

## **Jane Hayes (publishes as Jane Huffman Hayes)**

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### **Curriculum Vitae – October 2014**

#### **Research Interests**

Software engineering: traceability, requirement fault models, education  
Software reliability: software verification and validation, semantic modeling of  
software faults, software testing techniques, fault  
taxonomies and profiles, fault models, error leakage  
Software maintainability: maintainability estimation/measurement, maintenance  
effort modeling, maintenance processes

#### **Education**

##### **Ph.D., January 1999, Information Technology**

George Mason University. Fairfax, VA. Advisor: A. Jefferson Offutt  
Dissertation: Input Validation Testing: A System Level, Early Lifecycle Technique

##### **M.S., May 1987, Computer Science**

University of Southern Mississippi, Hattiesburg, MS. Advisor: Cliff Burgess  
Thesis: “Partially Automated In-Line Documentation (PAID): Design and Implementation of a  
Software Maintenance Tool”

##### **B.A. cum laude, May 1983, Geology and Political Science (double major)**

Hanover College, Hanover, IN. Advisors: J. Carl Metz and Stanley Totten

#### **Employment History**

##### **University of Kentucky, July 2012 - present**

Professor, Department of Computer Science

##### **University of Kentucky, July 2011 – present (except sabbatical Fall 2014)**

Associate Chair, Department of Computer Science

##### **University of Kentucky, November 2006 - present**

Associate Professor, Department of Computer Science

##### **University of Kentucky, January 2001 – November 2006**

Assistant Professor, Department of Computer Science

##### **Science Applications International Corporation (SAIC), January 2001 – 2008**

Technical Consultant

##### **SAIC, October 1999 – January 2001**

Corporate Vice President and Manager, Integrated System Technologies Operation

Senior Member of the Technical Staff

##### **SAIC, February 1995 - October 1999**

Vice President and Manager, Innovative Software Technologies Division

Senior Member of the Technical Staff.

##### **SAIC, 1991 – January 1995**

Assistant Vice President and Manager, IV&V Branch

Senior Member of the Technical Staff

## *Jane Hayes: Curriculum Vitae*

**SAIC**, 1990 – 1991

Principal Investigator  
Senior Member of the Technical Staff

**SAIC**, 1989 – 1990

Assistant Principal Investigator  
Member of the Technical Staff

**SAIC**, 1984 – 1989

Senior Systems Analyst

**University of Southern Mississippi**, 1985 – 1987

Teaching Assistant

**Perceptronics**, Summer 1986

Applications Programmer

**Defense Intelligence Agency**, 1983 – 1984

Photographic Technologist

### **Certification and Licensure**

Certified Investigator for Research Using Human Subjects  
Collaborative Investigator Training Initiative (CITI)  
University of Kentucky, Spring 2005 (renewed as required)

Certified Software Testing Engineer (CSTE), by Quality Assurance Institute, currently expired

## **Publications**

### **Refereed Journal Papers/Archival Publications**

Published or accepted:

1. Ashlee Holbrook<sup>1</sup>, Jane Huffman Hayes, Alex Dekhtyar, Wenbin Li “A study of methods for textual satisfaction assessment,” in *Journal of Empirical Software Engineering (EMSE)*, February 2013, Volume 18, Issue 1, pp 139-176.
2. Liming Zhao\* and **Jane Huffman Hayes**, “Rank-based Refactoring Decision Support: Two Studies,” *Innovations in Systems and Software Engineering: A NASA Journal (ISSE)*, July 2011. Online August 2011: <http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s11334-011-0154-3>, Volume 7, Issue 3 (2011), Page 171-189. Impact Factor: 0.875 (2010) from <http://www.scimagojr.com/journalsearch.php?q=300147006&tip=sid>
3. Orlena Gotel, Jane Cleland-Huang, **Jane Huffman Hayes**, Andrea Zisman, Alexander Egyed, Paul Gruenbacher, Alex Dekhtyar, Giulio Antoniol, Jonathan Maletic and Patrick Mader, “Traceability Fundamentals,” (18 page chapter), accepted in June 2011 to "Software and Systems Traceability," edited book by Springer-Verlag, peer reviewed.
4. Orlena Gotel, Jane Cleland-Huang, **Jane Huffman Hayes**, Andrea Zisman, Alexander Egyed, Paul Gruenbacher, Alex Dekhtyar, Giulio Antoniol, Jonathan Maletic and Brian Berenbach, “The Grand Challenge of Traceability,” (74 page chapter), accepted in June 2011 to "Software and Systems Traceability," edited book by Springer-Verlag, peer reviewed.
5. Alex Dekhtyar and **Jane Huffman Hayes**, “Studying the Role of Humans in the Traceability Loop,” (28 page chapter) accepted in June 2011 to "Software and Systems Traceability," edited book by Springer-Verlag, peer reviewed.

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<sup>5</sup> This was after Ashlee earned her PhD

6. Hakim Sultanov\*, **Jane Huffman Hayes**, and Wei-Keat Kong\*, "Application of Swarm Techniques to Requirement Tracing," Special Issue of Requirements Engineering Journal as one of the Top 5 papers at **IEEE International Conference in Requirements Engineering (RE) 2010**, accepted April 2011, online June 2011 at <http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s00766-011-0121-4>, print version Volume 16, Issue 3 (2011), Page 209-226 – Impact Factor<sup>2</sup>: 0.931(2009) from <http://www.springer.com/computer/swe/journal/766>
7. **Jane Huffman Hayes**, Inies R. Chemmannoor\*, and E. Ashlee Holbrook\*, "Improved Code Defect Detection with Fault Links," Journal of Software Testing Verification and Reliability, Article first published online: 15 JAN 2010, DOI: 10.1002/stvr.426. – Impact Factor: 1.632 (2010) from <http://www.wiley.com/bw/journal.asp?ref=0960-0833>
8. Senthil Karthikeyan Sundaram<sup>3</sup>, **Jane Huffman Hayes**, Alex Dekhtyar, and E. Ashlee Holbrook<sup>4</sup>, "Assessing Traceability of Software Engineering Artifacts," Requirements Engineering Journal, Volume 15, Issue 3 (2010), Page 313-335, August 2010. – Impact Factor: 0.931(2009) from <http://www.springer.com/computer/swe/journal/766> – cited by 2<sup>5</sup>.
9. **Jane Huffman Hayes** and Jeff Offutt<sup>5</sup>, "Recognizing Authors: An Examination of the Consistent Programmer Hypothesis," Journal of Software Testing Verification and Reliability, Article first published online: 16 JUL 2009, DOI: 10.1002/stvr.412, hardcopy Volume 20, Issue 4, pp. 329 - 356. – Impact Factor: 1.632(2010) from <http://www.wiley.com/bw/journal.asp?ref=0960-0833> – cited by 3.
10. **Jane Huffman Hayes**, "Authorship Attribution: A Principal Component and Linear Discriminant Analysis of the Consistent Programmer Hypothesis," International Journal on Computers and their Applications (IJCA), Vol. 15, No. 2, pp. 79-99, 2008. – Impact Factor: 0.835 (2010) from <http://www.ourglocal.com/journal/?issn=09758887> – cited by 2.
11. **Jane Huffman Hayes**, Alex Dekhtyar, Senthil Karthikeyan Sundaram, E. Ashlee Holbrook, Sravanthi Vadlamudi, and Alain April, "REquirements TRacing On target (RETRO): Improving Software Maintenance Through Traceability Recovery," Innovations in Systems and Software Engineering: A NASA Journal (ISSE), Vol. 3, No. 3, pp. 193-202, 2007. – Impact Factor: 0.875 (2010) from <http://www.scimagojr.com/journalsearch.php?q=300147006&tip=sid> – cited by 14.
12. **Jane Huffman Hayes**, Alex Dekhtyar, Senthil Karthikeyan Sundaram<sup>5</sup>, "Advancing Candidate Link Generation for Requirements Tracing: The Study of Methods," IEEE Transactions on Software Engineering, Vol. 32, No. 1, pp. 4-19, January 2006. – Impact Factor: 3.75 from <http://www.bioxbio.com/if/html/IEEE-T-SOFTWARE-ENG.html> – cited by 173.
13. **Jane Huffman Hayes** and Jeff Offutt<sup>5</sup>, "Input Validation Analysis and Testing," Journal on Empirical Software Engineering, Vol. 11, No. 4, pp. 493-522, December 2006. – Impact Factor: 1.612 (2009) from <http://www.springer.com/computer/swe/journal/10664> – cited by 9.
14. **Jane Huffman Hayes** and Alex Dekhtyar, "A Framework for Comparing Requirements Tracing Experiments," International Journal on Software Engineering and Knowledge Engineering (IJSEKE), Vol. 15, No. 5, pp. 751-781, October 2005. – Impact Factor: 0.554 (2010) from <http://www.scimagojr.com/journalsearch.php?q=19270&tip=sid> – cited by 24.
15. **Jane Huffman Hayes**, Alex Dekhtyar, and Senthil Karthikeyan Sundaram<sup>5</sup>, "Improving After-the-Fact Tracing and Mapping: Supporting Software Quality Predictions," IEEE Software, Vol. 22, No. 6, pp. 30-37, November/December 2005. – Impact Factor: 2.099 (2008) from <http://www.bioxbio.com/if/html/IEEE-SOFTWARE.html> – cited by 27.

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<sup>2</sup> The impact factor is a measure reflecting the average number of citations to articles published in science and social science journals, higher values mean more impact. There are varying opinions on its value.

<sup>3</sup> This was after Senthil Sundaram earned his PhD

<sup>3</sup> This was after Ashlee Holbrook earned her PhD

<sup>5</sup> All citation information from <http://scholar.google.com/>

16. Suresh Yadla\*, **Jane Huffman Hayes**, and Alex Dekhtyar, "[Tracing Requirements to Defect Reports: An Application of Information Retrieval Techniques](#)," *Innovations in Systems and Software Engineering: A NASA Journal*, Vol. 1, No. 2, pp. 116-124, September 2005. – Impact Factor: 1.222 (2006) from <http://www.scimagojr.com/journalsearch.php?q=300147006&tip=sid> – cited by 22.
17. Hong Tina Gao\*, **Jane Huffman Hayes**, Henry Cai\*, "[Integrating Biological Research Through Web Services](#)," *IEEE Computer*, Vol. 38, No. 3, pp. 26-31, March/April 2005.– Impact factor 1.282 (2005) from <http://www.dsie.upct.es/personal/cristinav/links/journals.htm>–cited by 18.
18. Alain April, **Jane Huffman Hayes**, Alain Abran, Reiner Dumke, "[Software Maintenance Maturity Model \(SM<sup>mm</sup>\): The Software Maintenance Process Model](#)," *Journal of Software Maintenance and Evolution: Research and Practice*, Vol. 17, No. 3, pp. 197-223, May-June 2005. – Impact Factor: 1.143 (2010) from <http://www.wiley.com/bw/submit.asp?ref=1532-060X>–cited by 66.
19. **Jane Huffman Hayes**, Naresh Mohamed\*, Tina Hong Gao\*, "[Observe-Mine-Adopt \(OMA\): An Agile Way to Enhance Software Maintainability](#)," *Journal of Software Maintenance and Evolution: Research and Practice*, Vol. 15, No. 5, pp. 297-323, October 2003.–Impact Factor: 0.971 (2008) from [http://en.wikipedia.org/wiki/Journal\\_of\\_Software\\_Maintenance\\_and\\_Evolution:\\_Research\\_and\\_Practice](http://en.wikipedia.org/wiki/Journal_of_Software_Maintenance_and_Evolution:_Research_and_Practice)–cited by 14.
20. Sandy Patel\* and **Jane Huffman Hayes**, "[Case Study: Teaching an Electronic Course](#)," *Journal for Advancement of Marketing Education*, Vol. 2, No. 1, pp. 7-17, Summer 2002. Overall ranking #15 of marketing journals per <http://www.ams-web.org/displaycommon.cfm?an=1&subarticlenbr=10>

## Refereed Conference Papers

1. Wenbin Li, Jane Huffman Hayes, and Mirosław Truszczyński, "Towards More Efficient Requirements Formalization: A Study," in Proceedings of 21st International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ) 2015 (16 page paper).
2. Jane Huffman Hayes, Yann-Gaël Guéhéneuc, Wenbin Li, Mirek Truszczyński, and Giuliano Antoniol, "Error leakage and wasted time: Sensitivity analysis of a requirements consistency checking process," in Proceedings of the First North American Search Based Software Engineering Symposium (NasBASE), Detroit, MI, February 26 – 27, 2015.
3. Jane Cleland-Huang, Orlena C. Z. Gotel, Jane Huffman Hayes, Patrick Mäder, and Andrea Zisman. 2014. Software traceability: trends and future directions. In Proceedings of the on Future of Software Engineering (FOSE 2014). ACM, New York, NY, USA, 55-69.
4. Bill Kidwell\*, **Jane H Hayes**, Allen Nikora, "Toward Extended Change Types for Analyzing Software Faults," International Conference on Quality Software (QSIC) 2014, Dallas, TX, October 2014.
5. Davide Falessi, Bill Kidwell\*, **Jane Huffman Hayes**, and Forrest Shull. 2014. "On failure classification: the impact of "getting it wrong"." In Companion Proceedings of the 36th International Conference on Software Engineering (ICSE Companion 2014). May 2014. ACM, New York, NY, USA, 512-515.
6. Mark Hays\*, **Jane Huffman Hayes**, and Arne C. Bathke. 2014. "Validation of Software Testing Experiments: A Meta-Analysis of ICST 2013." In Proceedings of the 2014 IEEE International Conference on Software Testing, Verification, and Validation (ICST '14). IEEE Computer Society, Washington, DC, USA, 333-342.
7. Wenbin Li\*, David Brown\*, **Jane Huffman Hayes**, Mirosław Truszczyński: "Answer-Set Programming in Requirements Engineering." Requirements Engineering: Foundation for Software Quality (REFSQ) 2014: 168-183.

8. H Sultanov\*, **JH Hayes**, “Application of Reinforcement Learning to Requirements Engineering: Requirements Tracing,” in Proceedings of the IEEE International Conference on Requirements Engineering (RE) 2013.
9. O Gotel, JC Huang, JC, **JH Hayes**, A Zisman, G Antoniol, A Egyed, P Grunbacher, “The Quest for Ubiquity: A Roadmap for Software and Systems Traceability Research,” in Proceedings of the IEEE International Conference on Requirements Engineering (RE) 2012.
10. WK Kong\*, **JH Hayes**, A Dekhtyar, O Dekhtyar, “Process Improvement for Traceability: A Study of Human Fallibility,” in Proceedings of the IEEE International Conference on Requirements Engineering (RE) 2012.
11. Wenbin Li\*, Mirek Truszczynski and **Jane Huffman Hayes**, “Temporal Action Language (TAL): A Controlled Language for Consistency Checking of Natural Language Temporal Requirements,” in Proceedings of NASA Formal Methods Symposium, 2012.
12. Jane Cleland-Huang, Yonghee Shin, Ed Keenan, Adam Czauderna, Greg Leach, Evan Moritz, Malcom Gethers, Denys Poshyvanyk, **Jane Huffman Hayes**, Wenbin Li\*, Toward Actionable, Broadly Accessible Contests in Software Engineering, in Proceedings of Int’l Conf. on SW Eng. Track on New and Innovative Emerging Results (NIER) 2012.
13. Jane Cleland-Huang, Mats Heimdahl, **Jane Huffman Hayes**, Robyn Lutz and Patrick Mäder, “Trace Queries for Managing Safety Requirements in High Assurance Systems,” in Proceedings of 18th International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ) 2012 (15 page paper), accepted 32%.
14. Alex Dekhtyar, Olga Dekhtyar, Jeff Holden, **Jane Huffman Hayes**, David Cuddeback and Wei-Keat Kong\*, “On Human Analyst Performance in Assisted Requirements Tracing: Statistical Analysis,” in Proceedings of IEEE International Conference on Requirements Engineering (RE) 2011, Trento, Italy, (10 page paper), accepted 16.7%\*\*\*.
15. N. Ali, W. Wu, G. Antoniol, M. DiPenta, YG Gueheneuc, YG, **J. Huffman Hayes**, “MoMS: Multi-Objective Miniaturization of Software,” in Proceedings of International Conference on Software Maintenance (ICSM) 2011, September 2011, Williamsburg, VA, (10 page paper) – accepted 28%.
16. David Cuddeback, Alex Dekhtyar, **Jane Huffman Hayes**, Jeff Holden, Wei-Keat Kong\*, “Towards Overcoming Human Analyst Fallibility in the Requirements Tracing Process”, in Proceedings of the **International Conference on Software Engineering (ICSE 2011)**, New and Innovative Emerging Results (NIER) Track, (4 page paper) – accepted 46 of 198 submissions (23.2%)\*
17. D. Port, **J. Huffman Hayes**, LiGuo Huang, Allen Nikora, “Text Mining Support for Software Requirements: Traceability Assurance,” in Proceedings of IEEE Computer Society Hawaii International Conference on System Sciences (HICSS), January 2011, HICSS 2011: 1 – 11. – acceptance rate unknown, but was 47% in 2009 – cited by 1.
18. Allen Nikora, **Jane Huffman Hayes**, Ashlee Holbrook <sup>6</sup>, “Experiments in Automated Identification of Ambiguous Natural-Language Requirements,” in Proceedings of the Industry Track of IEEE International Symposium on Software Reliability Engineering (ISSRE) 2010, pp. 229 – 238. (10 page paper) – accepted 31%.
19. Hakim Sultanov\*, **Jane Huffman Hayes**, “Application of Swarm Techniques to Requirements Engineering: Requirements Tracing,” Proceedings of IEEE International Conference on Requirements Engineering (RE), September 2010, Sydney, Australia, RE 2010: 211-220. **Named one of “5 best papers.”** – accepted 27 of 153 submissions (16%)\* – cited by 3.
20. David Cuddeback, Alex Dekhtyar, **Jane Huffman Hayes**, “Automated Requirements Traceability: the Study of Human Analysts,” Proceedings of IEEE International Conference on

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<sup>6</sup> This was after Ashlee earned her PhD

- Requirements Engineering (RE), September 2010, Sydney, Australia, RE 2010: 231-240. – accepted 27 of 153 submissions (16%)\* \*\* – cited by 8.
21. E. Ashlee Holbrook, **Jane Huffman Hayes**, Alex Dekhtyar, "Toward Automating Requirements Satisfaction Assessment," Proceedings of Requirements Engineering, IEEE International Conference on, pp. 149-158, 2009 17th IEEE International Requirements Engineering Conference, 2009. – accepted 25 of 131 submissions (16%)\* \*\* – cited by 3.
  22. **Jane Huffman Hayes**, Giuliano Antoniol, Yann-Gaël Guéhéneuc: "PREREQIR: Recovering Pre-Requirements via Cluster Analysis." Proceedings of the Working Conference on Reverse Engineering (WCRE) WCRE 2008: 165-174.– accepted 32 of 70 submissions (29%) – cited by 1.
  23. Giuliano Antoniol, **Jane Huffman Hayes**, Yann-Gaël Guéhéneuc, Massimiliano Di Penta: "Reuse or rewrite: Combining textual, static, and dynamic analyses to assess the cost of keeping a system up-to-date." Proceedings of International Conference on Software Maintenance (ICSM) ICSM 2008: 147-156. – accepted 40 of 156 submissions (26%) – cited by 2.
  24. Alex Dekhtyar, **Jane Huffman Hayes**, Senthil Sundaram, Ashlee Holbrook, Olga Dekhtyar, "Technique Integration for Requirements Assessment," pp.141-150, Proceedings of the 15th IEEE International Requirements Engineering Conference (RE 2007), 2007. – accepted 29 of 172 submissions (12%)\* \*\* – cited by 7.
  25. **Jane Huffman Hayes**, Inies Chemannor\*, Ashlee Holbrook\*, Dave Pruett, "A Case History of International Space Station Requirement Faults," in Proceedings of the IEEE International Conference on Engineering of Complex Computer Systems (ICECCS), 2006. (10 page paper) – accepted 67% – cited by 4.
  26. **Jane Huffman Hayes**, Alex Dekhtyar, Ashlee Holbrook\*, Olga Dekhtyar, Senthil Sundaram\*, "Will Johnny/Joanie Make a Good Software Engineer?: Are Course Grades Showing the Whole Picture?," Proceedings of Conference on Software Engineering Education and Training (CSEET), Oahu, HI, April 2006. (8 page paper) accepted 26 of 68 submissions (38%)–cited by 2.
  27. **Jane Huffman Hayes**, Liming Zhao\*, "Maintainability Prediction: A Regression Analysis of Measures of Evolving Systems," Proceedings of IEEE International Conference on Software Maintenance (ICSM) 2005, Budapest, Hungary, September, 2005. – (4 page paper) accepted 80 papers of 180 papers (44.4%). – cited by 12.
  28. **Jane Huffman Hayes**, Inies Chemannor\*, Vinod Surisetty\*, and Anneliese Andrews, "Fault Links: Exploring the Relationship Between Module and Fault Types," Proceedings of European Dependable Computing Conference (EDCC), Budapest, Hungary, April 2005. – (20 page paper) accepted ~30%, per the conference chair – cited by 1.
  29. **Jane Huffman Hayes**, Alexander Dekhtyar, Senthil Sundaram\*, Sarah Howard, "Helping Analysts Trace Requirements: An Objective Look," in Proceedings of IEEE Requirements Engineering Conference (RE) 2004, Kyoto, Japan, September 2004, pp. 249-261. – accepted 27 of 120 papers (22.5%)\* \*\* – cited by 71.
  30. **Jane Huffman Hayes**, Sandip Patel\*, and Liming Zhao\*, "A Metrics-Based Software Maintenance Effort Model," In Proceedings of the 8th European Conference on Software Maintenance and Reengineering, Tampere, Finland, March 2004. pp. 254-258. – accepted 33 of 62 papers (53.22%) – cited by 20.
  31. **Jane Huffman Hayes**, "Building a Requirement Fault Taxonomy: Experiences from a NASA Verification and Validation Research Project," in Proceedings of the IEEE International Symposium on Software Reliability Engineering (ISSRE), Denver, CO, November 2003, pp. 49 - 59. – accepted 41 papers of "over 200 papers submitted" (~20%) \* \*\* – cited by 21.
  32. **Jane Huffman Hayes**, Alexander Dekhtyar, James Osbourne\*, "Improving Requirements Tracing via Information Retrieval," in Proceedings of the International Conference on Requirements Engineering (RE), Monterey, California, September 2003, pp. 138 – 148. – accepted 25 of 135 papers. (18.5%) \* \*\* – cited by 154.

33. **Jane Huffman Hayes**, Tim Lethbridge, and Dan Port, "Evaluating Individual Contribution Toward Group Software Engineering Projects," in **Proceedings of the International Conference on Software Engineering (ICSE)**, Portland, Oregon, May 2003, pp. 622-627. – accepted 11 of 52 papers (21.1%)\* \*\* – cited by 34.
34. **Jane Huffman Hayes** and Pifu Zhang\*, "Fault Detection Effectiveness of Spathic Test Data," in Proceedings of the IEEE International Conference on Engineering of Complex Computer Systems (ICECCS) 2002, Greenbelt, MD, December 2002, pp. 183-192. – accepted 23 of 52 papers. (44%) – cited by 2.
35. **Jane Huffman Hayes**, "Energizing Software Engineering Education through Real-World Projects as Experimental Studies," in Proceedings of the 15th Conference on Software Engineering Education and Training (CSEET), Covington, KY, February 2002, pp. 192-206. – accepted 23 of 39 papers. (59%) – cited by 29.
36. **Jane Huffman Hayes**, "Affects on Maintenance of Web Software Applications," in Proceedings of the International Conference on Software & Systems Engineering and their Applications (ICSSEA), Paris, France, December 2001. –(6 page paper) acceptance rate unknown - cited by 1.
37. **Jane Huffman Hayes** and Hui Cai\*, "Software Engineering and Building Multi-Tier E-Business Applications Using Web Services Technology: Forget Everything You Know?," in Proceedings of the International Conference on Software & Systems Engineering and their Applications (ICSSEA), Paris, France, December 2001. – (5 page paper) acceptance rate unknown.
38. **Jane Huffman Hayes** and Jeff Offutt<sup>+</sup>, "Increased Software Reliability Through Input Validation Analysis and Testing", in Proceedings of The Tenth IEEE International Symposium on Software Reliability Engineering, pages 199-209, Boca Raton, Florida, November 1999. – accepted 32 papers of unknown number of papers (historical acceptance rates for ISSRE have ranged from 21 – 45%) – cited by 16.
39. **Jane Huffman Hayes** and Jeff Offutt<sup>+</sup>, "Input Validation Testing: A Requirements-Driven, System Level, Early Lifecycle Technique", published in the Proceedings of the 11th International Conference on Software Engineering and its Applications, Paris, France, October 1998. (9 page paper) – acceptance rate unknown - cited by 3.
40. **Jane Huffman Hayes**, "Input Validation Testing: A System Level, Early Lifecycle Technique," accepted to ICSE '97 Doctoral Consortium, published in the Proceedings of the Seventeenth **International Conference on Software Engineering** Doctoral Consortium, Boston, Massachusetts, May 1997. – accepted 10 of 39 (25.6%)\* \*\* – cited by 7.
41. Jeff Offutt<sup>+</sup> and **Jane Huffman Hayes**, "A Semantic Model of Program Faults," published in The Proceedings of the International Symposium on Software Testing and Analysis (ISSTA), pages 195-200, ACM, San Diego, California, January 1996. – accepted 24 of 69 papers (34.7%) – cited by 101.
42. **Jane Huffman Hayes**, "Testing Object-Oriented Systems: A Fault-Based Approach," published in The Proceedings of the International Symposium on Object-Oriented Methodologies and Systems (ISOOMS), Springer-Verlag Lecture Notes on Computer Science series, Number 858, pages 205-220, Palermo, Italy, September 1994. – accepted 25 of 68 papers. (36.7%) – cited by 20.
43. **Jane Huffman (Hayes)** and Cliff Burgess, "Partially Automated In-Line Documentation (PAID): Design and Implementation of a Software Maintenance Tool," published in The Proceedings of the 1988 IEEE Conference on Software Maintenance (ICSM), pages 60-65, Phoenix, Arizona, October 1988. – acceptance rate unknown – cited by 6.

In submission:

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Kidwell, Hayes, Toward a Learned Project-Specific Fault Taxonomy: Application of Software Analytics, SWAN paper

### **Refereed Workshop Papers**

1. Huffman Hayes, J, Li, W, Rahimi, M: “Weka meets TraceLab: Toward convenient classification: Machine learning for requirements engineering problems: A position paper.” Proceedings of the Artificial Intelligence in Requirements Engineering (AIRE) workshop 2014: 9-12
2. Sandeep Pandanaboyana, Shreeram Sridharan, Jesse Yannelli and **Jane Hayes**, “REquirements TRacing On target (RETRO) Enhanced with an Automated Thesaurus Builder: An Empirical Study, in Proceedings of Traceability of Emerging Forms of Software Engineering (TEFSE) 2013, co-located with ICSE 2013.
3. Hays, **Hayes**, Stromberg, Bathke, “Traceability Challenge 2013: Statistical Analysis for Traceability Experiments Software Verification and Validation Research Laboratory (SVVRL) of the University of Kentucky,” in Proceedings of Traceability of Emerging Forms of Software Engineering (TEFSE) 2013, Challenge Track, co-located with ICSE 2013.
4. Li, **Hayes**, Yang, Yanelli, Imai, Carnes, Doyle, “Trace Matrix Analyzer (TMA),” in Proceedings of Traceability of Emerging Forms of Software Engineering (TEFSE) 2013, co-located with ICSE 2013.
5. Li, **Hayes**, “Traceability Challenge 2013: Query+ Enhancement for Semantic Tracing (QuEST) Software Verification and Validation Research Laboratory (SVVRL) of the University of Kentucky,” in Proceedings of Traceability of Emerging Forms of Software Engineering (TEFSE) 2013, Challenge Track, co-located with ICSE 2013.
6. Mark Hays\* and **Jane Huffman Hayes** “The Effect of Testability on Fault Proneness: A case study of the Apache HTTP Server,” in proceedings of International Workshop on Program Debugging (IWPD), an International Symposium on Software Reliability and Engineering (ISSRE) workshop, November 2012.
7. Wei-Keat Kong\* and **Jane Huffman Hayes**, “Proximity-Based Traceability: An Empirical Validation using Ranked Retrieval and Set-based Measures,” in Proceedings of Empirical Research in Requirements Engineering Workshop (EMPIRE 2011), associated with IEEE RE Conference, (8 page paper), \*\*\*RECEIVED BEST PAPER AWARD\*\*, accepted 52%.
8. Wei-Keat Kong\*, **Jane Huffman Hayes**, Alex Dekhtyar, Jeff Holden, “How Do We Trace Requirements? An Initial Study of Analyst Behavior in Trace Validation Tasks,” in Proceedings of Workshop\_on Cooperative and Human Aspects of Software Engineering (CHASE) 2011, an ICSE workshop. (8 page paper) – accepted 57%.
9. A. Dekhtyar, **J. Huffman Hayes**, M. Smith\*, “Towards a Model of Analyst Effort for Traceability Research: A Position Paper,” in Proceedings of Traceability of Emerging Forms of Software Engineering (TEFSE) 2011, an ICSE workshop. (5 page paper) – accepted 9 of 17 (52.9%).
10. Jane Cleland-Huang, Adam Czauderna, Alex Dekhtyar, Olly Gotel, **Jane Huffman Hayes**, Ed Keenan, Greg Leach, Jonathan Maletic, Denys Poshyvanyk, Yonghee Shin, Andrea Zisman, Antoniol Giulio, Brian Berenbach and Maeder Patrick, “Grand Challenges, Benchmarks, and TraceLab: Developing Infrastructure for the Software Traceability Research Community,” in Proceedings of TEFSE 2011, an ICSE workshop. (7 page paper) – accepted 9 of 17 (52.9%).
11. Hakim Sultanov\*, Wei-Keat Kong\*, **Jane Huffman Hayes**, and Wenbin Li\*, “Software Verification and Validation Research Laboratory (SVVRL) of the University of Kentucky: Traceability Challenge 2011: Language Translation,” in Proceedings of TEFSE 2011, an ICSE workshop. (4 page paper) – accepted 9 of 17 (52.9%).
12. J. Cleland-Huang, **Jane Huffman Hayes**, and J. M. Domel, 2009. “Model-based traceability.” In Proceedings of the 2009 Workshop on Traceability in Emerging Forms of Software Engineering



- (May 18 - 18, 2009), an International Conference on Software Engineering workshop, TEFSE 2009: 6 - 10. – accepted 75%– cited by 8.
13. **Jane Huffman Hayes**, Alex Dekhtyar, David S. Janzen, “Towards Traceable Test-Driven Development,” In Proceedings of the 2009 ICSE Workshop on Traceability in Emerging Forms of Software Engineering (May 18 - 18, 2009), an International Conference on Software Engineering workshop, TEFSE 2009: 26 - 30. – accepted 75%.
  14. **Jane Huffman Hayes**, Wei-Keat Kong, Wenbin Li, Hakim Sultanov, Steven Alexander Wilson, Sami Taha, Jody Larsen, Senthil Sundaram., "Software Verification and Validation Research Laboratory (SVVRL) of the University of Kentucky: Traceability Challenge", (2009). Workshop paper published – UK “won” the Challenge. Held at 2009 Workshop on Traceability in Emerging Forms of Software Engineering (TEFSE) (May 18 - 18, 2009), an International Conference on Software Engineering workshop, TEFSE 2009. – (5 page paper) accepted 75%.
  15. Alex Dekhtyar, **Jane Huffman Hayes**, Judy Goldsmith, (2007), “Uncertainty as the Source of Knowledge Transfer Opportunity,” Proceedings of International Workshop on Living with Uncertainty 2007 (IWLU’2007), Atlanta, GA. (4 page paper)–acceptance rate unknown.
  16. Alex Dekhtyar, **Jane Huffman Hayes**, Jody Larsen, “Make the Most of Your Time: How Should the Analyst Work with Automated Traceability Tools?” In Proceedings of the Third international Workshop on Predictor Models in Software Engineering (May 20 - 26, 2007), Minneapolis, MN, International Conference on Software Engineering. (9 page paper) – accepted 49 of 334 submissions (15%)\* \*\* – cited by 15.
  17. Alex Dekhtyar, **Jane Huffman Hayes**, Giulio Antoniol, “Benchmarks for traceability?” In Proceedings of Workshop on Traceability of Emerging Forms of Software Engineering (TEFSE) 2007, Slade, KY, March 22/23, 2007. (10 page paper) – accepted 75%.
  18. Liming Zhao and **Jane Huffman Hayes**, “Predicting Classes in Need of Refactoring: An Application of Static Metrics,” in Proceedings of the Workshop on Predictive Models of Software Engineering (PROMISE), associated with ICSM 2006, Philadelphia, PA, September 2006. (5 page paper) – accepted 45 of 147 submissions (28%) – cited by 6.
  19. Ken McGill, Wes Deadrick, **Jane Huffman Hayes**, Alex Dekhtyar, “Houston, We Have a Success Story: Technology Transfer at the NASA IV&V Facility,” in the Proceedings of the Workshop on Technology Transfer in Software Engineering (WOTTSE), an International Conference on Software Engineering (ICSE) 2006 workshop, Shanghai, China, May 2006, pp. 49 - 53. – acceptance rate unknown - cited by 4.
  20. **Jane Huffman Hayes**, Ashlee Holbrook\*, Inies Chemannoor\*, Dave Pruett, “Fault-Based Analysis: How History Can Help Improve Performance and Dependability Requirements for High Assurance Systems,” proceedings of Fifth International Workshop on Requirements for High Assurance Systems (RHAS), Chicago, IL, November, 2005. – (6 page paper) acceptance rate unknown – cited by 3.
  21. **Jane Huffman Hayes**, Alex Dekhtyar, Senthil Sundaram\*, “Humans in the Traceability Loop: Can't Live With 'Em, Can't Live Without 'Em,” Proceedings of Workshop on Traceability of Emerging Forms of Software Engineering (TEFSE) 2005, Long Beach, CA, November, 2005. – (4 page paper) accepted 90% - cited by 31.
  22. **Jane Huffman Hayes**, Alex Dekhtyar, Senthil Sundaram\*, “Text Mining for Software Engineering: How Analyst Feedback Impacts Final Results,” Proceedings of Workshop on Mining of Software Repositories (MSR), associated with ICSE 2005, St. Louis, MO, May 2005. – (5 page paper) accepted 22 of 38 papers (58%) – cited by 21.
  23. Senthil Sundaram\*, **Jane Huffman Hayes**, Alex Dekhtyar, ”Baselines in Requirements Tracing,” Proceedings of Workshop on Predictive Models of Software Engineering (PROMISE), associated with ICSE 2005, St. Louis, MO, May 2005. – (6 page paper) accepted 8 of 20 papers (40%) – cited by 13.

24. Alex Dekhtyar, **Jane Huffman Hayes**, and Tim Menzies. "Text is Software Too," in Proceedings of the Mining of Software Repositories (MSR) Workshop, Edinburgh, Scotland, May 2004, pp. 22-26. – accepted 26 of 38 papers (68.4%) – cited by 18.
25. Jeff Offutt<sup>+</sup>, Yuan Yang, and **Jane Huffman Hayes**, "SEWeb: Making Experimental Artifacts Available," Workshop on Empirical Research in Software Testing (WERST), in SIGNOTES, Volume 29, Issue 5, September 2004, Boston, MA, July 2004. – (3 page paper) acceptance rate unknown – cited by 4.
26. **Jane Huffman Hayes** and Jeff Offutt<sup>+</sup>, "Applying a Semantic Fault Model to the Empirical Study of Corrective Maintenance," presented at and in on-line proceedings of the Eighth IEEE Workshop on Empirical Studies of Software Maintenance (WESS 2002), Montreal, Canada, October, 2002. – (6 page paper) acceptance rate unknown – cited by 1.
27. **Jane Huffman Hayes** and Jeff Offutt<sup>+</sup>, "Product and Process: Key Areas Worthy of Software Maintainability Empirical Study," presented at and in on-line proceedings of The Sixth IEEE Workshop on Empirical Studies of Software Maintenance (WESS 2000), San Jose, California, October 2000. – (3 page paper) acceptance rate unknown - cited by 1.

### **Refereed by Abstract**

- J Huffman Hayes**, D Zowghi: Ready-set-transfer! Technology transfer in the requirements engineering domain (panel). In Proceedings of IEEE Requirements Engineering Conference, RE 2014: 500-501
- Jane Huffman Hayes**, Jane Cleland-Huang, Adam Czauderna, "TraceLab Player: From Researchers to IV&Vers," NASA IV&V Workshop, 2013
- Jane Cleland-Huang, Adam Czauderna, **Jane Huffman Hayes**, "Using TraceLab to Design, Execute and Baseline Empirical Requirements Engineering Experiments," Requirements Engineering Conference 2013 (RE) poster/demos
- Hakim Sultanov\*, **Jane Huffman Hayes**, Troy Thompson, "Scan Station: Using a combination self-aware approach and design patterns," IEEE CASE08, Aug 23 – 26, 2008, Washington, DC.
- Ashlee Holbrook\*, **Jane Huffman Hayes**, Alex Dekhtyar, "Addressing a Grand Challenge in Traceability: Semantics," poster in Proceedings of TEFSE 2007, Slade, KY, March 22/23, 2007.
- J. H. Graham, **Jane Huffman Hayes**, R.K. Ragade, "Requirements Methods for Safety-Critical Industrial Software Systems," Proceedings of Sixth Intl. Conf. on Engineering Design and Automation (EDA), Wailea, Maui, Hawaii, August 2002, pp. 42-45.
- Steve Mirsky, Lance Miller, and **Jane Huffman Hayes**, "Development and Documentation of Verification and Validation Guidelines for Expert Systems in the Nuclear Power Industry," PLEX '93 (Plant Life Extension), Zurich, Switzerland, 29 November-1 December 1993.
- Jane Huffman Hayes**, Jeff Weatherbee, and Lillian Zelinski, "A Tool for Performing Software Interface Analysis," published in The Proceedings of the First International Conference on Software Quality, Dayton, Ohio, October 1991.
- Jane Huffman Hayes**, "Risk Reduction Through Requirements Tracing," published in The Conference Proceedings of Software Quality Week 1990, San Francisco, California, May 1990, pp. 1 - 25.

### **Invited Papers**

- Cleland-Huang, J, Gotel, O, Huffman Hayes, J, Mäder, P, and Zisman, A. 2014. Software traceability: trends and future directions. In Proceedings of the on Future of Software Engineering (FOSE 2014). ACM, New York, NY, USA, 55-69.

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<sup>+</sup> My advisor

**Jane Huffman Hayes**, “Be the Change You Want to See in Requirements Engineering: A Letter to Myself,” Dagstuhl seminar, "Requirements Management – Novel Perspectives and Challenges" (12442), October 2012.

**Jane Huffman Hayes**, “Walk Before You Run,” Dagstuhl seminar, "Requirements Management – Novel Perspectives and Challenges" (12442), October 2012.

**Jane Huffman Hayes** and Mary Biddle\*, “Nancy Mead and Software Engineering Education: Advancements through Action,” in Proceedings of the IEEE Conference on Software Engineering Education and Training (CSEET), Charleston, SC, April 2008.

**Jane Huffman Hayes**, Alex Dekhtyar, and James M. Carigan\*, “Recommending a Framework for Comparison of Requirements Tracing Experiments,” in on-line proceedings of the Workshop on Empirical Studies of Software Maintenance (WESS 2004), Chicago, IL, September 2004.

**Jane Huffman Hayes**, “Do You Like Pina Coladas? How Improved Communication Can Improve Software Quality,” *IEEE Software*, January/February 2002, pp. 90 - 92.

**Jane Huffman Hayes**, “On the Virtues of Not Knowing,” *IEEE Software*, May/June 2004, pp. 74 – 75.

### **Editorial Work**

*The Proceedings of the ACM 3rd International Workshop on Traceability in Emerging Forms of Software Engineering TEFSE 2005*, J.I. Maletic, J. Cleland-Huang, **J. H. Hayes**, G. Antoniol (Editors), November 8th, Long Beach California, ACM, ISBN 1-59593-243-7, 2005.

### **Other Publications**

Lance Miller, Steve Mirsky, and **Jane Huffman Hayes**, NUREG/CR-6316, Guidelines for the Verification and Validation of Expert System Software and Conventional Software, U.S. Nuclear Regulatory Commission and Electric Power Research Institute, March 1995.

Orlena Gotel, Jane Cleland-Huang, **Jane Huffman Hayes**, Andrea Zisman, Alexander Egyed, Paul Gruenbacher, Alex Dekhtyar, Giulio Antoniol, Jonathan Maletic and Brian Berenbach, “Problem Statements and Grand Challenges,” 08-23-2006, COET-GCT-06-01-0.5, available at [www.coest.org](http://www.coest.org).

**Jane Huffman Hayes**, Alex Dekhtyar, Jane Cleland-Huang, Charter (Business Plan) for the Center of Excellence for Traceability, COET-CBP-07-02-1.0, 2/15/07.

### **Patents and Invention Disclosures**

Patent Submitted but abandoned by University of Kentucky (UK) after 7 years, “Integration of Microarray Data Analysis Application through Web Services Technology for Drug Target Identification,” with Hong Gao and Hui Cai, submitted for provisional patent, Nov. 2003, abandoned in April 2010.

### **Grants**

(\$2,085,200 total, \$1,218,200 as PI, \$867,000 as Co-PI/Senior Personnel, as of July 2011)

### **Current Support:**

None.

### **In submission:**

NSF, SHF:Small:Optimizing Effort and Error in Building Software Quality Methods, 2 years, \$499K, pending

NSF, NSF, CI-EN: Collaborative Research: TraceLab Community Infrastructure for Replication, Collaboration, and Innovation, 3 years, \$125K, pending

PI, NASA AIST procurement, “Assuring Requirements Consistency for SWOT and NiSAR,” 2 year proposal, submitted July 12, 2014, pending.

**Past Support:**

Gift recipient, Galmont Consulting, \$500 toward sabbatical travel, Fall 2014.

NASA, Predicting Fault Types and Fault Links Systems using Historical Data, with Allen Nikora, Bill Kidwell, Kishor Trivedi, ~\$210K for 3 years, funded in December 2010.

NSF, MRI-R2: Development of a Software Traceability Instrument to Facilitate and Empower Traceability Research and Technology Transfer, with Jane Cleland-Huang, Jonathan Maletic, Denys Poshyvanyk, ~\$180K for 3 years, funded in August 2010.

NASA, Predicting Fault Types and Fault Links Systems using Historical Data, with Allen Nikora, Bill Kidwell, Kishor Trivedi, ~\$210K for 3 years, funded in December 2010.

NSF, CPA-SEL-T: Collaborative Research: Traceability+: a Service Oriented Framework to Support Value-Added Software Traceability, with Jane Cleland-Huang and Jonathan Maletic, ~\$500K for 5 years, submitted in December 2007, funded for \$250K for 3 years in summer 2008 (\$750K total, with me as PI, only \$250K came to UK). No-cost extension granted, new end date is 7/31/2012.

NSF, CPA-SEL-T: Collaborative Research: Traceability+: a Service Oriented Framework to Support Value-Added Software Traceability, Research Experience for Undergraduates, \$7900, plus \$3250 supplement, plus \$6900 supplement. No-cost extension granted, new end date is 7/31/2012.

Gift recipient, Galmont Consulting, \$11,000 toward testing research, supports one PhD student, Fall 2011 through Spring 2012.

Co-PI, “Image-Net: Discriminatory Imaging and Network Advancement for Missiles, Aviation, and Space,” United States Army Space and Missile Defense Command/United States Army Forces Strategic Command (USASMDC/ARSTRAT), Huntsville, Alabama, funded for Base Year for 0.5 summer month and 0.33 RA (or approximately \$21K), UK was awarded \$2,092,905 for Base Year, 9/26/2011 to 9/30/2012 (note that this was a marketing lead that I brought to the Department).

Co-PI, NASA, Toward Unambiguous and Consistent Textual Requirements: An Application of Natural Language Processing Techniques, with Allen Nikora (JPL), Mirek Truszczynski, and Victor Marek, \$106K, April 2010 – December 2010.

PI, “Center of Excellence for Traceability (or Traceability Consortium),” \$203,639, 9/2006 – 8/2007, NASA IV&V Facility and Goddard Space Flight Center (GSFC).

PI, “Workshop on Addressing the Grand Challenges of Traceability,” \$25K, 8/2006 – 7/2007, National Science Foundation.

PI, “Use of Information Retrieval and Data Mining Techniques for Requirements Traceability,” \$50K, 9/15/05 – 9/14/06, NASA IV&V Facility and Goddard Space Flight Center (GSFC).

PI, “Fault-Based Analysis: Improving IV&V Through Requirements Risk Reduction,” 11/2003 – 10/2006, \$194.3K, Johnson Space Center (JSC) via NASA’s IV&V Facility.

PI, “Improving Requirements Tracing and IV&V via Information Retrieval and Text Mining,” \$134.9K, 9/1/04 – 8/30/05, NASA IV&V Facility and GSFC.

Co-PI, “Robust Requirements Tracing via Internet Search Technology: Improving an IV&V Technique, Phase II,” 2/15/03 – 7/31/04, \$86K, NASA IV&V Facility and GSFC.

PI, “Fault-Based Analysis: Improving IV&V Through Requirements Risk Reduction,” 1/2002 – 9/30/2002, \$112K, NASA IV&V Facility and GSFC.

PI, “Robust Requirements Tracing via Internet Search Technology: Improving an IV&V Technique,” 3/1/02 – 2/28/03, \$46K, NASA’s GSFC.

PI, “Gerald N. Galstan Memorial Fellowship,” 1/01 – 5/03, \$26K, – SAIC.

PI, “Voice Recognition for Procedure Automation on Body Wearables in a High Noise Environment,” 6/99 – 1/00, \$200K, SAIC Corporate (Internal R&D).

PI, “Speech and Natural Language Processing,” 1/00 – 12/00, \$30K, \$30K, 1/00 – 12/00, SAIC Corporate (Internal R&D).

PI, “Input Validation Testing: A System Level, Early Lifecycle Technique,” ~1/98 – 1/99, ~\$200K, partially funded by U.S. Navy.

Assistant PI, "Guidelines for the Verification and Validation of Expert System Software and Conventional Software," ~6/91 – 6/93, \$474K, U.S. Nuclear Regulatory Commission and Electric Power Research Institute.

## **Invited Talks**

- Jane Hayes, "Make the Most of Your Time: How Should the Analyst Work with Automated Traceability Tools?," Ecole Polytechnique de Montreal, Canada, November 19, 2014
- Jane Hayes, "TraceLab," Ecole Polytechnique de Montreal, Canada, November 19, 2014
- Jane Hayes, "Improved Requirements Tracing using Information Retrieval: Most Influential paper RE 2013", Rio de Janeiro, Brazil, July 18, 2013.
- Jane Hayes, "Making the Leap," keynote speech to be given to Tri-State Women in Computing (TRIWIC) Grace Hopper Celebration of Women in Computing, November 2011, General Butler State Park.
- Jane Cleland-Huang and Jane Hayes, "Requirements Traceability in Software Intensive Systems," Technical Briefing at International Conference on Software Engineering (ICSE), May 2011.
- Jane Hayes "Software Engineering: A Personal Perspective," Hanover College Student meeting, November 2010.
- Jane Hayes, "Effort Estimation Techniques for Development and Quality Assurance," Hewlett-Packard, Lexington, KY, November 16, 2009.
- Jane Hayes, "Management and Technical Aspects of Assuring the Quality of Critical Software Systems: Confessions of a Former Dilbert Boss," DePaul University, October 2007.
- Jane Hayes, "Technique Integration for Requirements Assessment," DePaul University, October 2007.
- Jane Hayes "The Role of Analysts in Traceability," Ecole Polytechnique de Montreal, May 2007.
- Jane Hayes "Software Engineering: A Personal Perspective," Georgetown College Association for Computing Machinery (ACM) Student Chapter meeting, April 2006.
- Jane Hayes "Software Engineering: A Personal Perspective," University of Kentucky Association for Computing Machinery (ACM) Student Chapter meeting, November 2005.
- Jane Hayes, "Fault Links and Models for Software Maintainability," University of Louisville, Louisville, KY, June 2005.
- Jane Hayes, "Improving Requirements Tracing from the Analyst's Perspective (using IR Techniques)," University of Waterloo, Canada, April 2005.
- Jane Hayes, "Software Engineering: Research and Careers," Centre College, October 2004.
- Jane Hayes, "What is Software Assurance?," panel at NASA OSMA Software Assurance Symposium, September 2002.
- Jane Hayes, "A Semantic Fault Model Applied to the Empirical Study of Corrective Maintenance: A Work in Progress," University of Maryland, May 2002.
- Jane Hayes, "Topics in Software Verification and Validation: Requirements Tracing," University of Louisville, January 2001.
- Jane Hayes, "Industry/Academia: Horse of a Different Color?," Technology Leadership Forum, Lexington, KY, December 2001.
- Jane Hayes, "Success Criteria/Exit Criteria/Stopping Criteria: Managing Results and Expectations," invited talk, presented at 21st Annual International Conference on Software Testing, Orlando, Florida, October 2001.
- Jane Hayes, "Buyer Beware: Who Certified Your Software Certifier?," speech for First International Software Certification Conference 1999 (ISACC '99), Dulles, Virginia, March 1999.
- Jane Hayes and Chris Stoddard, "Risk Determination Using the SAIC Risk Cube", presented at the NASA Workshop on Risk Management, Nemaconlin, Pennsylvania, October 1998.

Student papers:

Bill Kidwell, Microsoft Student Research Competition (SRC), ICSE 2010  
Hakim Sultanov, Microsoft Student Research Competition (SRC), ICSE 2010  
Chase Carnes, paper at National Conference for Undergraduate Research (NCUR), 2013  
Fan Yang, paper at UK undergraduate research showcase, 2012

## **Honors and Awards**

Most Influential Paper RE 2013 for paper in IEEE Conference on Requirements Engineering (RE) 2003

Best Paper Award at Empirical Requirements Engineering (EmpiRE) 2011

“One of the best papers” (of five) of IEEE Requirements Engineering Conference (RE) 2010, invited for Special Issue of Requirements Engineering Journal (REJ)

“Alumni Achievement Award,” from Alumni Association of Hanover College, October 2008.

“Best Paper Award,” with Alex Dekhtyar and Senthil Sundaram, Summer 2006, awarded by NASA at the Software Assurance Symposium to our Jan. 2006 paper in IEEE Transactions on Software Engineering

Outstanding Teacher in Computer Science, University of Kentucky, Spring 2006

“Best Research Award” with Alex Dekhtyar, August 2005, NASA, for “Improving Requirements Tracing and IV&V via Information Retrieval and Text Mining” project

“The Buzz Research Award,” with Alex Dekhtyar, August 2003, NASA, from NASA, for “Robust Requirements Tracing via Internet Search Technology: Improving an IV&V Technique, Phase II” project

## **Publicly Available Software Tools and Data Sets**

UAV dataset for tracing - Center of Excellence for Software Traceability (COEST) site

WARC dataset for tracing - Center of Excellence for Software Traceability (COEST) site

MeansTest – a composite component of TraceLab for statistical analysis (COEST.org)

RETRO – requirements tracing tool (via NASA GSFC open source site)

RETRO.NET – requirements tracing tool, available upon request

PheTracker – phenylalanine tracking tool for PDAs

MODIS dataset – SEEWEB repository, PROMISE repository, Center of Excellence for Software Traceability (COEST) site

CM-1 dataset for tracing – SEEWEB repository, PROMISE repository, Center of Excellence for Software Traceability (COEST) site

CM-1 dataset for metrics – PROMISE repository

GanttProject dataset for tracing – Center of Excellence for Software Traceability (COEST) site

Pine dataset for tracing – Center of Excellence for Software Traceability (COEST) site

Observe-Mine-Adopt model

## **Professional Activities**

**Director**, Center of Excellence for Software Traceability (COEST), elected in March 2007. This is the sole and highest level position in the organization, akin to a CEO.

*Jane Hayes: Curriculum Vitae*

*Editorial Board and Associate Editor, Journal on Empirical Software Engineering (Springer), May 2011 to now*

*Editorial Board and Associate Editor of Wiley's Journal on Software Testing, Verification, and Reliability (STVR), December 2006 to now*

*Editorial Board of IEEE Software, January 2002 – December 2006*

*Co-editor, Quality Time column of IEEE Software, January 2002 – December 2006*

*Organizer, Workshop on Grand Challenges of Traceability, August 4<sup>th</sup> and 5<sup>th</sup>, 2006, Fairmont, WV*

*Member of the Steering Committee of Traceability for Emerging Forms of Software (TEFSE) as of February 2007*

*Steering committee, Workshop on Requirements Engineering and Testing (RET) 2015*

*Program Committee member of SANER 2015 (22<sup>nd</sup> International Conference on Software Analysis, Evolution and Reengineering)*

*Program Committee, IEEE International Conference on Requirements Engineering (RE) 2015*

*Program Committee, Workshop on Traceability for Emerging Forms of Software (TEFSE) 2015*

*Program Committee, ACM Student Research Competition (SRC) 2015 at ICSE 2015*

*Co-organizer, Ready-Set-Transfer for IEEE Requirements Engineering (RE) Conference 2014*

*Program Board, IEEE International Conference on Requirements Engineering (RE) 2013*

*Program Committee, Workshop on Traceability for Emerging Forms of Software (TEFSE) 2013, co-located with ICSE*

*Program Committee for mentoring papers, IEEE and ACM International Conference on Software Engineering (ICSE) 2014*

*Program Committee, IEEE and ACM International Conference on Software Engineering (ICSE) 2013*

*Organizing committee, IEEE International Conference on Requirements Engineering (RE) 2012*

*Industry Track Co-Chair, IEEE International Conference on Requirements Engineering (RE) 2012*

*Organizing committee, IEEE International Conference on Requirements Engineering (RE) 2010*

*Tutorials Chair, IEEE International Conference on Requirements Engineering (RE) 2010*

*Program Committee, European Conference on Software Maintenance and Reuse (CSMR) 2011 European Projects track, sponsored by IEEE Computer Society, November 2010*

*Program Committee, Workshop on Requirements Engineering for Systems and Systems of Systems (RESS), Requirements Engineering (RE) 2011 workshop*

*External reviewer, IEEE International Symposium on Software Reliability and Engineering (ISSRE) 2010*

*Program Committee, Workshop on Traceability for Emerging Forms of Software (TEFSE) 2009, 2011, an ICSE workshop*

*Technical Program Committee for the second IEEE International Conference on Software Testing, Verification and Validation (ICST) 2009*

*Co-Chair of Doctoral Symposium Committee, IEEE ICST 2009*

*Program Committee, Software Engineering Education Committee of ICSE 2008*

*Organizing Committee, working session on traceability, International Conference on Software Maintenance (ICSM) 2007, October, Paris.*

*General Chair of Workshop on Traceability for Emerging Forms of Software (TEFSE) 2007*

*Program Committee* of the First International Workshop on Leadership and Management in Software Architecture (LMSA 2008) held in conjunction with the 30th International Conference on Software Engineering (ICSE), Leipzig, Germany, 10 - 18 May 2008

*Organizing Committee*, Workshop on Traceability, associated with IEEE Int'l Conf on Requirements Engineering (RE), 2006 (September)

*Organizing Committee*, Workshop on Information Retrieval Based Approaches in Software Evolution, associated with IEEE Int'l Conf on Software Maintenance (ICSM), 2006 (November)

*Program Committee*, Workshop on Requirements Engineering Visualization (REV) 2007

Member of *organizing committee* for the inaugural ICSE 2007 Portraits in Practice

*Program Committee*, Empirical Software Engineering and Measurement (ESEM 2007) Short Papers Track, Madrid, Spain, September 2007.

*Program Committee*, 29th Intl. Conf. on Software Engineering (ICSE), May 2007, Educational Track

*Program Committee*, 28th Intl. Conf. on Software Engineering (ICSE), Shanghai, China 20-28 May 2006, Experience Track

*Program Committee*, Workshop on Technology Transfer in Software Engineering (WOTTSE) 2006, in association with ICSE 2006

*Program Committee*, IEEE Int'l Conf on Requirements Engineering (RE), 2006, 2010, 2011

*Program Committee* for the Poster and Research Demonstrations track of RE 2009

*Mentor* for Mentor program of RE 2010

*Program Committee*, Predictive Models of Software Engineering (PROMISE), 2006, 2007, 2009, 2010, 2011

*Program Committee*, 15th Conference on Software Engineering Education and Training (CSEET), 2006, 2007

*Program Committee*, Workshop on Mining of Software Repositories (MSR), 2005, 2006, 2007

*Organizing Committee* and *Program Committee*, Workshop on Traceability for Emerging Forms of Software (TEFSE) 2005, in conjunction with Automated Software Engineering (ASE)

*Program Committee*, IEEE International Conference on Engineering of Complex Computer Systems (ICECCS), 2001, 2002, 2004 (no conference in 2003), 2005, 2007

*Co-chair*, Workshop on Empirical Studies of Software Maintenance (WESS) 2004

*Program Committee*, International Computer Software and Applications Conference (COMPSAC), 2003, 2004

*Program Committee*, 9th International IEEE Software Metrics Symposium (METRICS)

*Program Committee*, Eighth IEEE International Symposium on High Assurance Systems Engineering (HASE)

#### **Review Activities:**

Editorial Board Member: Software Quality Journal – until December 2006, IEEE Software – until December 2006, STVR – Dec. 2006 to present, EMSE – May 2011 to present

Referee: IEEE Transactions on Software Engineering (TSE), IEEE Software, International Journal on Software Engineering and Knowledge Engineering, Elsevier Information and Software Technology, Journal on Software and System Modeling (SoSyM), Software Quality Journal, Journal of Software Maintenance and Evolution: Research and Practice, STVR, Empirical Software Engineering (EMSE), Communications of the ACM, Automated Software Engineering



## *Jane Hayes: Curriculum Vitae*

Reviewed a chapter of the Encyclopedia of Software Engineering (2 vol) (Wiley), reviewed a chapter for Springer Traceability book (2011)

Reviewed new testing book for McGraw-Hill

## **Service**

### **Computer Science Community**

See Professional Activities above

Invited panelist, NSF, numerous panels (latest one 2013)

### **Standing Department Committees**

2003 – 2011, Member, Accreditation committee (accreditation visit for undergraduate program was October 16 – 18, 2005)

2002 – 2011, Member, Undergraduate curriculum committee

2002 – present (as tasked), assist Graduate Admissions committee

2003 – present, Systems Group

November 2008 to 2010, 2011 - ? member of Executive Committee

November 2012 – July 2013, chair of Media and Outreach Committee

August 2013 – present, member of Media and Outreach Committee

September 2009 to present, member of Industry Advisory Board (lead on high school visits: in 2011 visited: Powell Cty, Dunbar, Lafayette, St. Xavier, DuPont Manual)

July 2011 – present Associate Chair of Department (not while on sabbatical)

July 2011 – present, responsible for Industry Partner Association

### **Ad Hoc Department Committees**

August 2013 – April 2014, co-chair of Faculty Search Committee

2013 Search Committee for Viz Center Director

2013 Search Committee for CS Chair

2007 to present, assist with “revision” of undergraduate software engineering curriculum

2003 – 2006, Committee to Develop Portfolio Evaluation Criteria and Process

2002 Undergraduate laboratory specification development committee

2001 Organizer and coordinator of regular meetings of the Synergistic Laboratory for Advanced Networking Team (SLANT)

### **College and University**

November 2012 – August 2014 Member of Senate Advisory Committee on Privilege and Tenure (SACPT), appointed by Pres. Capilouto

Mar/Apr 2011 Chaired CS Chair Review Committee

2007 – May 2010 Elected member of University Senate

October 2008 – May 2010 Member, Senate’s Academic Programs Committee

2007 faculty representative on 2007-2008 Lexmark Fellowship selection panel

### **Other**

Dec 2009 - Was interviewed by two female students from Middlesboro High School (Bell County) as part of Project Lead The Way for Architecture, Engineering, Engineering Technology or related field

April 2010 – Reviewed scholarship applications for UK Society of Women Engineers (SWE)

Numerous E-Day activities (E-Day each year) with SWE and COE, also Girls Enjoying Math and Science (GEMS) in 2007 and 2010

KSEF SBIR/STTR reviewer in May 2014

Hour of Code – at EDay in February 2014 and in Powell Cty McDonald’s in July 2014

Guest teacher/project reviewer at Informatics I and II classes at Powell Cty High School – Fall 2014

Outside examiner in Spring 2014 for mining Engineering

## **Educational Activities**

### **Courses Developed and Taught**

CS 650 Software Engineering, renumbered as 616 – course was revitalized in Spring 2014 to be a partial flipped classroom

CS 499 Senior Design project

CS 685 Requirements Engineering, renumbered as 617

CS 685 Software Design, renumbered as 618

CS 685 Software Test and Software Quality Evaluation, renumbered as 619

CS 685 Empirical Software Engineering

CS 585 Software Test and Software Quality Evaluation (using a new text book, and teaching to undergrads and grads)

CS 216 Software Engineering (teaching the software engineering portion in Fall 2008, four weeks of MWF courses)

CS 499, revised over summer 2009 to use new textbook and new project approach

CS 585 Software Test, revised in Spring 2011 to include Common Body of Knowledge (CBOK) for QAI Certified Associate Software Tester (CAST) exam

CS 485 (to be renumbered CS 498), developed software engineering course in Spring 2012 as a pre-requisite for CS 499

CS 618 Software Design was totally revised in Spring 2012 to include new textbooks, readings, project and to cover Domain Driven Design

CS 585/685, Software and Systems Traceability, new course taught in Spring 2013

### **Students Graduated**

Hui Cai (Henry), M.S., September 2001.

Julia Shi, M.S., May 2002.

Tina Gao, M.S. (thesis option), Fall 2003.

Veer Patel, M.S., spring 2004.

Jenchi Cheng, M.S., summer 2004.

Inies Chemannoor, M.S. (thesis option), September 2004.

Suresh Yadla, M.S., December 2004.

Selva Prasanna, M.S., February 2005.

Srividya Adusumilli, M.S., March 2005.

Ignatius Vijai Ignatius, M.S., April 2005.

Vasu Mahalingam, M.S., March 2006.

Shih-Che Huang, M.S., April 2006.

Deepa Ramakrishnan, M.S., April 2006.

Subha Srinivasan, M.S., April 2006.

Prithvi Gangavarapu, M.S., April 2006.

Sandeep Alluri, November 2006.

Dan Sharp, M.S., February 2007.

Chi Chau, M.S., April 2007.

Ananth Raghuraman, M.S., April 2007.

Raj Mamadgi, M.S., May 2007.

**\*Senthil Sundaram, Ph.D., June 2007.**

Dan Olson, M.S., November 2007.

**\*Ashlee Holbrook, Ph.D., May 2008.**

Sarah Vessels, M.S., May 2011.

**\*Wei-Keat Kong, Ph.D., May 2012.**

Jody Larsen, MS, August 2013.

**\*Hakim Sultanov, Ph.D., May 2013.**

**\*Mark Hays, Ph.D., May 2014.**

### **Current Students**

#### Ph.D.

Wenbin Li, A.B.D., working on dissertation

Billy Kidwell, A.B.D., working on dissertation

M.S. – Albert Kalim, M.S. project

### **Independent Studies**

Spring 2003 – 2

Summer 2003 – 1

Fall 2003 – 2

Spring 2004 – 3

Fall 2004 – 4

Spring 2005 – 8

Fall 2005 - 4

Spring 2006 – 5

Fall 2006 – 2

Spring 2007 – 3

Fall 2008 – 3

Spring 2009 – 4

Summer 2009 – 2

Fall 2009 – 4

Spring 2010 – 3

Fall 2010 – 7

Spring 2011 – 6

Fall 2011 – 5

Spring 2012 – 2

Fall 2012 – 3

Spring 2013 – 4

Fall 2013 – 4

Spring 2014 - 3

### **Graduate Project/Thesis Committees**

Spring 2003 – 1

Fall 2003 – 4

Spring 2004 – 2

Summer 2004 – 1 M.S., 1 Ph.D.

Fall 2004 – 2

Spring 2005 – 6

Spring 2006 – 4

*Jane Hayes: Curriculum Vitae*

Summer 2006 – 1

Fall 2006 – 3

Spring 2007 – 1

Summer 2007 – 1

Fall 2009 – 1

Spring 2010 – 1

Fall 2013 – 1 (Qingrong Xu – Automatic Generation of Network Topologies for Large-Scale GENI Experiments)

See attached Teaching Portfolio for additional information

**Professional Memberships**

Member of IEEE Computer Society

Member of Association for Computing Machinery