-15, 1991.
- Member of Program Committee for Workshop on Information Technology and Systems - WITS-92, Dallas, TX, Dec. 1992.
- Member of Program Committee for the International Conference on the Entity Relationship Approach, Vienna, Austria, Oct. 1992.
- Member of Program Committee for the 13th International Conference on Information Systems, Dallas, TX, Dec. 1992.
- Member of Program Committee for the 10th International Conference on Information Systems, Boston, Dec. 1989.
- Member of Program Committee for the 11th International Conference on Information Systems, Copenhagen, Dec. 1990.
- Member of Program Committee for the First International Workshop on Interoperability among Heterogeneous Databases, Kyoto, Japan, May 1991.

Manuscript Reviewing

- Journals: Information Systems Research, IEEE Computer, IEEE Expert, Communications of the ACM, ACM Computing Surveys, IEEE Transactions on Knowledge and Data Engineering, IEEE Journal on Selected Areas in Communications, IEEE Transactions on Engineering Management, Journal of Decision Support Systems, Journal of MIS, Journal of Systems and Software, Journal of Database Administration, Interfaces, Management Science, MIS Quarterly, Software Practices and Experience, International Journal of Man-machine studies, IEEE Transactions on Engineering Management, IEEE Transactions on Software engineering, IEEE Transactions on parallel and Distributed Systems.
- Funding Agencies: National Science Foundation, NASA, NIH.
- Conferences: International Conference on Data Engineering, International Conference on Distributed Computing Systems, International Conference on Very Large Data Bases, International Conference on Information Systems, Hawaii International Conference on System Sciences, ER Conference, International Conference on Data Engineering.
- Book Publishers: Macmillan Publishers, W.C. Brown Publishers, Science Research Associates, Merrill Publishing Company, The Dryden Press, Benjamin Cummings, Boyd and Fraser, McGraw Hill.