

Rick Kazman, Ph.D.

Education

Ph.D., Carnegie Mellon University, 1991

M.Math, University of Waterloo, 1986

M.A., York University, 1982

B.A., University of Waterloo, 1981

Research Interests

Software Architecture, Software Engineering Economics, Software Design and Analysis Tools

Academic Employment History

Professor, Department of Information Technology Management, University of Hawaii, August 2000- present.

Researcher, Software Engineering Institute, Carnegie Mellon University, September 2000-present.

Senior Member of Technical Staff, Software Engineering Institute, Carnegie Mellon University, September 1996-August 2000.

Adjunct Associate Professor, Department of Computer Science, University of Waterloo, September 1996- 2003.

Adjunct Associate Professor, Department of Computer Science, University of Toronto, September 1997- 2000.

Assistant Professor, Department of Computer Science, University of Waterloo, September 1992-August 1996.

Instructor, Department of Linguistics, University of Pittsburgh, September 1991- August 1992.

Member of Technical Staff, Software Engineering Institute, Carnegie Mellon University, June 1991 - August 1992.

Research Assistant, Software Engineering Institute, Carnegie Mellon University, June 1988 - May 1991.

Awards and Honors

Invited Presentations

- Keynote Speaker, 12th European Conference on Software Architecture (ECSA 2018), Madrid, Spain, September 2018.
- Keynote Speaker, 1st International Workshop on Establishing a Community-Wide Infrastructure for Architecture-Based Software Engineering (ECASE'17) at the International Conference on Software Engineering (ICSE) 2017, Buenos Aires, Argentina, May 2017.
- Keynote Speaker, 4th International Workshop on Crowdsourcing in Software Engineering (CSI-SE) at the International Conference on Software Engineering (ICSE) 2017, Buenos Aires, Argentina, May 2017.
- Keynote Speaker, 4th International Workshop on Green and Sustainable Software at the International Conference in Software Engineering (ICSE) 2015, Florence, Italy, May 2015.
- Keynote Speaker, 3rd International Workshop on Software Engineering for Systems-of-Systems at International Conference in Software Engineering (ICSE) 2015, Florence, Italy, May 2015.
- Keynote Speaker, 4th International Workshop on the Twin Peaks of Requirements and Architecture at International Conference in Software Engineering (ICSE) 2014, Hyderabad, India, June 2014.
- Keynote Speaker, Korean Software Engineering Society, Seoul, Korea, August 2010.
- Keynote Speaker, Application Landscapes in Banks and Insurance Workshop at Informatik 2008, Germany, September 2008.
- Keynote Speaker, Boeing Software Architecture Conference, July 2008.
- Keynote Speaker, 1st International Workshop on Management and Economics of Software Product Lines at the Asia-Pacific Software Engineering Conference (APSEC) 2007, Nagoya, Japan, December 2007.
- Keynote Speaker, Software Engineering Conference (Russia) 2007, Moscow, Russia, November 2007.
- Keynote Speaker, International Computer Symposium 2006, Taipei, Taiwan, December 2006.
- Keynote Speaker, Asia-Pacific Software Engineering Conference (APSEC) 2005, Taipei, Taiwan, December 2005.
- Keynote Speaker, ASERC Workshop on Software Architecture 2003, Banff, Canada, February 2003.
- Invited Speaker, Oregon Winter Lecture Series (OWLS), January 2002.
- Invited Speaker, SoftExpo 2001, Seoul, Korea, November 2001.
- Keynote Speaker, NCR TIES Conference, Orlando, FL, October 2000.
- Invited Speaker, Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA '99), Denver, CO, November 1999.
- Keynote Speaker, Philips Software Conference, Eindhoven, Holland, June 1999.
- Keynote Speaker, National Security Administration (NSA) Reuse Symposium, Washington,

D.C., August 1998.

- Invited Speaker, Tricore Research Symposium, Tokyo, Japan, May 1998.
- Keynote Speaker, Lockheed Martin COTS/Reuse Symposium, Owego, N.Y., September 1997.
- Invited Speaker, Tricore Research Symposium, Tokyo, Japan, November 1996.

Awards

- University of Hawaii Dennis Ching Teaching Award, 2005.
- Productivity Award for “Software Architecture in Practice”, *Software Development Magazine*, 1999.
- SEI Achievement Award for “Software Architecture in Practice”, 1998.
- Best Paper Award for “Accessing Multimedia through Concept Clustering”, HICSS-30, 1997.

Research Contributions

Books

1. H. Cervantes, R. Kazman, *Designing Software Architectures: A Practical Approach*, Addison-Wesley, 2016.
2. L. Bass, P. Clements, R. Kazman, *Software Architecture in Practice*, 3rd ed., Addison-Wesley, 2012 (2nd ed. 2003, 1st ed. 1998).
3. L. Northrop, P. Feiler, R. Gabriel, J. Goodenough, R. Linger, T. Longstaff, R. Kazman, M. Klein, D. Schmidt, K. Sullivan, and K. Wallnau, *Ultra-Large-Scale Systems: The Software Challenge of the Future*. Software Engineering Institute, Carnegie Mellon University, Pittsburgh, PA, 2006
4. P. Clements, R. Kazman, M. Klein, *Evaluating Software Architectures: Methods and Case Studies*, Addison- Wesley, 2001.

Refereed Journal Publications

1. Y. Cai, L. Xiao, R. Kazman, R. Mo, Q. Feng, "Design Rule Spaces: A New Model for Representing and Analyzing Software Architecture", *IEEE Transactions on Software Engineering*, January, 2018.
2. D. Tamburri, R. Kazman, "General Methods for Software Architecture Recovery: A Potential Approach and its Evaluation", *Empirical Software Engineering*, Sept. 2017.
3. A.H. Eden, E. Gasparis, J. Nicholson, R. Kazman, "Round-Trip Engineering with the Two-Tier Programming Toolkit", *Software Quality Journal*, May 2017.
4. H. Chen, R. Kazman, R. Schuetz, F. Matthes, "How Lufthansa Capitalized on Big Data for Business Model Renovation", *MIS Quarterly Executive*, March 2017, 16:1, 19-34.
5. D. Tamburri, R. Kazman, H. Fahimi, "The Architect's Role in Community Shepherding", *IEEE Software*, 33:6, Nov-Dec 2016, 70-79.
6. H. Chen, R. Kazman, S. Haziyevev, "Agile Big Data Analytics for Web-based Systems: An Architecture-centric Approach", *IEEE Transactions on Big Data*, 2016, 2:3, Sept. 2016, 234-248.
7. H. Cervantes, R. Kazman, J. Ryoo, D. Choi, D. Jang, "Architectural Approaches to Security: Four Case Studies", *IEEE Computer*, November 2016, 60-67.
8. H-M Chen, R. Kazman, S. Haziyevev, "Strategic Prototyping for Developing Big Data Systems", *IEEE Software*, March/April 2016, 36-43.
9. R. Kazman, D. Goldenson, I. Monarch, W. Nichols, G. Valetto, "Evaluating the Effects of Architectural Documentation: A Case Study of a Large Scale Open Source Project", *IEEE Transactions on Software Engineering*, March 2016, 42:3, 220-260.
10. J. Ryoo, P. Anand, R. Kazman, "Architectural Analysis of Security Vulnerabilities", *IEEE Security and Privacy*, November/December 2015, 13:6, 52-59.
11. S. Bellomo, I. Gorton, R. Kazman, "Insights from 15 Years of ATAM Data: Towards Agile Architecture", *IEEE Software*, September/October, 2015, 32:5, 38-45.
12. M. Naedele, H-M Chen, R. Kazman, Y. Cai, L. Xiao, C. Silva, "Manufacturing Execution Systems: A Vision for Managing Software Development", *Journal of Systems and Software*, March 2015, 101, 59-68.
13. M. Naedele, R. Kazman, Y. Cai, "Making the Case for a "Manufacturing Execution System" for Software Development", *Communications of the ACM*, December 2014, 57:12, 33-36.
14. A. Eden, E. Gasparis, J. Nicholson, R. Kazman, "Automated Verification of Design Patterns: A Case Study", *Science of Computer Programming*, February 2014, 80:B, 211-222.
15. H. Cervantes, P. Velasco, R. Kazman, "A Principled Way of Using Frameworks in Architectural Design", *IEEE Software*, March/April 2013, 30:2, 46-53.
16. A. Eden, E. Gasparis, J. Nicholson, R. Kazman, "Modeling and Visualizing Object-Oriented Programs with Codecharts", *Formal Methods in System Design*, 2013, 43:1, 1-28.
17. R. Kazman, M. Gagliardi, W. Wood, "Scaling Up Software Architecture Analysis", *Journal of Systems and Software*, 2012, 85, 1511-1519.

18. N. Nunes, L. Constantine, R. Kazman, "iUCP - Estimating interactive software projects with enhanced use-case points", *IEEE Software*, 2011, 28:4, 64-73.
19. D. Falessi, G. Cantone, R. Kazman, P. Kruchten, "Decision-making Techniques for Software Architecture Design: A Comparative Survey", *ACM Computing Surveys*, 2011, 43:4.
20. H-M Chen, R. Kazman, O. Perry, "From Software Architecture Analysis to Service Engineering: An Empirical Study of Enterprise SOA Implementation", *IEEE Transactions on Services Computing*, April-June 2010, 3:2, 145-160.
21. J. Ryoo, P. Laplante, R. Kazman, "In Search of Architectural Patterns for Software Security", *IEEE Computer*, June 2009, 42:6, 98-100.
22. R. Kazman, H-M Chen, "The Metropolis Model: A New Logic for the Development of Crowdsourced Systems", *Communications of the ACM*, July 2009, 76-84.
23. S. Kim, H. In, J. Baik, R. Kazman, K. Han, "Escaping from Red Ocean with Value-Innovative Requirements", *IEEE Software*, January/February 2008, 80-87.
24. Q. Chen, H-M Chen, R. Kazman, "Investigating Antecedents of Technology Acceptance of Initial eCRM Users Beyond Generation X and the Role of Self-Construal", *Electronic Commerce Research*, 7:3-4, December, 2007, 315-339.
25. H-M Chen, Q. Chen, R. Kazman, "The Affective and Cognitive Impacts of Perceived Touch on Online Customers' Intention to Return in the Web-Based eCRM Environment", *Journal of Electronic Commerce in Organizations*, 2007, 5:1, 69-91.
26. A. Eden, Y. Hirshfeld, R. Kazman, "Abstraction Classes in Software Design", *IEE Proceedings - Software*, August 2006, 153:4 163-182.
27. B. Schmerl, J. Aldrich, D. Garlan, R. Kazman, H. Yan, "Discovering Architectures from Running Systems", *IEEE Transactions on Software Engineering*, July 2006, 32:7, 454-466.
28. R. Kazman, M. Klein, L. Bass, "The Essential Components of Software Architecture Design and Analysis", *Journal of Systems and Software*, 2006, 79, 1207-1216.
29. A. Garg, R. Kazman, H-M Chen, "Interface Descriptions for Enterprise Architecture", *Journal of the Science of Computer Programming*, 2006, 61:1, 4-15.
30. R. Kazman, L. Bass, M. Klein, T. Lattanze, L. Northrop, "A Basis for Evaluating Software Architecture Analysis Methods", *Software Quality Journal*, 2005, 13, 329-355.
31. R. Kazman, H. In, H-M Chen: "From Requirements Negotiation to Software Architecture Decisions", *Information & Software Technology*, 2005, 47:8, 511-520.
32. H-M Chen, R. Kazman, A. Garg, "BITAM: An Engineering-principled Method for Managing Misalignments between Business and IT Architectures", *Journal of Science of Computer Programming*, 2005, 57:1, 5-26.
33. R. Gunther, R. Kazman, C. MacGregor, "Using 3D Sound as a Navigational Aid in Virtual Environments", *Behavior and Information Technology*, 2004, 23:6, 435-446.
34. R. Kazman, J. Asundi, J.S. Kim, B. Sethananda, "A Simulation Testbed for Mobile Adaptive Architectures", *Computer Standards and Interfaces*, 2002, 25:3, 291-298.
35. R. Kazman, L. Bass, "Making Architecture Reviews Work in the Real World", *IEEE Software*,

Jan./Feb. 2002, 19:1, 67-73.

36. R. Kazman, S. J. Carriere, S. G. Woods, "Toward a Discipline of Scenario-based Architectural Engineering", *Annals of Software Engineering*, 2000, 9, 5-33.

37. R. Kazman, M. Klein, P. Clements, "Evaluating Software Architectures for Real-Time Systems", *Annals of Software Engineering*, 1999, 7, 71-93.

38. R. Kazman, S. J. Carriere, "Playing Detective: Reconstructing Software Architecture from Available Evidence", *Automated Software Engineering*, April 1999, 6:2, 107-138.

39. S. J. Carriere, R. Kazman, "Webquery: Searching and Visualizing the Web Through Connectivity", *Computer Networks and ISDN Systems*, 1997, 29, 1257-1267.

40. R. Kazman, G. Abowd, L. Bass, P. Clements, "Scenario-Based Analysis of Software Architecture", *IEEE Software*, Nov. 1996, 13:6, 47-55.

41. R. Kazman, R. Al-Halimi, W. Hunt, M. Mantei, "Four Paradigms for Indexing Video Conferences", *IEEE Multimedia*, Spring 1996, 3:1, 63-73.

42. R. Kazman, "HIDRA: An Architecture for Highly Dynamic Physically Based Multi-Agent Simulations", *International Journal in Computer Simulation*, 1995, 5:2, 149-164.

43. R. Kazman, "Simulating the Child's Acquisition of the Lexicon and Syntax—Experiences with *Babel*", *Machine Learning*, May 1994, 16, 89-122.

Refereed Conference Publications

1. R. Mo, Y. Cai, R. Kazman, Q. Feng, "Assessing an Architecture's Ability to Support Feature Evolution", *Proceedings of the 26th International Conference on Program Comprehension (ICPC 2018)*, May 2018.
2. M. Galster, D. Weyns, A. Tang, R. Kazman, M. Mirakhorli, "From Craft to Science: The Road Ahead for Empirical Software Engineering Research", *Proceedings of the International Conference on Software Engineering (ICSE) 2018*, (Gronenberg, Sweden), May 2018.
3. R. Minas, R. Kazman, E. Tempero, "Neurophysiological Impact of Software Design Processes on Software Developers", in D. Schmorow, C. Fidopiastis (eds) *Augmented Cognition. Enhancing Cognition and Behavior in Complex Human Environments (AC 2017)*, Lecture Notes in Computer Science, v. 10285. Springer, 2017.
4. H-M Chen, R. Kazman, I. Monarch, P. Wang, "Can Cybersecurity Be Proactive? A Big Data Approach and Challenges", *Proceedings of HICSS 50*, (Waikoloa, Hawaii), January 2017.
5. D. Sobhy, R. Bahsoon, L. Minku, R. Kazman, "Diversifying Software Architecture for Sustainability: A Value-based Perspective", *10th European Conference on Software Architecture (ECSA 2016)*, (Copenhagen, Denmark), December 2016.
6. Q. Feng, R. Kazman, Y. Cai, R. Mo, L. Xiao, "An Architecture-centric Approach to Security Analysis", *Proceedings of the 13th Working IEEE/IFIP Conference on Software Architecture (WICSA 2016)*, (Venice, Italy), April 2016.
7. H. Cervantes, S. Haziyeve, O. Hrytsay, R. Kazman, "Smart Decisions: An Architectural Design Game", *Proceedings of the International Conference on Software Engineering (ICSE) 2016*, (Austin, TX), May 2016.
8. L. Xiao, Y. Cai, R. Kazman, R. Mo, Q. Feng, "Identifying and Quantifying Architectural Debts", *Proceedings of the International Conference on Software Engineering (ICSE) 2016*, (Austin, TX), May 2016.
9. R. Mo, Y. Cai, R. Kazman, L. Xiao, Q. Feng, "Decoupling Level: A New Metric for Architectural Maintenance Complexity", *Proceedings of the International Conference on Software Engineering (ICSE) 2016*, (Austin, TX), May 2016.
10. H-M Chen, R. Kazman, S. Haziyeve, V. Kropov D. Chtchourov, "Big Data as a Service: A Neo-Metropolis Model Approach for Innovation", *Proceedings of HICSS 49*, (Kauai, Hawaii), January 2016.
11. H-M Chen, R. Schütz, R. Kazman, F. Matthes, "Amazon in the Air: Innovating with Big Data at Lufthansa", *Proceedings of HICSS 49*, (Kauai, Hawaii), January 2016.
12. H-M Chen, R. Kazman, S. Haziyeve, "Agile Big Data Analytics Development: An Architecture-Centric Approach", *Proceedings of HICSS 49*, (Kauai, Hawaii), January 2016.
13. H. Terho, S. Suonsyrjä, A. Jaaksi, T. Mikkonen, R. Kazman, H-M Chen, "Lean Startup Meets Software Product Lines: Survival of the Fittest or Letting Products Bloom?", 14th Symposium on Programming Languages and Software Tools (SPLST '15), (Tampere, Finland), October 2015.
14. M. Hauder, R. Kazman and F. Matthes, "Empowering End-Users to Collaboratively Structure Processes for Knowledge Work", *18th International Conference on Business Information Systems*

(BIS 2015), (Poznan, Poland), June 2015.

15. R. Mo, Y. Cai, R. Kazman, L. Xiao, “Hotspot Patterns: The Formal Definition and Automatic Detection of Architecture Smells”, *Proceedings of the 12th Working IEEE/IFIP Conference on Software Architecture (WICSA 2015)*, (Montreal, Canada), May 2015.

16. R. Kazman, Y. Cai, R. Mo, Q. Feng, L. Xiao, S. Haziyevev, V. Fedak, A. Shapochka, “A Case Study in Locating the Architectural Roots of Technical Debt”, *Proceedings of the International Conference on Software Engineering (ICSE) 2015*, (Florence, Italy), May 2015.

17. Y. Lee, H. In, R. Kazman, “Customer Requirements Validation Method based on Mental Models”, *Proceedings of the 21st Asia-Pacific Software Engineering Conference*, (Jeju, Korea), December 2014.

18. L. Xiao, Y. Cai, R. Kazman, “Titan: A Toolset That Connects Software Architecture with Quality Analysis”, *Proceedings of the 22nd ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2014)*, (Hong Kong), November 2014.

19. L. Xiao, Y. Cai, R. Kazman, "Design Rule Spaces: A New Form of Architecture Insight", *Proceedings of the International Conference on Software Engineering (ICSE) 2014*, (Hyderabad, India), June 2014.

20. P. Monteiro, R. Machado, P. Ribeiro, C. Simões, R. Kazman “RUP Alignment and Coverage Analysis of CMMI ML2 Process Areas for the Context of Software Projects Execution”, *Proceedings of Software Quality Days (SWQD) 2014*, (Vienna, Austria), January 2014.

21. J. Klein, S. Cohen, R. Kazman, “Common Software Platforms in System-of-Systems Architectures: The State of the Practice”, *8th Annual System of Systems Engineering Conference*, (Maui, HI), June 2013.

22. R. Kazman, K. Schmid, C. B. Nielsen, J. Klein, “Understanding Patterns for System of Systems Integration”, *8th Annual System of Systems Engineering Conference*, (Maui, HI), June 2013.

23. Y. Cai, R. Kazman, C. Jaspan, J. Aldrich, “Introducing Tool-Supported Architecture Review into Software Design Education”, *Proceedings of the Conference on Software Engineering Education and Training (CSEE&T) 2013*, (San Francisco, CA), May 2013.

24. A. Lokhman, T. Mikkonen, I. Hammouda, R. Kazman, H-M Chen, “A Core-Periphery-Legality Architectural Style for Open Source System Development”, *Proceedings of HICSS 46*, (Maui, HI), January 2013.

25. P. Monteiro, R. Machado, A. Lima, R. Kazman, C. Simões, P. Ribeiro, “Mapping CMMI and RUP Process Frameworks for the Context of Elaborating Software Project Proposals”, *Proceedings of Software Quality Days (SWQD) 2013*, (Vienna, Austria), January 2013.

26. J. Ryoo, P. Laplante, R. Kazman, “Revising a Security Tactics Hierarchy through Decomposition, Reclassification, and Derivation”, *Proceedings of the International Conference on Software Security and Reliability (SERE 2012)*, (Washington, D.C.), June 2012.

27. R. Kazman, P. Kruchten, “Design Approaches for Taming Complexity”, *Proceedings of the 2012 IEEE Systems Conference (SysCon 2012)*, (Vancouver, Canada), March 2012.

28. F. Faniyi, R. Bahsoon, A. Evans, R. Kazman, “Evaluating Security Properties of Architectures in Unpredictable Environments: A Case for Cloud”, *Proceedings of the 9th Working IEEE/IFIP*

Conference on Software Architecture (WICSA), (Boulder, Colorado), June 2011.

29. R. Kazman, L. Bass, J. Ivers, G. Moreno, "Architecture Evaluation without an Architecture: Experience with the Smart Grid", *Proceedings of 33rd International Conference on Software Engineering (ICSE 33)*, (Honolulu, HI), May 2011.

30. L. Bass, R. Kazman, I. Ozkaya, "Developing Architectural Documentation for the Hadoop Distributed File System", *Proceedings of 7th International Conference on Open Source Systems*, (Salvador, Brazil), 2011, 50-61.

31. P. Monteiro, R. Machado, R. Kazman, C. Henriques, "Dependency Analysis between CMMI Process Areas", *11th International Conference on Product Focused Software Development and Process Improvement (PROFES 2010)*, (Limerick, Ireland), June 2010.

32. Z. Hall, R. Kazman, D. Plakosh, J. Giampapa, K. Wallnau, "Edge Enabled Systems", *AFCEA-GMU Critical Issues in C4I 2010*, (Fairfax, VA), May 2010.

33. J. Carriere, R. Kazman, I. Ozkaya, "A Cost-Benefit Framework for Making Architectural Decisions in a Business Context", *Proceedings of 32nd International Conference on Software Engineering (ICSE 32)*, (Capetown, South Africa), May 2010.

34. J. Ryoo, P. Laplante, R. Kazman, "A Methodology for Mining Security Tactics from Security Patterns", *Proceedings of HICSS – 43*, (Kauai, HI), January 2010.

35. H-M Chen, R. Kazman, O. Perry, "An Integrated Framework for Service Engineering: A Case Study in Financial Services Industry," *Proceedings of ACM International Conference on Electronic Commerce*, Taipei, Taiwan, Aug. 2009.

36. J. Nicholson, E. Gasparis, A. Eden, R. Kazman, "Automated Verification of Design Patterns with LePUS3", *Proceedings of 1st NASA Formal Methods Symposium*, (Moffett Field, CA), April 2009.

37. E. Gasparis, A. Eden, J. Nicholson, R. Kazman, "The Design Navigator: Charting Java Programs", *Proceedings of 30th International Conference on Software Engineering (ICSE 30)*, (Leipzig, Germany), May 2008.

38. D. Port, R. Kazman, "Strategic Planning for Information Security and Assurance", *2nd International Conference on Information Security and Assurance (ISA 2008)*, (Busan, Korea), April 2008.

39. L. Bass, P. Clements, R. Kazman, M. Klein, "Evaluating the Software Architecture Competence of Organizations", *Proceedings of the Working IEEE/IFIP Conference on Software Architecture (WICSA) 2008*, (Vancouver, Canada), February 2008.

40. D. Port, R. Kazman, "Laptop Enabled Active Learning in the Software Engineering Classroom: An Experience Report", *Proceedings of CSEET 2007*, (Dublin, Ireland), June 2007.

41. T.C. N. Graham, R. Kazman, C. Walmsley, "Agility and Experimentation: Practical Techniques for Resolving Architectural Tradeoffs", *Proceedings of the 29th International Conference on Software Engineering (ICSE 29)*, (Minneapolis, MN), May 2007.

42. P. Clements, R. Kazman, M. Klein, D. Devesh, S. Reddy, P. Verma, "The Duties, Skills and Knowledge of Software Architects", *Proceedings of the Working IEEE/IFIP Conference on Software Architecture (WICSA) 2007*, (Mumbai, India), January 2007.

43. D. Port, R. Kazman, H. Nakao, M. Katahira, "Practicing What is Preached: 80-20 Rules for Strategic IV&V Assessment", *Proceedings of IEEE EQUITY 2007*, (Amsterdam, Netherlands), March 2007.
44. D. Port, R. Kazman, H. Nakao, N. Hoshino, Y. Miyamoto, "Investigating a Constructive Scorecard Model for Creating Meaningful Quantitative Data from Qualitative Inputs", *Proceedings of ISESE 2006*, (Rio de Janeiro, Brazil), September 2006.
45. H-M Chen, Q. Chen, R. Kazman, "The Affective and Cognitive Impacts of Perceived Touch on Online Customer's Intention to Return in the Web-based eCRM environment", *Proceedings of Web 2005*, (Las Vegas, NV), December, 2005.
46. A. Garg, R. Kazman, "Interface Descriptions for Enterprise Architecture", *Proceedings of 2005 International Conference on Software Engineering Research and Practice*, (Las Vegas, NV), June 2005, 87-93.
47. A. Takenaka, D. Port, R. Kazman, "Using Function Points to Measure Design Information and Interface", *Proceedings of ISESE 04*, (Redondo Beach, CA), August 2004.
48. H-M Chen, R. Kazman, A. Garg, "Managing Misalignments Between Business and IT", *Proceedings of 2004 International Conference on Software Engineering Research and Practice*, (Las Vegas, NV), June 2004, 923- 929.
49. R. Kazman, P. In, H-M Chen, "From Requirements Negotiation to Software Architecture Decisions", *Proceedings of 2nd International Conference on Software Engineering Research, Management and Applications (SERA2004)*, (Los Angeles, CA), May 2004, 213-220.
50. H. Yan, D. Garlan, B. Schmerl, J. Aldrich, R. Kazman, "DiscoTect: A System for Discovering Architectures from Running Systems", *Proceedings of the 26th International Conference on Software Engineering (ICSE 26)*, (Edinburgh, Scotland), May 2004, 470-479.
51. R. Kazman, M. Klein, R. Nord, "Tailorable Architecture Methods", *28th NASA Goddard/IEEE Software Engineering Workshop*, (Washington, D.C., December 2003).
52. R. Kazman, J. Gunaratne, B. Jerome, "Why Can't Software Engineers and HCI Practitioners Work Together?", *Human-Computer Interaction Theory and Practice - Part 1 (Proceedings of HCI International '03)*, (Crete, Greece), June 2003, 504-508.
53. M. Moore, R. Kazman, M. Klein, J. Asundi, "Quantifying the Value of Architecture Design Decisions: Lessons from the Field", *Proceedings of the 25th International Conference on Software Engineering (ICSE 25)*, (Portland, OR), May 2003, 557-562.
54. A. Eden, R. Kazman, "Architecture, Design, and Implementation", *Proceedings of the 25th International Conference on Software Engineering (ICSE 25)*, (Portland, OR), May 2003, 149-159.
55. R. Kazman, J. Asundi, A. Ran, "Adaptable Architectures for Mobile Systems", *International Conference on Software Engineering Research and Practice*, (Las Vegas, NV), June 2002.
56. R. Kazman, J. Asundi, M. Klein, "Quantifying the Costs and Benefits of Architectural Decisions", *Proceedings of the 23rd International Conference on Software Engineering (ICSE 23)*, (Toronto, Canada), May 2001, 297- 306.
57. S. J. Carriere, S. G. Woods, R. Kazman, "Software Architecture Transformation", *Proceedings of the 6th IEEE Working Conference on Reverse Engineering (WCRE)*, (Atlanta, GA), October

1999, 13-23.

58. S. G. Woods, S. J. Carriere, R. Kazman, "A Semantic Foundation for Architectural Reengineering", *International Conference on Software Maintenance*, (Oxford, England), September 1999, 391-398.

59. R. Kazman, M. Barbacci, M. Klein, S. J. Carriere, S. G. Woods, "Experience with Performing Architecture Tradeoff Analysis", *Proceedings of the 21st International Conference on Software Engineering (ICSE 21)*, (Los Angeles, CA), May 1999, 54-63.

60. S. J. Carriere, R. Kazman, S. G. Woods, "Assessing and Maintaining Architectural Quality", *Proceedings of 3rd Euromicro Working Conference on Software Maintenance And Reengineering (CSMR)*, (Amsterdam, Holland), March 1999, 22-30.

61. M. Klein, R. Kazman, L. Bass, S. J. Carriere, M. Barbacci, H. Lipson, "Attribute-Based Architectural Styles", *Software Architecture (Proceedings of the First Working IFIP Conference on Software Architecture (WICSA1))*, (San Antonio, TX), February 1999, 225-243.

62. G. Guo, J. Atlee, R. Kazman, "A Software Architecture Reconstruction Method", *Software Architecture (Proceedings of the First Working IFIP Conference on Software Architecture (WICSA1))*, (San Antonio, TX), February 1999, 15-33.

63. R. Kazman, S. G. Woods, S. J. Carriere, "Requirements for Integrating Software Architecture and Reengineering Models: CORUM II", *Proceedings of the 5th IEEE Working Conference on Reverse Engineering (WCRE)*, (Honolulu, HI), October 1998, 154-163.

64. R. Kazman, M. Klein, M. Barbacci, T. Longstaff, H. Lipson, J. Carriere, "The Architecture Tradeoff Analysis Method", *Proceedings of the Fourth IEEE International Conference on Engineering of Complex Computer Systems (ICECCS)*, (Monterey, CA), August 1998, 68-78.

65. R. Kazman, S. J. Carrière, "View Extraction and View Fusion in Architectural Understanding", *Fifth International Conference on Software Reuse*, (Victoria, B.C.), June 1998, 290-299.

66. R. Kazman, M. Burth, "Assessing Architectural Complexity", *Proceedings of 2nd Euromicro Working Conference on Software Maintenance And Reengineering (CSMR)*, (Florence, Italy), March 1998, 104-112.

67. C.-H. Lung, S. Bot, K. Kalaichelvan, R. Kazman, "An Approach to Software Architecture Analysis for Evolution and Reusability", *Proceedings of CASCON '97*, November 1997.

68. R. Kazman, P. Clements, L. Bass, G. Abowd, "Classifying Architectural Elements as a Foundation for Mechanism Matching", *Proceedings of COMPSAC 1997*, (Washington, D.C.), August, 1997, 14-17.

69. J. Carriere, R. Kazman, "Webquery: Searching and Visualizing the Web Through Connectivity", *Proceedings of 6th International World Wide Web Conference*, (Santa Clara, CA), April 1997, 701-711.

70. J. Kominek, R. Kazman, "Accessing Multimedia through Concept Clustering", *Proceedings of CHI '97*, (Atlanta, GA), March 1997, 19-26.

71. R. Kazman, J. Kominek, "Supporting the Retrieval Process in Multimedia Information Systems", *Proceedings of HICSS - 30*, (Maui, HI), January 1997, Vol. VI, 229-238. *Recipient of the Best Paper award.*

72. L. Cheng, R. Kazman, J. Robinson, "Evaluation of Vibrotactile Feedback in Delicate Virtual Reality Operations", *Proceedings of ACM Multimedia 96*, (Boston, MA), November 1996, 243-253.
73. R. Kazman, J. Carriere, "Rapid Prototyping of Visualizations Using VANISH", *Proceedings of IEEE Information Visualization '96*, (San Francisco, CA), October 1996, 21-28.
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75. R. Kazman, J. Carriere, "An Adaptable Software Architecture for Rapidly Creating Information Visualizations", *Proceedings of Graphics Interface '96*, (Toronto, ON), May 1996, 17-27.
76. S. Mereu, R. Kazman, "Audio Enhanced 3D Interfaces for Visually Impaired Users", *Proceedings of CHI '96*, (Vancouver, BC), April 1996, 72-78.
77. J. Atlee, P. Dasiewicz, R. Kazman, R. Seviara, A. Singh, "A Joint CS/E&CE Undergraduate Option in Software Engineering", *Proceedings of the 9th Conference on Software Engineering Education*, (Daytona Beach, FL), April 1996, 16-28.
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81. A. Park, R. Kazman, "An Intelligent, Interactive and Integrated Graphical User Interface for Mining Teleoperation", *Telem manipulator and Telepresence Technologies, Proceedings of SPIE 2351*, (Boston, MA), November 1994, 119-129.
82. R. Tapp, R. Kazman, "Determining the Usefulness of Colour and Fonts in a Programming Task", *Proceedings of the 3rd Workshop on Program Comprehension*, (Washington, D.C.), November 1994, 154-161.
83. R. Kazman, G. Abowd, L. Bass, M. Webb, "SAAM: A Method for Analyzing the Properties of Software Architectures," *Proceedings of the 16th International Conference on Software Engineering (ICSE 16)*, (Sorrento, Italy), May 1994, 81-90.
84. R. Kazman, J. Kominek, "Information Organization in Multimedia Resources," *Proceedings of ACM SIGDOC '93*, (Kitchener, Ontario), October 1993, 149-162.
85. R. Kazman, "Making WAVES: On the Design of Architectures for Low-end Distributed Virtual Environments," *Proceedings of IEEE Virtual Reality Annual International Symposium*, (Seattle, WA), September 1993, 443- 449.
86. L. Bass, R. Kazman, R. Little, "Toward a Software Engineering Model of Human-Computer Interaction," *Engineering for Human-Computer Interaction, Proceedings of EHCI '92*, (Ellivuori, Finland), North Holland, August 1993, 131-153.
87. R. Kazman, "Why Do Children Say 'Me do it'?", *The Proceedings of the Thirteenth Annual Conference of the Cognitive Science Society*, (Chicago, IL), Lawrence Erlbaum, August 1991, 455-

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88. R. Kazman, "A Psychologically Plausible Cross-Linguistic Model of Lexical and Syntactic Acquisition," *Machine Learning: Proceedings of the Eighth International Workshop (ML91)*, (Evanston, IL), Morgan Kaufmann, June 1991, 75-79.

89. L. Bass, B. Clapper, E. Hardy, R. Kazman, R. Seacord, "Serpent: A User Interface Management System," *Proceedings of the Winter 1990 USENIX Conference*, January 1990, 245-257.

Book Chapters

1. P. Boxer, R. Kazman, "Analyzing the Architectures of Software-Intensive Ecosystems", in *Managing trade-offs in adaptable software architectures*, Elsevier, 2016.
2. Y. Cai, R. Kazman, C. A. Silva, L. Xiao, H-M Chen, "A Decision-Support System Approach to Economics-Driven Modularity Evaluation", in *Economics-Driven Software Architecture*, Elsevier, 2014.
3. H-M Chen, Q. Chen, R. Kazman, "From High Tech to High Touch: The Effects of Perceived Touch on Online Customers' Intention to Return," in *Consumer Behavior, Organizational Development and Electronic Commerce: Emerging Issues for Advancing Modern Socioeconomic*, IGI Global publishing, 2008
4. H-M Chen, Q. Chen, R. Kazman. "The Affective and Cognitive Impacts of Perceived Touch on Online Customers' Intention to Return in the Web-based eCRM environment," Chapter 5.19 in S. Backer ed., *Electronic Commerce: Concepts, Methodologies, Tools and Applications*, Information Science Reference, 2008.
5. R. Kazman, D. Klappholz, D. Port, "Risk Assessment and Risk Management" in *Handbook of Information Security, Volume 3: Threats, Vulnerabilities, Prevention, Detection and Management*, H. Bidgoli (ed.), Wiley, 2006.
6. B. Jerome, R. Kazman, "Surveying The Solitudes: An Investigation into the Relationships between Human Computer Interaction and Software Engineering in Practice", in *Human-Centered Software Engineering - Integrating Usability in the Development Process*, A. Seffah, J. Gulliksen, M. Desmarais (eds.), Kluwer, 2005.
7. R. Kazman, "Software Engineering and its Relationships to Human-Computer Interaction", in *Encyclopedia of Human-Computer Interaction*, Berkshire Publishing, 2004.
8. R. Kazman, "Software Architecture", *Handbook of Software Engineering and Knowledge Engineering*, Vol 1., World Scientific, 2001, 47-68.
9. R. Kazman, L. Bass, "Software Architecture and Quality", *Constructing Superior Software*, Macmillan, 1999, P. Clements (ed.), 1999, 83-104.
10. A. Zomaya, R. Kazman, "Simulated Annealing Techniques", *Handbook on Algorithms and Theory of Computation*, M.J. Atallah (ed.), CRC Press, 1998, 1160-1176.
11. R. Al-Halimi, R. Kazman, "Temporal Indexing of Video through Lexical Chaining", *WordNet: An Electronic Lexical Database and some of its Applications*, C. Fellbaum (ed.), MIT Press, 1997, 333-351.
12. G. Cockton, C. Gram (eds.), *Design Principles for Interactive Software*, Chapman & Hall, 1996.
13. P. Clements, L. Bass, R. Kazman, G. Abowd, "Predicting Software Quality by Architecture-Level Evaluation", *Component-Based Software Engineering*, A. Brown (ed.), IEEE CS Press, 1996, 19-26. (Originally *Proc. 5th International Conference on Software Quality*, (Austin, TX), October 1995, 485-497).
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15. R. Kazman, "Load Balancing, Latency Management and Separation of Concerns in a Distributed Virtual World," *Parallel Computing - Paradigms and Applications*, A. Zomaya (ed.), International Thomson Computer Press, 1996, 480-497.
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1. R. Ellison, A. Householder, J. Hudak, R. Kazman, C. Woody, "Extending AADL for Security Design Assurance of Cyber-Physical Systems", CMU/SEI-2015-TR-014, 2015.
2. R. Kazman, C. Nielsen, K. Schmid, "Understanding Patterns for System-of-Systems Integration", CMU/SEI-2013-TR-017, 2013.
3. J. Scott, R. Kazman, "Realizing and Refining Architectural Tactics: Availability", CMU/SEI-2009-TR-006, 2009.
4. L. Bass, P. Clements, R. Kazman, J. Klein, M. Klein, J. Sivi, "A Workshop on Architecture Competence", CMU/SEI-2009-TN-005, 2009.
5. L. Bass, P. Clements, R. Kazman, M. Klein, "Models for Evaluating and Improving Architecture Competence", CMU/SEI-2008-TR-006, 2008.
6. I. Ozkaya, R. Kazman, M. Klein, "Quality-Attribute Based Economic Valuation of Architectural Patterns", CMU/SEI-2007-TR-003, Software Engineering Institute, Carnegie Mellon University, 2007.
7. R. Kazman, L. Bass. "Categorizing Business Goals for Software Architectures", CMU/SEI-2005-TR-021, Software Engineering Institute, Carnegie Mellon University, 2005.
8. H. Yan, J. Aldrich, D. Garlan, R. Kazman, B. Schmerl, "Discovering Architectures from Running Systems: Lessons Learned", CMU/SEI-2004-TR-016, Software Engineering Institute, Carnegie Mellon University, 2004.
9. R. Kazman, P. Kruchten, R. Nord, J. Tomayko, F. "Integrating Software-Architecture-Centric Methods into the Rational Unified Process", CMU/SEI-2004-TR-011, Software Engineering Institute, Carnegie Mellon University, 2004.
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11. R. Nord, M. Barbacci, P. Clements, R. Kazman, M. Klein, L. O'Brien, J. Tomayko, "Integrating the Architecture Tradeoff Analysis Method (ATAM) with the Cost Benefit Analysis Method (CBAM)", CMU/SEI-2003- TN-038, Software Engineering Institute, Carnegie Mellon University, 2003.
12. R. Kazman, R. Nord, M. Klein, "A Life Cycle View of Architecture Analysis and Design Methods", CMU/SEI- 2003-TN-034, Software Engineering Institute, Carnegie Mellon University, 2003.
13. R. Kazman, L. O'Brien, C. Verhoef, "Architecture Reconstruction Guidelines, 3rd Edition", CMU/SEI-2002- TR-034, Software Engineering Institute, Carnegie Mellon University, 2002.
14. R. Kazman, J. Asundi, M. Klein, "Making Architecture Design Decisions: An Economic Approach", CMU/SEI- 2002-TR-035, Software Engineering Institute Technical Report, Carnegie Mellon University, 2002.
15. J. Asundi, R. Kazman, M. Klein, "Using Economic Considerations to Choose Amongst Architecture Design Alternatives", CMU/SEI-2001-TR-035, Software Engineering Institute, Carnegie Mellon University, 2001.
16. R. Kazman, L. O'Brien, C. Verhoef, "Architecture Reconstruction Guidelines", CMU/SEI-2001-TR-026, Software Engineering Institute, Carnegie Mellon University, 2001.

17. R. Kazman, M. Klein, P. Clements, "ATAM: A Method for Architecture Evaluation", CMU/SEI-2000-TR-004, Software Engineering Institute, Carnegie Mellon University, 2000.
18. M. Klein, R. Kazman, "Attribute-Based Architectural Styles", CMU/SEI-99-TR-022, Software Engineering Institute, Carnegie Mellon University, 1999.
19. J. Bergey, M. Fisher, L. Jones, R. Kazman, "Software Architecture Evaluation with ATAM in the DoD System Acquisition Context", CMU/SEI-99-TN-12, Software Engineering Institute, Carnegie Mellon University, 1999.
20. L. Bass, R. Kazman, "Architecture-Based Development", CMU/SEI-99-TR-007, Software Engineering Institute, Carnegie Mellon University, 1999.
21. R. Kazman, M. Klein, M. Barbacci, T. Longstaff, H. Lipson, J. Carriere, "The Architecture Tradeoff Analysis Method", CMU/SEI-98-TR-8, Software Engineering Institute, Carnegie Mellon University, 1998.
22. B. C. Meyers, D. Plakosh, P. Place, M. Klein, R. Kazman, "Assessment of CORBA and POSIX Designs for FAA En Route Resectorization", CMU/SEI-98-SR-002, Software Engineering Institute, Carnegie Mellon University, 1998.
23. M. Barbacci, J. Carrière, R. Kazman, M. Klein, H. Lipson, T. Longstaff, C. Weinstock, "Steps in an Architecture Tradeoff Analysis Method: Quality Attribute Models and Analysis", CMU/SEI-97-TR-029, Software Engineering Institute, Carnegie Mellon University, 1997.
24. R. Kazman, S. J. Carriere, "Playing Detective: Reconstructing Software Architecture from Available Evidence", CMU/SEI-97-TR-010, Software Engineering Institute, Carnegie Mellon University, 1997.
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27. R. Kazman, G. Abowd, L. Bass, P. Clements, "Scenario-Based Analysis of Software Architecture", CS-95-45, University of Waterloo Department of Computer Science, 1995.
28. R. Kazman, L. Bass, "Toward Deriving Software Architectures from Quality Attributes", CMU/SEI-94-TR-10, Carnegie Mellon University, Software Engineering Institute, 1994.
29. R. Kazman, G. Abowd, L. Bass, M. Webb, "Analyzing the Properties of User Interface Software Architectures", CMU-CS-93-201, School of Computer Science, Carnegie Mellon University, 1993.
30. R. Kazman, "On building a Model of Grammar from Information in the Lexicon", *Machine Learning of Natural Language and Ontology, Proceedings of the AAAI Spring Symposium*, Document D91-09, DFKI, Kaiserslautern, Germany, 1991.
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Contributions to Workshops

1. N. Ernst, R. Kazman, P. Bianco, "Towards Rapid Composition with Confidence in Robotics Software", 1st International Workshop on Robotics Software Engineering (RoSE'18), (Gothenberg, Sweden), May 2018.
2. R. Nord, I. Ozkaya, E. Schwartz, F. Shull, R. Kazman, "Can Knowledge of Technical Debt Help Identify Software Vulnerabilities?", *9th USENIX Workshop on Cyber Security Experimentation and Test*, (Austin, TX), August 2016.
3. Y. Cai, R. Kazman, "Software Architecture Health Monitor", *International Workshop on Bringing Architecture Design Thinking into Developers' Daily Activities*, (Austin, TX), May 2016.
4. H-M Chen, R. Kazman, J. Garbajosa, E. Gonzalez, "Toward Big Data Value Engineering for Innovation", *2nd International Workshop on Big Data Software Engineering (BIGDSE)*, (Austin, TX), May 2016.
5. H-M Chen, R. Kazman, I. Monarch, P. Wang, "Predicting and Fixing Vulnerabilities Before They Occur: A Big Data Approach", *2nd International Workshop on Big Data Software Engineering (BIGDSE)*, (Austin, TX), May 2016.
6. H-M Chen, R. Kazman, F. Matthes, "Demystifying Big Data Adoption: Beyond IT Fashion and Relative Advantage", *Proceedings of Diffusion Interest Group In Information Technology (DIGIT) 2015*, (Dallas, TX), Dec. 2015.
7. H-M Chen, R. Kazman, S. Haziyevev, V. Kropov, D. Chtchourov, "Architectural Support for DevOps in a Neo-Metropolis BDaaS Platform", *IEEE 34th Symposium on Reliable Distributed Systems Workshop (SRDSW)*, (Montreal, Canada), Sept. 2015.
8. H-M Chen, R. Kazman, S. Haziyevev, O. Hrytsay, "Big Data System Development: An Embedded Case Study with a Global Outsourcing Firm", *1st International Workshop on Big Data Software Engineering (BIGDSE)*, (Florence, Italy), May 2015.
9. M. Mirakhorli, H-M Chen, R. Kazman, "Mining Big Data for Detecting, Extracting and Recommending Architectural Design Concepts", *1st International Workshop on Big Data Software Engineering (BIGDSE)*, (Florence, Italy), May 2015.
10. S. Bellomo, R. Kazman, N. Ernst, R. Nord, "Toward Design Decisions to Enable Deployability; Empirical Study of Three Projects Reaching for the Continuous-Delivery Holy Grail", *The First International Workshop on Dependability and Security of System Operation (DSSO 2014)*, (Atlanta, GA), June 2014.
11. H-M Chen, R. Kazman "Architecting Ultra-Large-Scale Green Information Systems", *1st International Workshop on Green and Sustainable Software (GREENS)*, (Zurich, Switzerland), June 2012.
12. J. Klein, G. Chastek, S. Cohen, R. Kazman J. McGregor, "An Early Look at Defining Variability Requirements for System of Systems Platforms", *Workshop on Requirements Engineering for Systems and Systems-of-Systems*, (Chicago, IL), September 2012.
13. N. Brown, Y. Cai, Y. Guo, R. Kazman, M. Kim, P. Kruchten, E. Lim, A. MacCormack, R. Nord, I. Ozkaya, R. Sangwan, C. Seaman, K. Sullivan, N. Zazworka, "Managing Technical Debt in

Software-Reliant Systems”, *FSE/SDP Workshop on the Future of Software Engineering Research at ACM SIGSOFT FSE-18*, (Santa Fe, NM), November, 2010.

14. R. Kazman, H-M Chen, “The Metropolis Model and its Implications for the Engineering of Software Ecosystems”, *FSE/SDP Workshop on the Future of Software Engineering Research at ACM SIGSOFT FSE-18*, (Santa Fe, NM), November, 2010.

15. P. Monteiro, R. Machado, R. Kazman, “Inception of Software Validation and Verification Practices within CMMI Level 2”, *SEDES’2009 Workshop, Proceedings of the 4th International Conference on Software Engineering Advances - ICSEA 2009*, September, 2009, pp. 536-541.

16. R. Kazman, “The Carr-Benkler Wager and its Implications for ULS Software Engineering”, *Second International Workshop on Ultra-Large-Scale Software- Intensive Systems (ULSSIS) at ICSE 30*, (Leipzig, Germany), May 2008.

17. H. In, R. Kazman, D. Olson, “From Requirements Negotiation to Software Architectural Decisions”, *STRAW 2001*, (Toronto, Canada), May 2001.

18. J. Asundi, R. Kazman, “A Foundation for the Economic Analysis of Software Architectures”, *Third International Workshop on Economics-Driven Software Engineering (EDSER-3)*, (Toronto, Canada), May 2001.

19. D. Li, H. In, R. Kazman, “A Flexible Architecture and its Tradeoff Analysis Framework for CSCW Applications”, *Workshop on Software Architectures for Cooperative Systems*, (Philadelphia, PA), December, 2000.

20. J. Asundi, R. Kazman, M. Klein, “An Architectural Approach to Software Cost Modeling”, *Second International Workshop on Economics-Driven Software Engineering (EDSER-2)*, (Limerick, Ireland), June 2000.

21. R. Kazman, M. Klein, “Performing Architecture Tradeoff Analysis”, *International Software Architecture Workshop (ISAW-3)*, (Orlando, FL), October 1998, 85-88. (Selected for presentation).

22. S. J. Carrière, R. Kazman, “The Perils of Reconstructing Architectures”, *International Software Architecture Workshop (ISAW-3)*, (Orlando, FL), October 1998, 13-16.

23. M. Barbacci, L. Bass, J. Carriere, P. Clements, R. Kazman, M. Klein, and R. Linger, “Analysis and Design of Survivable Systems using Attribute-Based Architecture Styles”, *Information Survivability Workshop 1998*, (Orlando, FL), October 1998.

24. L. Briand, S. J. Carriere, R. Kazman, J. Wuest, “COMPARE: A Comprehensive Framework for Architecture Evaluation”, *ECOOP 98 Workshop on Techniques, Tools and Formalisms for capturing and assessing Architectural Quality in Object-Oriented Software*, (Brussels, Belgium), July 1998.

25. S. J. Carriere, R. Kazman, “Assessing Design Quality From a Software Architectural Perspective”, *OOPSLA ‘97 Workshop on Object-Oriented Design Quality*, (Atlanta, GA), October 1997.

26. R. Kazman, “Tool Support for Architecture Analysis and Design”, *Joint Proceedings of the SIGSOFT ‘96 Workshops (ISAW-2)*, (San Francisco, CA), October 1996, 94-97.

27. R. Reid, R. Kazman, "Reusable User Interface Metaphor Components", *CHI '96 Basic Research Symposium*, (Vancouver, B.C.), April 1996.
28. R. Kazman, L. Bass, G. Abowd, P. Clements, "An Architectural Analysis Case Study: Internet Information Systems", *Proc. of the First Int'l Workshop on Architectures for Software Systems (ISAW)*, (Seattle, WA), Carnegie Mellon University, School of Computer Science Technical Report CMU-CS-95-151, 1995, 148-165.
29. R. Kazman, "Architectural Issues for Distributed Virtual Reality", *ACM CSCW'94 Workshop on Software Architectures for Cooperative Systems*. SIGOIS Bulletin, 15 (3), April 1995.
30. R. Kazman, "A Software Architectural Analysis Methodology", Invited talk for: *CASCON '94 Workshop on Software Architecture*, (Toronto, ON), November 1994.
31. L. Bass, G. Abowd, R. Kazman, "Issues in the Evaluation of User Interface Tools," *Software Engineering and Human-Computer Interaction, ICSE '94 Workshop on SE-HCI*, (Sorrento, Italy), Springer-Verlag Lecture Notes in Computer Science 896, May 1994, 17-27.
32. M. Webb, R. Kazman, L. Bass, G. Abowd, "Assessment of Software Architecture Support for Modifiability in User Interface Architectures", *Software Measurement and Reliability for Software Maintenance Workshop*, (Montreal, Quebec), September 1993.
33. R. Kazman, "Three Topics Ignored: Usability, Tools and Examples", *National Workshop on Software Engineering Education*, (Toronto, ON), May 1993.
34. R. Kazman, "HIDRA: A Software Architecture for Dynamic Distributed Systems", *CSCW-92 Tools and Technologies Workshop*, Computer Supported Cooperative Work Conference, (Toronto, ON), October 1992.

Teaching Activities

Undergraduate Courses

Systems Analysis and Design in Organizations (University of Hawaii).

Database Systems (University of Hawaii).

Programming Application Systems (University of Hawaii).

Information Systems for the Global Business Environment (University of Hawaii)

Software Specification and Abstraction (University of Waterloo).

Concepts of Computer Programming (University of Waterloo).

Graduate Courses

Project Management, IT, and Change (University of Hawaii)

Management of Information Technology (University of Hawaii)

Architectures for Software Systems (Carnegie Mellon University).

User Interface Tools and Techniques (University of Waterloo).

Software Architecture (University of Waterloo).

Short Courses/Tutorials

Designing Software Architectures Using ADD 3.0 (WICSA 2016 Tutorial, Venice, Italy, April 2016).

Flexible Software Architecture: From Design to Coding (Technical University of Munich, October 2014).

Advanced Topics in Software Architecture, (Universidad de los Andes, Bogota, Colombia, June 2010).

Economics-Driven Architecting, (ICSE 2009 Tutorial, Vancouver, Canada, May 2009).

Economics-Driven Architecting, (OOPSLA 08 Tutorial, Nashville, TN, October 2008).

Economics-Driven Architecting, (WICSA 2008 Tutorial, Vancouver, Canada, February 2008).

Software Architecture: Principles and Practice (Software Engineering Institute, 2004-2010).

Software Architecture Design and Analysis (Software Engineering Institute, 2006-2010).

Designing and Analyzing Software Architectures Using ABASs, (ICSE 2000 Tutorial, Limerick, Ireland, June 2000).

Analysis and Redesign of Object-oriented Software Architectures, (OOPSLA 99 Tutorial, Denver, CO, November 1999).

Software Architecture in Practice, (ACM State-of-the-Art Summer School in Computer Science, Prague, Czech Republic, 1998).

An Introduction to Software Architecture, (Institute for Computer Research Short Course, Waterloo, ON, 1994, 1996, 1997).

Evaluating, Building, and Using User Interface Tools, (Summer School on the Design of Human

Computer Interfaces for Disabled People, San Sebastian, Spain, 1994).
Evaluating User Interface Tools, (CHI '94 Tutorial, Boston, MA, April, 1994).
The Serpent User Interface Management System”, (X Technical Conference Tutorial, Boston, MA, January 1990).

Curriculum/Course Development

Software Architecture: Principles and Practices (prepared for Software Engineering Institute), 1999-2018.

Software Architecture Design and Analysis (prepared for Software Engineering Institute), 2004-2017.

CASE Tools Curriculum (prepared for IBM Canada), 1992-94.

University of Waterloo Undergraduate Software Engineering option (jointly designed with Electrical & Computer Engineering), 1993-5.

Graduate Student Supervision/Co-Supervision

Ph.D.:

Carlos Paradis—(University of Hawaii), in progress.

Eduardo Pinto—(University of Porto), in progress.

Qiong Feng—(Drexel University), in progress.

Ran Mo—(Drexel University), in progress.

Master's:

Aditya Garg, “Interface Descriptions for Enterprise Architecture”, 2004.

George Guo, “A Software Architecture Reconstruction Method”, 1998.

Andrew Park, “Graphical User Interfaces for Teleoperated Drilling in an Underground Mining Environment”, 1997.

Randall Reid, “MetaCom: An Application Framework for Reusable Metaphor Components”, 1997.

Ryan Gunther, “The Use of 3D Sound as a Navigational Aid in Virtual Environments”, 1997.

Julie Waterhouse, “Comparison of 2D and 3D Interfaces for Editing Surfaces Reconstructed from Contours”, 1996

David Bauer, “Bauer Function Grapher: A Tool for Source Code Comprehension”, 1996.

Kavita Reddy, “The Empirical Derivation of a Design Space and Design Rules for Software Architecture”, 1996.

Li-Te Cheng, “Evaluation of Tactile Feedback for Delicate Virtual Reality Operations”, 1996.

John Kominek, “Adaptive Image Compression Using Quadtree-Refined Spline Interpolation”, 1995.

Jilong Chen, “Alternative Approaches to Gesture Recognition”, 1995.

Stephen Mereu, “Improving Depth Perception in 3D Interfaces with Sound”, 1995.

Alain Gaudrault, “Load Balancing in a Distributed Virtual Reality Environment”, 1995.

Riston Tapp, "Determining the Usefulness of Colour and Fonts in a Programming Task", 1994.
Greg Hood, "A WAVES Detailed Design", 1994.

Thesis committee membership

Ph.D.:

Lu Xiao—(Ph.D., Drexel University), 2016.
Dharmalingam Ganesan—(Ph.D., Free University of Amsterdam), 2012.
Christian del Rosso—(Ph.D., University of Groningen), 2008.
Omolade Saliu—(Ph.D., University of Calgary), 2007.
Christoph Stoermer—(Ph.D., Free University of Amsterdam), 2007.
Mugurel Ionita—(Ph.D., Technical University of Eindhoven), 2005.
Evgeni Eskenazi—(Ph.D., Technical University of Eindhoven), 2004.
Robert Waters—(Ph.D., Georgia Tech), 2004.
Alexander Fioukov—(Ph.D., Technical University of Eindhoven), 2004.
Nico Lassing—(Ph.D., Free University of Amsterdam), 2002.
Jai Asundi—(Ph.D., Carnegie Mellon University), 2001.
Thomas Dolan—(Ph.D., Technical University of Eindhoven), 2001.
Carolyn Hoover—(Ph.D., Carnegie Mellon University), 2001.
Rene Krikhaar—(Ph.D., Free University of Amsterdam), 1999.
Steven Woods—(Ph.D., University of Waterloo), 1996.
Luiza Carneiro—(Ph.D., University of Waterloo), 1994.

Professional Service Activities

Professional Societies

Chair IEEE TCSE (Technical Council on Software Engineering), 2016-present

Chair IEEE TAC (Technical Activities Committee), 2018-present

Member TCSE Executive Committee, 2012-2015

Conference/Workshop Organization

ICSE 2019 (SEIS Co-Chair)

HICSS 40-present (Software Technology Track Co-Chair)

ICSE Steering Committee (2015-present)

ICSE 2017 (Technical Briefings Program Committee)

SA-TTA 2016 (at SAC '16) (Program Committee)

SSSE 2015 (Program Committee)

DSSO 2015 Workshop (at SRDS '15) (Program Committee)

WICSA 2015 (Program Committee)

FoSADA 2015 (at WICSA '15) (Program Committee)

ISSC 2015 (Program Committee)

SEIS Track (at ICSE '15) (Program Committee)

DSSO 2014 Workshop (at DSN '14) (Program Committee)

CSI-SE Workshop (at ICSE '14) (Program Committee)

GREENS Workshop (at ICSE '14) (Program Committee)

ECISA 2014 (Program Committee; Doctoral Consortium Co-chair)

WICSA 2014 (Program Committee)

SE-SmartGrid Workshop (at ICSE '13) (Program Committee)

Twin Peaks Workshop (at ICSE '13) (Program Committee)

MTD Workshop (at ICSE '13) (Program Committee)

WICSA/ECISA 2012 (Program Committee)

EICS 2012 (Program Co-Chair)

SE-SmartGrid Workshop (at ICSE '12) (Co-Chair)

GREENS Workshop (at ICSE '12) (Co-Chair)

CSEE&T 2011 (Program Committee)

ECISA 2011 (Program Committee)

WICSA 2011 (Program Committee)

INTERACT 2011 (Program Committee)

ICSE 2011 (Organizing Committee)

ECSA 2010 (Program Committee)
WICSA 2009 (General Chair)
INTERACT 2009 (Program Committee)
EICS 2009 (Local Chair, Program Committee)
LMSA Workshop (at ICSE '09) (Program Committee)
QOSCSOA 08 (at ICSOC 08) (Program Committee)
EIS 2008 (Program Committee)
MESPUL 08 (at SPLC 08) (Program Committee)
ULSSIS Workshop (at ICSE '08) (Co-Chair)
MESPUL 07 (at APSEC 07) (Program Committee)
MOMPES 2008 (at ETAPS 2008) (Organizing Committee)
ICSP 2008 (Program Committee)
ESC1 Workshop (at ICSE '07) (Co-Chair)
ULS Workshop (at ICSE '07) (Co-Chair)
IWSSA Workshop (at SERP '07) (Program Committee)
WICSA 2007 (Program Committee)
EIS 2007 (Program Committee)
ICSP 07 (Program Committee)
IEEE EQUITY (Program Co-Chair)
DSVIS 05 (Program Committee)
ICMI 06 (Program Committee)
CAINE 05 (Program Committee)
CSEET 06 (Program Committee)
HICSS 39 (Minitrack chair)
INTERACT 2005 (Program Committee)
WICSA 2005 (Program Committee)
IWSSA Workshop (at SERP '05) (Program Committee)
CSEET 05 (Program Committee)
DSVIS 05 (Program Committee)
ICSE 05 (Program Committee)
HICSS 38 (Minitrack chair)
WICSA 2004 (Program Committee)
IWSSA Workshop (at SERP '04) (Program Committee)
SE/HCI 2004 workshop (at CHI 04) (Co-organizer)
SE/HCI 2004 workshop (at ICSE 04) (Co-organizer)
EHCI 04 (General Chair)
ICCBSS 2004 (Program Committee)
WASA 03 workshop (at SERP 03) (Program Committee)

STRAW 03 workshop (at ICSE 03) (Co-organizer)
SE/HCI 2003 workshop (at ICSE 03) (Co-organizer)
SWARM Dagstuhl workshop 03061 (Co-organizer)
INTERACT 2003 (Program committee)
WICSA 2002 (Program committee)
SARA 2002 Workshop (at ICSE 02) (Co-organizer)
EDSER 2002 Workshop (at ICSE 02) (Steering committee)
SAINT 2002 (Program committee)
ICSM 2001 (Program committee)
WICSA 2001 (Program co-chair)
EHCI 01 (General Chair)
HICSS 34 (Minitrack chair)
CSCW 2000 (Workshop organizer)
ISAW 2000 (Program Committee)
ASSETS 2000 (Program Committee)
WoCo8 (Program Committee)
WICSA1999 (Program Committee)
INTERACT 99 (Program Committee)
Metrics 99 (Program Committee)
ICECCS 99, ICECCS 2000 (Program Committee)
HICSS 32 (Minitrack chair)
EHCI 98 (Program co-chair)
CHI 98 (Program Committee)
ASSETS 98 (Program Committee)
Graphics Interface 96 (Program Committee)
EHCI 95 (Program Committee)

Refereeing/Reviewing

Empirical Software Engineering
ACM Computing Surveys
Journal of the Association for Information Systems
Journal of Computer Security
Communications of the ACM
Transactions on Services Computing
Transactions on Software Engineering
Transactions on Software Engineering and Methodology
European Journal of Information Systems
Journal of Systems and Software
IEEE Software
Automated Software Engineering
Journal of Software Maintenance and Evolution
Transactions on Systems, Man and Cybernetics
Software and System Modeling
Information and Software Technology
Software Practice and Experience
International Journal in Human-Computer Studies
Transactions on Computer Human Interaction
IBM Systems Journal
IEE Proceedings - Software Engineering
Encyclopedia of Software Engineering
Journal of Software Maintenance
Science of Computer Programming
Software Process Improvement and Practice
Computer Communications
Interacting with Computers

Grant Reviewing

National Science Foundation (USA)
NSERC (Canada)
Estonian Science Foundation (Estonia)
CFI (Canada)
NWO (Holland)
FWF (Austria)
Kplus (Austria)

Editorships

Managing trade-offs in Adaptable Software Architectures. (Editor, with I. Mistrik, N. Ali, J. Grundy, and B. Schmerl), Elsevier, 2016.

Economics-Driven Software Architecture. (Editor, with I. Mistrik, R. Bahsoon, and Y. Zhang), Elsevier, 2014.

Automated Software Engineering (Editor for Special Issue on Software Architecture Reconstruction and Modeling), 2006.

Third International Conference on COTS-Based Software Systems (Editor, with Dan Port), 2004.

Software Process Improvement and Practice Journal (Editor for Special Issue on Bridging the Process and Practice Gaps between Software Engineering and Human Computer Interaction)

International Journal of Software Engineering and Knowledge Engineering (Editor for Special Issue on Software Architecture)

International Journal of Parallel and Distributed Systems and Networks (Associate Editor)

Handbook Of Parallel And Distributed Computing (Associate editor)

Society/Working Group Memberships

IEEE Technical Council on Software Engineering (Chair, 2015-present, Executive Committee Member, 2006-present)

IFIP Working Group 2.7/13.4 (member 1992-present, Chair 1998-2004)

IEEE Computer Society (1992-present)

Research Grants

National Science Foundation, \$1,660,000, (Co-PI with N. Medvidovic, J. Garcia, S. Malek, M. Mirakhorli, Y. Cai, L. Xiao), "Constructing a Community-Wide Software Architecture Infrastructure", 2018-2021.

National Science Foundation, \$865,000, (Co-PI with Y. Cai), "Finding and Fixing Architectural Hotspots: An Economics-Based Decision Support Approach", 2015-2018.

National Science Foundation, \$1,100,000, (Co-PI with Y. Cai), "An Economics-Based Framework for Assessing Software Modularization Decisions", 2011-2015.

National Science Foundation, \$285,000, (Co-PI with Y. Cai, J. Aldrich), "Teaching Software Modularity through Architectural Review", 2012-2014.

NASA Human & Robotic Technology Program Grant, \$300,000, (Co-PI with D. Port), "A Model of Options and Costs for Reliable Autonomy", 2005-2007.

University of Hawaii CIBER Grant (Co-PI with H-M Chen and Q. Chen), \$9,500, "From High-Tech to High-Touch: An Empirical Study on the Impact of Culture Value on the electronic Customer Relationship Management System Success", 2003.

Nokia Research Grant, \$22,000 (PI), "Utility-based Cooperative Resource Management", 2001.

Nokia Research Grant, \$10,000 (PI), "Software Reengineering Analysis", 2000.

Tricore Research Grant, \$30,000 (PI), "Software Engineering Curriculum Development for Japan", 1998- 1999.

SERC Research Grant (Co-PI, with K. Ponnambalam), \$200,000, "Analyzing Software Architecture and Optimization Techniques of Software Structures", 1996-1997.

NSERC/SSHRC Network of Centres of Excellence Grant, (with L. Harisum et al), \$13,400,000, "Telelearning Research Network", 1995-1999. (Local team, T. Carey et al - \$700,000).

IRAP Research, Development, and Adaptation Grant (PI), \$51,000, "Full Text Retrieval Empowering Technology", 1995-1996.

Intel Corporation Research Grant (PI), \$97,000, "Heterogeneous Indexing Techniques for Multimedia Meetings", 1995-1996.

NSERC Equipment Grant (Co-PI, with J. Atlee), \$56,500, "Creation of Software Engineering Laboratory", 1995.

NSERC Research Grant (PI), \$33,000, "Software Architecture Analysis for Human-Computer Interaction", 1994-1996.

Intel Corporation Research Grant (PI), \$86,500, "Multimedia Meeting Management", 1994-1995.

INCO Corporation Research Grant (PI), \$45,000, "Design and Development of a Graphical User Interface for an Intelligent, Interactive, and Integrated Tele-operation System for Mining, 1994-1995.

Internal Research Award (PI), \$10,000, Faculty of Mathematics, University of Waterloo, 1993.

Internal Research Award (PI), \$7,000, Faculty of Mathematics, University of Waterloo, 1992.

Industrial Consulting

Government of Australia, 2017

ABB (USA), 2015-2018

Huawei (China), 2015-2018

Samsung (Korea), 2008, 2010, 2017

SoftServe (Ukraine), 2014, 2016

Libero Events (Romania), 2014

Qualcomm (USA), 2013

ILTAM (Israel), 2008, 2009, 2012

Madeira Tecnopolo (Portugal), 2010.

Finmeccanica (Italy), 2009.

Comverse (Israel), 2008.

Tekama (Russia), 2008, 2010

Seegrid (USA), 2008

KOSTA (Korea), 2007

Nokia (Finland), 2007

AIIT (Korea), 2005

Philips (USA), 2004-2005

2e Consulting (Korea), 2001

Lucent (USA), 2000

Ericsson (Spain), 1999

HP (USA), 1999

Ericsson (Sweden), 1999

Philips (Netherlands), 1999, 2001

Thomson SA (France), 1998

Alcatel SA (France), 1998

Pathlight (USA), 1998

Tektronix (USA), 1996

Tricore International (Japan), 1995-1999

IBM Corporation (Canada), 1994-1995

Xerox Corporation (Canada), 1992-1993