

Curriculum Vitae

Raymond J. Madachy, Ph.D.

Professor

Naval Postgraduate School

Department of Systems Engineering

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Research Interests

Digital engineering tool environments, modeling and simulation of systems and software engineering processes, generative AI, system cost modeling, affordability and tradespace analysis, integrating systems and software engineering disciplines, intellectual property valuation, software litigation, systems engineering and lawmaking.

Education

University of Southern California

Ph.D. Industrial and Systems Engineering, 1994

Areas: systems engineering, systems architecting, computer science

Dissertation: “A Software Project Dynamics Model for Process Cost, Schedule and Risk Assessment”

University of California, San Diego

M. S. System Science, 1983

Comprehensive exam covered digital signal processing and system dynamics

Research in bio-engineering, orbital mechanics and man-machine interface

University of Dayton

B.S. Mechanical Engineering, 1981

Minor: Aerospace Engineering

Magna Cum Laude

Selected Honors and Awards

[Jeff Grady Award](#), INCOSE San Diego Chapter, for “Advancing Systems Engineering Knowledge”, 2025

Best Paper Award, IEEE Empirical Software Engineering and Measurement Conference, 2017

[Lifetime Achievement Award in Systems and Software Cost Estimation](#), USC Center for Systems and Software Engineering, for “Innovative Development of a Wide Variety of Cost, Schedule and Quality Models and Simulations”, 2016

Best Paper Award, International Cost Estimating and Analysis Association Conference, 2015

Best Paper Award, International Cost Estimating and Analysis Association Conference, 2014

Best Paper Award, Sixth International Conference on Applications of Software Measurement, 1995

Professional Experience

2008-present	Naval Postgraduate School Professor, Department of Systems Engineering, 2018-present Associate Professor, Department of Systems Engineering, 2008-2018
2005-2008	University of Southern California Research Assistant Professor and Interim Director of Systems Architecting and Engineering Program, Department of Industrial and Systems Engineering, 2007-2008 Research Scientist, Departments of Industrial and Systems Engineering and Computer Science, 2005-2007
2001-2005	Chief Science Officer, Cost Xpert Group Inc.

2001-2005 (part-time)	Research Associate, University of Southern California, Department of Computer Science
2000-2001	Chief Scientist, C-bridge Internet Solutions, C-bridge Institute
1992-2000	Litton Systems Manager, Software Engineering Process Group, Litton Guidance & Control Systems, 1997-2000 Senior Engineering Specialist, Litton Data Systems, 1992-1997
1988-1992	Librascope Corporation Staff Engineer, 1991-1992 Lead Software Engineer, 1989-1991 Programming Research Specialist, 1988-1989
1987-1988	Laboratory Manager, University of California, Los Angeles
1985-1986	Independent Contractor, TRW Electronics and Defense, Advanced Programs Division
1982-1985	Member of Technical Staff, Hughes Aircraft Co., Radar Systems
1981-1982	Aerospace Engineer, General Dynamics, Convair

Publications

Books

- [1] R. Madachy. *What Every Engineer Should Know About Python*. CRC Press, Boca Raton, FL, 2025.
- [2] R. Madachy and D. Houston. *What Every Engineer Should Know About Modeling and Simulation*. CRC Press, Boca Raton, FL, 2017.
- [3] B. Clark and R. Madachy, editors. *Software Cost Estimation Metrics Manual for Defense Systems*. Software Metrics Inc., Haymarket, VA, 2015.
- [4] R. Madachy. *Software Process Dynamics*. Wiley-IEEE Press, Hoboken, NJ, 2008.
- [5] B. Boehm, C. Abts, W. Brown, S. Chulani, B. Clark, E. Horowitz, R. Madachy, D. Reifer, and B. Steece. *Software Cost Estimation with COCOMO II*. Prentice-Hall, 2000.

Conference Proceedings Books (Editor)

- [6] Q. Wang, V. Garousi, R. Madachy, and D. Pfahl (Eds.). *Trustworthy Software Development Processes, International Conference on Software Process 2009*. Springer, Berlin-Heidelberg, Vancouver, Canada, 2009.

Chapters in Books

- [7] R. Madachy, R. Bell, and R. Longshore, “A Generative AI-driven Systems Engineering Maturity and Cost Modeling Framework,” in *Proceedings of the 22nd Annual Conference on Systems Engineering Research (CSER)*, A. M. Madni, D. Verma, M. Sievers, M. Wheaton, E. Ordoukhanian, and S. Purohit, Eds. Cham, Switzerland: Springer, 2026.
- [8] R. Madachy, and R. Valerdi. Expert COSYSMO Systems Engineering Cost Model and Risk Advisor. In N. Scala and J. Howard, editors, *Handbook of Military and Defense Operations Research*. CRC Press, Boca Raton, FL, 2020.
- [9] International Council on Systems Engineering (INCOSE). “Project Planning” in *Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities, Version 4.0*. John Wiley & Sons, Hoboken, NJ, 2015.
- [10] A. Pyster, D. Olwell, N. Hutchison, S. Enck, J. Anthony, D. Henry, and A. Squires (Eds.). *Systems Engineering Management. Guide to the Systems Engineering Body of Knowledge (SEBoK) version 1.0.1*. Hoboken, NJ: The Trustees of the Stevens Institute of Technology 2012. URL <http://www.sebokwiki.org>.

- [11] A. Pyster, D. H. Olwell, T. L. J. Ferris, N. Hutchison, S. Enck, J. Anthony, D. Henry, and A. Squires(Eds.). *Expected Background for Students Entering a Master's Program. Graduate Reference Curriculum for Systems Engineering (GRCSE)*. Hoboken, NJ, USA: The Trustees of the Stevens Institute of Technology. Available at, 2012. URL <http://www.bkcase.org/grcse/>.
- [12] D. Petkov, D. Edgar-Nevill, R. Madachy, and R. O'Connor. Towards a wider application of the systems approach in information systems and software engineering. In D. Paradice, editor, *Emerging Systems Approaches in Information Technologies: Concepts, Theories and Applications*. IGI Publishing, 2010.
- [13] D. Petkov, D. Edgar-Nevill, R. Madachy, and R. O'Connor. Information systems, software engineering and systems thinking: Challenges and opportunities. In M. Gordon Hunter, editor, *Strategic Information Systems: Concepts, Methodologies, Tools and Applications*. IGI Publishing, 2009.
- [14] R. Madachy and B. Boehm. "Software Dependability Applications" in *Software Process Modeling*. Kluwer Academic Publishers, 2004.
- [15] R. Madachy. "Simulation in Software Engineering" in *Encyclopedia of Software Engineering*. Wiley and Sons, Inc., New York, NY, second edition, 2001.

Refereed Journal Papers

- [16] R. Bell, R. Madachy, and R. Longshore. Balancing accuracy and cost: Trade-offs in large language model quantization for the systems engineering domain. *Systems Engineering*, 2026. doi: [10.1002/sys.70061](https://doi.org/10.1002/sys.70061).
- [17] R. Bell, R. Longshore, R. Madachy, and A. Hanrahan. Baselineing large language model performance in systems engineering using SysEngBench. *Systems Engineering*, 2026. doi: [10.1002/sys.70067](https://doi.org/10.1002/sys.70067).
- [18] Rosa, W., Clark, B., Madachy, R. & Boehm, B. Empirical Effort and Schedule Estimation Models for Agile Processes in the US DoD. *IEEE Transactions On Software Engineering*. 48(8), 2022.
- [19] H. Zhang, D. Raffo, T. Birkholzer, D. Houston, R. Madachy, J. Munch, and S. Sutton. Software process simulation — at a crossroads? *Journal of Software: Evolution and Process*, 2014.
- [20] E. Kocaguneli, T. Menzies, J. Keung, D. Cok, and R. Madachy. Active learning and effort estimation: Finding the essential content of software effort estimation data. *IEEE Transactions on Software Engineering*, 99, December 2012.
- [21] T. Menzies, S. Williams, O. Elrawas, D. Baker, B. Boehm, J. Hihn, K. Lum, and R. Madachy. Accurate estimates without local data. *Software Process Improvement and Practice*, 14, 2009.
- [22] R. Madachy. Cost modeling of distributed team processes for systems of systems and global development. *Software Process Improvement and Practice*, 2008.
- [23] D. Petkov, D. Edgar-Nevill, R. Madachy, and R. O'Connor. Information systems and software engineering and systems thinking: Challenges and opportunities. 2008.
- [24] T. Menzies, O. Elwaras, J. Hihn, Feather M., B. Boehm, and R. Madachy. The business case for automated software engineering. *IEEE Automated Software Engineering*, 2007.
- [25] R. Valerdi and R. Madachy. Impact and contributions of mbase on software engineering graduate courses. *Journal of Systems and Software*, 80(8), August 2007.
- [26] R. Madachy, B. Boehm, and J. Lane. Assessing hybrid incremental processes for sisos development. *Software Process Improvement and Practice*, 2007.
- [27] B. Boehm, L. Huang, A. Jain, and R. Madachy. Reasoning about the roi of software dependability: the idave model,. *IEEE Software*, 21(3), 2004.
- [28] R. Madachy and D. Tarbet. Case studies in software process modeling with system dynamics. *Software Process Improvement and Practice*, (Spring), 2000.
- [29] K. Bennett, E. Burd, C. Kemerer, M. Lehman, M. Lee, R. Madachy, C. Mair, D. Sjoberg, and S. Slaughter. Empirical studies of evolving systems. *Empirical Software Engineering*, 4(4):370–380, December 1999.

- [30] M. Kellner, R. Madachy, and D. Raffo. Software process simulation modeling: Why? what? how? *Journal of Systems and Software*, (Spring), 1999.
- [31] B. Boehm, A. Egyed, D. Port, A. Shah, J. Kwan, and A R. Madachy. Stakeholder win-win approach to software engineering education. *Annals of Software Engineering*, 6, 1998.
- [32] B. Boehm, A. Egyed, J. Kwan, A. Shah, and R. Madachy. Using the winwin spiral model: A case study. *IEEE Computer*, 1998.
- [33] R. Madachy and B. Khoshnevis. Dynamic simulation modeling of an inspection-based software lifecycle process. *Simulation*, 69(1), July 1997.
- [34] R. Madachy. Heuristic risk assessment using cost factors. *IEEE Software*, 1997.
- [35] R. Madachy. Knowledge-based risk assessment and cost estimation. *Automated Software Engineering*, 1995.
- [36] B. Boehm, B. Clark, E. Horowitz, C. Westland, R. Madachy, and R. Selby. Cost models for future software life cycle processes: Cocomo 2.0. *Annals of Software Engineering*, pages 57–94, 1995.

Refereed Magazine and Practitioner Articles

- [37] R. Madachy. Trustworthy AI for quantitative systems engineering via deterministic delegation to verified tools. *INCOSE INSIGHT*, 29(3):58–66, June 2026.
- [38] R. Madachy, D. O’Leary, T. McDermott, and S. Bank. Twenty tips for using generative AI in systems engineering. *INCOSE INSIGHT*, 29(3):29–31, June 2026.
- [39] R. Madachy, B. Boehm, and D. Houston. Modeling software defect dynamics. *DoD Software Tech News*, 13 (1), April 2010.
- [40] B. Boehm, E. Horowitz, R. Madachy, and C. Abts. Future trends, implications in cost estimation models. *Crosstalk*, 2000.
- [41] R. Madachy and D. Tarbet. Initial experiences in software process modeling. *Software Quality Professional*, (Spring), 2000.

Refereed Conference Papers

- [42] R. Madachy. A Personal Generation Process Model for Human–AI Collaboration in Systems Engineering. In *Proceedings of the 2026 Conference on Systems Engineering Research*, Conference on Systems Engineering Research Series. Springer, 2026.
- [43] P. Wach, R. Bell, B. Jugan, R. Longshore, and R. Madachy. The Cost of Expertise: Performance Trade-Offs in LLMs for Systems Engineering. In *Proceedings of the 35th International Symposium of INCOSE*, 2025.
- [44] R. Bell, R. Longshore, and R. Madachy. Exploring Visual Question Answering Capabilities of Multi-Modal Large Language Models with Model Based Systems Engineering Models. In *Proceedings of the Acquisition Research Symposium*, Acquisition Research Program, 2025.
- [45] R. Bell, R. Longshore, and R. Madachy. Automating AI Expert Consensus: Feasibility of Language Model-Assisted Consensus Methods for Systems Engineering. In *Proceedings of the Acquisition Research Symposium*, Acquisition Research Program, 2025.
- [46] R. Madachy and J.M. Green. System Product Line Cost and Investment Modeling Applied to UAVs. In *Proceedings of the 21st Annual Acquisition Research Symposium*. Acquisition Research Program, 2024.
- [47] R. Bell, R. Longshore, and R. Madachy. Introducing SysEngBench: A Novel Benchmark for Assessing Large Language Models in Systems Engineering. In *Proceedings of the 21st Annual Acquisition Research Symposium*. Acquisition Research Program, 2024.
- [48] R. Longshore, R. Bell, and R. Madachy. Leveraging Generative AI to Modify and Query MBSE Models. In *Proceedings of the 21st Annual Acquisition Research Symposium*. Acquisition Research Program, 2024.

- [49] R. Madachy, R. Bell, and R. Longshore. Systems Acquisition Cost Modeling Initiative for AI Assistance. In *Proceedings of the 21st Annual Acquisition Research Symposium*. Acquisition Research Program, 2024.
- [50] R. Madachy, and J.M. Green. Systems and Cost Effectiveness Modeling of Unmanned Systems Product Lines for Acquisition. In *Proceedings of the 19th Annual Acquisition Research Symposium*, Acquisition Research Program, 2022.
- [51] R. Madachy, W. Rosa, and B. Clark. New Effort and Schedule Estimation Models for Agile Processes in the US DoD. In *Proceedings of the 19th Annual Acquisition Research Symposium*, Acquisition Research Program, 2022.
- [52] W. Rosa, R. Madachy, C. Wallshein, B. Clark, and B. Boehm. Early phase cost models for agile software processes in the us dod. In *Proceedings of the 2017 ACM / IEEE International Symposium on Empirical Software Engineering and Measurement*, Toronto, Canada, November 2017. Best Paper Award.
- [53] R. Madachy. System dynamics behaviors for modeling lawmaking processes. In *Proceedings of the 4th Annual Science of Laws Conference*. The Science of Laws Institute, November 2017.
- [54] R. Madachy. System dynamics structures for modeling lawmaking processes. In *Proceedings of the 3rd Annual Science of Laws Conference*. The Science of Laws Institute, 2016.
- [55] W. Rosa, B. Boehm, R. Madachy, B. Clark, C. Jones, J. McGarry, C. Wallshein, and N. Lanham. Early phase software effort and schedule estimation models. In *Proceedings of the 2015 International Cost Estimating and Analysis Association Conference*, June 2015. Best Paper Award.
- [56] W. Rosa, R. Madachy, B. Boehm, and B. Clark. Simple empirical software effort estimation model. In *Proceedings of the 8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement*, September, 2014. ACM/IEEE.
- [57] W. Rosa, R. Madachy, B. Boehm, B. Clark, C. Jones, J. McGarry, and J. Dean. Improved method for predicting software effort and schedule. In *Proceedings of the 2014 International Cost Estimating and Analysis Association (ICCEA) Conference*, 2014. Best Paper Award.
- [58] M. Towhidnejad, T. Ferris, A. Squires, and R. Madachy. Enabling systems engineering program outcomes via systems engineering body of knowledge. In *2013 Conference on Systems Engineering Research, Procedia Computer Science*, 16, pages 983–989, 2013.
- [59] R. Turner, J. Lane, D. Ingold, and R. Madachy. A lean approach to improving se visibility in large operational systems evolution. volume 23, 2013.
- [60] R. Turner, R. Madachy, D. Ingold, and J. Lane. Modeling kanban processes in systems engineering. In *Proceedings of the 2012 International Conference on Software and System Process*, Zurich, Switzerland, 2012. IEEE.
- [61] R. Turner, R. Madachy, D. Ingold, and J. Lane. Improving systems engineering effectiveness in rapid response development environments. In *Proceedings of the 2012 International Conference on Software and System Process*, Zurich, Switzerland, 2012. IEEE Computer Society.
- [62] T. Hilburn, A. Squires, and R. Madachy. A model for educating systems engineers. In *Proceedings of the IEEE Systems Conference*, Vancouver, Canada, March 2012. IEEE.
- [63] R. Turner, D. Ingold, J. Lane, R. Madachy, and D. Anderson. An event-driven, value-based, pull systems engineering scheduling approach. In *Proceedings of the IEEE Systems Conference*. Vancouver, March 2012.
- [64] R. Turner, D. Ingold, J. Lane, R. Madachy, and D. Anderson. Effectiveness of kanban approaches in systems engineering within rapid response environments. In *Proceedings of the 10th Annual Conference on Systems Engineering Research*, March 2012.
- [65] J. Wirthlin, D. Houston, and R. Madachy. Defense acquisition system simulation studies. In *Proceedings of the 2011 International Conference on Software and System Process*, Waikiki, HI, 2011. IEEE Computer Society.

- [66] R. Madachy, B. Boehm, B. Clark, T. Tan, and W. Rosa. Us dod application domain empirical software cost analysis. In *Proceedings of 2011 Empirical Software Engineering and Measurement International Symposium*, Banff, Canada, September 2011. IEEE Computer Society.
- [67] R. Madachy, R. Valerdi, and G. Wang. Interdisciplinary impacts: A tribute to prof. barry w boehm. In *Proceedings of the Barry W. Boehm Symposium*, Beijing, China, 2011. International Journal of Software and Informatics.
- [68] B. Boehm, J. Lane, and R. Madachy. Total ownership cost models for valuing system flexibility. In *2011 Conference on Systems Engineering Research*, Los Angeles, CA, April 2011.
- [69] T. Birkholzer, R. Madachy, D. Pfahl, D. Port, H. Beiteringer, M. Schuster, and A. Olkov. A library of reusable components for software process simulation. In *Proceedings of the 2010 International Conference on Software Process*, Paderborn, Germany, 2010.
- [70] R. Madachy and R. Valerdi. Automating systems engineering risk assessment. In *Proceedings of the 8th Annual Conference on Systems Engineering Research*, 2010.
- [71] R. Madachy and B. Boehm. Assessing quality processes with ODC COQUALMO. In *Proceedings of the 2008 International Conference on Software Process*, Leipzig, Germany, 2008.
- [72] H. Johnson and R. Madachy. Simulating international space station issue resolution. In *Proceedings of AIAA Space 2008 Conference*, Long Beach, CA, 2008.
- [73] R. Madachy, B. Haas, H. Bradbury-Huang, J. Newell, R. Vos, and M. Rahimi. Achieving sustainable development in southern california: Collaborative learning through system dynamics modeling. In *Proceedings of the 18th International Symposium of INCOSE*, Netherlands, 2008.
- [74] B. Boehm, D. Ingold, and R. Madachy. The macro risk model - an early warning tool for software-intensive systems projects. In *Proceedings of the 18th International Symposium of INCOSE*, Netherlands, 2008.
- [75] R. Madachy. Distributed global development parametric cost modeling. In *Proceedings of the 2007 International Conference on Software Process*, Minneapolis, MN, 2007.
- [76] R. Madachy, B. Boehm, J. Richardson, M. Feather, and T. Menzies. Value-based design of software v&v processes for nasa flight projects. In *Proceedings of AIAA Space 2007 Conference*, Long Beach, CA, 2007.
- [77] R. Valerdi and R. Madachy. Impact and contributions of mbase on software engineering graduate courses. In *Proceedings of 19th Conference on Software Engineering Education and Training*, IEEE Computer Society, 2006. Turtle Bay, HI.
- [78] R. Madachy. Reusable model structures and behaviors for software processes. In *Proceedings of the Software Process Workshop/Workshop on Software Process Simulation 2006*, Shanghai, China, May 2006. Springer-Verlag.
- [79] R. Madachy, B. Boehm, and J. Lane. Spiral lifecycle increment modeling for new hybrid processes. In *Proceedings of the Software Process Workshop/Workshop on Software Process Simulation 2006*, Shanghai, China, May 2006. Springer-Verlag.
- [80] R. Madachy. Simulation for business value and software process/product tradeoff decisions. In *Proceedings of The 8th International Workshop on Economics-Driven Software Engineering Research at the 28th International Conference on Software Engineering*, Shanghai, China, 2006. IEEE Computer Society.
- [81] R. Madachy. Integrating business value and software process modeling. In *Proceedings of the 2005 Software Process Workshop*, Beijing, China, May 2005. Springer-Verlag.
- [82] R. Madachy. Software process and business value modeling. In *Proceedings of the 6th International Workshop on Software Process Simulation and Modeling*, St. Louis, MI, 2005. IEEE.
- [83] R. Madachy. People applications in software process modeling and simulation. In *Proceedings of the 6th International Workshop on Software Process Simulation and Modeling*, St. Louis, MI, 2005. IEEE.

- [84] R. Madachy. A software product business case model. In *Proceedings of the 5th International Workshop on Software Process Simulation and Modeling*, 2004.
- [85] B. Boehm, L. Huang, A. Jain, and R. Madachy. Quality as stakeholder value. In *Proceedings of the Second Work shop on Software Quality*. IEEE Computer Society, 2004.
- [86] B. Boehm, J. Bhuta, D. Garlan, E. Gradman, L. Huang, A. Lam, R. Madachy, N. Medvidovic, K. Meyer, S. Meyers, G. Perez, K. Reinholtz, R. Roshandel, and N. Rouquette. Using empirical testbeds to accelerate technology maturity and transition: The scrover experience. In *Proceedings of the 2004 International Symposium on Empirical Software Engineering*. IEEE Computer Society, 2004.
- [87] B. Boehm, A. W. Brown, R. Madachy, and A Y. Yang. Software product line life cycle cost estimation model. In *Proceedings of the 2004 International Symposium on Empirical Software Engineering*. IEEE Computer Society, 2004.
- [88] Y. Chen, B. Boehm, R. Madachy, and R. Valerdi. An empirical study of eservices product uml sizing metrics. In *Proceedings of the 2004 International Symposium on Empirical Software Engineering*. IEEE Computer Society, 2004.
- [89] R. Madachy and D. Tarbet. Case studies in software process modeling with system dynamics. In *Proceedings of the ProSim 1999 Workshop*, Silver Falls, OR, June 1999.
- [90] B. Boehm, A. Egyed, J. Kwan, and R. Madachy. Developing multimedia applications with the winwin spiral model. In *Proceedings of the Sixth European Software Engineering Conference and Fifth ACM SIGSOFT Symposium on the Foundations of Software Engineering*, Zurich, Switzerland, September 1997. Verlag.
- [91] R. Madachy. System dynamics modeling of an inspection-based process. In IEEE Computer Society Press, editor, *Proceedings of the Eighteenth International Conference on Software Engineering*, Berlin, Germany, March 1996.
- [92] R. Madachy. Modeling software processes with system dynamics: Current developments. In *Proceedings of the 1996 International System Dynamics Conference*, Cambridge, MA, July 1996.
- [93] R. Madachy. Measuring inspections at litton. In *Proceedings of the Sixth International Conference on Applications of Software Measurement*, Orlando, FL, October 1995. Software Quality Engineering. Best Paper Award.
- [94] R. Madachy. Knowledge-based risk assessment and cost estimation. In *Proceedings of the Ninth Knowledge-Based Software Engineering Conference*, IEEE Computer Society Press, September 1994. Monterey, CA.

Other Conference Papers

- [95] R. Madachy. Knowledge-based assistance for software cost estimation and project risk assessment. In *Litton Software Technology Management Conference*, Santa Barbara, CA, 1994. Best Paper Award.
- [96] R. Madachy. Case and hypertext integration issues. In *The Third Annual Teamworkers International User Group Conference*, San Diego, CA, March 1990.
- [97] R. Madachy, P. Dousette, and S. Sperling. Librascope case position. In *Advance Working Papers of Third International Workshop on CASE*. Imperial College, London, UK, July, 1989.

Conference Presentations and Tutorials

- [98] R. Madachy. Tutorial: Customizing AI for Systems Engineering. In *Proceedings of the 2026 INCOSE LA-SD Chapters' Joint Technical Conference*, 2026. (Accepted)
- [99] R. Madachy. Embedding Trustworthy AI into Quantitative Systems Engineering Tools. In *Proceedings of the 2026 INCOSE LA-SD Chapters' Joint Technical Conference*, 2026. (Accepted)
- [100] R. Madachy. Top Twenty Tips for Using Generative AI in Systems Engineering. In *Proceedings of the 2026 INCOSE LA-SD Chapters' Joint Technical Conference*, 2026. (Accepted)
- [101] R. Madachy and R. Bell. Tutorial: Developing AI Agents and Custom LLMs for Systems Engineering. In *Proceedings of the 23rd Annual Conference on Systems Engineering Research (CSER)*, 2026.

- [102] R. Madachy, O. Yakimenko, J. Sweeney, R. Giachetti, and M. Rhoades. Enhancing Systems Engineering Academic Processes with AI at NPS. In *Proceedings of the 23rd Annual Conference on Systems Engineering Research (CSER)*, 2026.
- [103] R. Madachy. Architecting Trustworthy AI for Systems Engineering Cost Estimation. In *Proceedings of the 36th International Symposium of INCOSE*, 2026.
- [104] R. Madachy. Understanding and Improving Human–AI Collaboration in Systems Engineering through Simulation. In *Proceedings of the 36th International Symposium of INCOSE*, 2026.
- [105] R. Bell and R. Madachy. An Empirical Meta Evaluation of Large Language Model Evaluation Methods for Systems Engineering. In *Proceedings of the 36th International Symposium of INCOSE*, 2026.
- [106] R. Madachy and R. Valerdi. Trustworthy AI for Cost Modeling via Deterministic Delegation and Smart Input Inference. In *Proceedings of 2025 International Boehm COCOMO Forum*, Virtual, November 2025.
- [107] R. Madachy, R. Longshore, and R. Bell,. Tutorial: Open Source System Modeling with Python and Generative AI. In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.
- [108] R. Madachy and R. Bell. Tutorial: Developing Custom LLMs for Systems Engineering. In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.
- [109] R. Madachy, R. Valerdi, G. Wang, B. Brown, and M. Wheaton. Panel: Cost Impacts of Generative AI in Systems Engineering Processes (Moderated by R. Madachy). In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.
- [110] R. Madachy, R. Bell, and R. Longshore. A Maturity and Cost Model for Systems Engineering with Generative AI. In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.
- [111] R. Bell, R. Longshore, and R. Madachy. Tailored Learning for Cost Modeling: An Open Source RAG-Based Tool. In *Proceedings of 2024 International Boehm COCOMO Forum*, Virtual, November 2024.
- [112] R. Madachy and R. Longshore. Tutorial: Open Source System Modeling with Python. In *Proceedings of the 34th International Symposium of INCOSE*, Dublin, Ireland, 2024.
- [113] R. Madachy, R. Longshore, and R. Bell. Systems and Software Engineering Cost Modeling of AI Assistance. In *Proceedings of the 34th International Symposium of INCOSE*, Dublin, Ireland, 2024.
- [114] R. Madachy. Keynote: Open Source Systems Modeling and Convergence with AI. In *Proceedings of the 2024 Boehm Center for Systems and Engineering Annual Research Review*, Virtual, April 2024.
- [115] R. Madachy, R. Bell, and R. Longshore. Factoring AI Assistance into Software and Systems Engineering Cost Models. In *Proceedings of 2023 International Boehm COCOMO Forum*, Virtual, November 2023.
- [116] R. Madachy. Introduction to PyML. In *Proceedings of the 2022 INCOSE San Diego Mini-Conference*, San Diego, CA, December 2022.
- [117] R. Madachy. Law System Use Case Modeling. In *Proceedings of the 2022 INCOSE San Diego Mini-Conference*, San Diego, CA, December 2022.
- [118] R. Madachy, and J. Green. Naval Combat System Product Line Economics. In *Proceedings of the 2019 INCOSE San Diego Mini-Conference*, San Diego, CA, November 2019.
- [119] R. Madachy, D. Jacques, K. Giammarco, and J. Green. Integrating System Architecture and Cost Models for Affordability Tradeoff Analysis. In *Proceedings of the 2019 INCOSE San Diego Mini-Conference*, San Diego, CA, November 2019.
- [120] R. Madachy, D. Jacques, K. Giammarco, and J. Green. Integrating System Architecture and Cost Models via Size Attributes. In *Proceedings of the 34th International Forum on COCOMO and Systems/Software Cost Modeling*, Washington, DC, October 2019.
- [121] R. Madachy, and J. Green. An MBSE Approach for System Product Line Architecture Modeling and Economic Analysis. In *Proceedings of the 2018 INCOSE San Diego Mini-Conference*, San Diego, CA, December 2018.

- [122] J. Simonetti, R. Gallerani, K. Giammarco, and R. Madachy. A Process Architecture Model for Cost Analysis of Agile Software Development Projects. In *Proceedings of the 33rd International Forum on COCOMO and Systems/Software Cost Modeling*, Washington, DC, November 2018.
- [123] R. Madachy, D. Jacques, K. Giammarco, and D. Edwards. Model-based systems engineering tradespace analysis with sysml and cosysmo. In *Proceedings of the 32nd International Forum on COCOMO and Systems/Software Cost Modeling*, Los Angeles, CA, October 2017.
- [124] W. Rosa, R. Madachy, B. Clark, and B. Boehm. Agile software development cost modeling for the us dod. In *Proceedings of the 32nd International Forum on COCOMO and Systems/Software Cost Modeling*, Los Angeles, CA, October 2017.
- [125] R. Madachy. Cost, schedule, and quality models and simulations. In *Proceedings of the 31st International Forum on COCOMO and Systems/Software Cost Modeling*, Los Angeles, CA, October 2016. Invited Presentation.
- [126] R. Madachy, K. Giammarco, D. Jacques, and D. Edwards. System cost modeling and sysml integration. In *Proceedings of the 31st International Forum on COCOMO and Systems/Software Cost Modeling*, Los Angeles, CA, October 2016.
- [127] M. Farah-Stapleton, R. Madachy, M. Auguston, and K. Giammarco. Executable architecture modeling. In *Proceedings of the 31st International Forum on COCOMO and Systems/Software Cost Modeling*, Los Angeles, CA, October 2016.
- [128] R. Madachy. Software maintainability metrics workshop. In *Proceedings of the 2016 International Software Engineering Research Network Meeting*, La Ciudad, Spain, September 2016.
- [129] R. Madachy. Software process dynamics. In *Proceedings of the 2016 Brazilian Function Point Users Group*, Sao Paulo, Brazil, August 2016. Invited Presentation.
- [130] W. Rosa, B. Boehm, R. Madachy, and B. Clark. Early phase software cost and schedule estimation models. In *Proceedings of the 30th International Forum on COCOMO and Systems/Software Cost Modeling*, Washington, DC, November 2015.
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- [201] Madachy R. Systems Engineering Maturity and Cost Modeling Framework for GenAI. *INCOSE San Diego Chapter Meeting*, June 2025.
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- [204] R. Madachy, D. Jacques, K. Giammarco, and J. Green. Integrating System Architecture and Cost Models for Affordability Tradeoff Analysis. Systems Engineering Research Center Webinar, Virtual, November 2019.
- [205] Madachy R. and D. Jacques. System Cost Modeling and SysML Integration in Model-Based Systems Engineering. *INCOSE San Diego Chapter Meeting*, December 2016.
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- [212] Madachy R. Quick Engineering Cost Estimates and Trades using Coconomography. *INCOSE San Diego Chapter Meeting*, February 2011.
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- [216] Tradespace and Affordability - Phase 3. Technical Report SERC-2014-TR-039-3, Systems Engineering Research Center, December 2014.
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- [222] R. Turner, R. Madachy, J. Lane, D. Ingold, and L. Levine. Agile-Lean Software Engineering (ALSE) Evaluating Kanban in Systems Engineering, A013 - Final. Technical Report SERC-2013-TR-022-2, Systems Engineering Research Center, 2013.
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Other Publications

Newsletter Articles

- [260] R. Madachy. From the President. INCOSE San Diego Chapter Newsletter, March 2016. URL <https://sdincose.org/wp-content/uploads/2016/10/March20201620SD20INCOSE20Newsletter.pdf>. (From the President Column).
- [261] R. Madachy. Our INCOSE Heritage: Foundations of Systems Architecting. INCOSE San Diego Chapter Newsletter, June 2016. URL <https://sdincose.org/wp-content/uploads/2017/08/June-2016-INCOSE-Newsletter.pdf>. (From the President Column).
- [262] R. Madachy. Our INCOSE Heritage: Integrating Software and Systems Engineering. INCOSE San Diego Chapter Newsletter, September 2016. URL <https://sdincose.org/wp-content/uploads/2016/10/Sept20201620INCOSE20Newsletter.pdf>. (From the President Column).
- [263] R. Madachy. Our INCOSE Heritage: Systems Engineering Dichotomies. INCOSE San Diego Chapter Newsletter, December 2016. URL <https://sdincose.org/wp-content/uploads/2017/01/Dec20201620INCOSE20Newsletter.pdf>. (From the President Column).

Sponsored Research

"System Dynamics Modeling Course and Capstone Project", Air Force Research Laboratories (AFRL), PI, \$130,750 2024 - 2025, \$174,961 2025 - 2026

"Systems and Software Engineering Cost Modeling of AI Assistance", Naval Research Program (NRP), PI, \$150,000 2024 - 2026

"Optimize the Military and Civilian Workforce With Respect to Both Cost and Readiness", Marine Corps Air Station (MCAS) Miramar, \$160,000 FY2023

"Open Source System Modeling Library", Naval Postgraduate School Foundation, PI, \$10,000 FY2022

"DoD Agile Software Development Early Phase Cost Modeling", Naval Research Program (NRP), PI, \$55,000 FY2018

"System Qualities Ontology, Tradespace And Affordability Program", Office of the Deputy Assistant Secretary of Defense for Systems Engineering (ODASD(SE)), PI, \$30,000 FY2015-FY2016 ((Phase 4 Task 2); \$30,000 FY2015-FY2016 ((Phase 4 Task 3) \$38,400 FY2016-FY2017 (Phase 5) \$38,400 FY2017-FY2018 (Phase 6) (8 awards including Phases 1-3 below, total \$276,400)

"Ilities Tradespace And Affordability Program", Office of the Deputy Assistant Secretary of Defense for Systems Engineering (ODASD(SE)), PI, \$40,000 FY2013 (Phase 1); \$30,000 FY2013-FY2014 (Phase 2); \$30,000 FY2014-FY2015 ((Phase 3 Task 2); \$30,000 FY2014-FY2015 (Phase 3 Task 3)

"Software Cost Estimation Metrics", Air Force Cost Analysis Agency, PI, \$75,000 for 2009-2010, \$65,000 for 2010-2011, \$25,000 FY2011; \$15,000 FY2011-FY2012 (4 awards, total \$180,000)

PMS-485 "Systems And Software Support", SPAWAR, PI, \$12,000, FY2012

SPAWAR PMS 485 Support, SPAWAR, Co-PI, \$27,000 FY2011

"Systems Of Systems Cost Estimating Support to SPAWAR 5.1.1", Space and Naval Warfare Systems Command, PI, \$29,750 for FY2011

"Future Airborne Capability Environment (FACE) Business Model Development", NAVAIR, PI, \$104,000 FY2014-FY2015

"Littoral Warfare Engineering Facility Business Case Analysis", Naval Surface Warfare Center, PI, Port Hueneme Division, \$32,500 FY2013-FY2014

"Agile-Lean Software Engineering (ALSE): Evaluating Kanban In Systems Engineering", National Security Agency, \$120,000 FY2012, Co-PI at \$40,000 FY2012

”Valuing Flexibility”, Office of the Deputy Assistant Secretary of Defense for Systems Engineering (ODASD), PI, \$100,000 (2010-2011), Co-PI, \$11K FY2011)

“Future Directions in Software Development Practices”, National Aeronautics and Space Administration / West Virginia University, Co-PI, \$40,000 for 2008

“Army Future Combat Systems Support”, Sverdrup Technology, Inc., Co-PI, \$450,000 for 2006–2007, \$419,000 extension for 2008

“Software Risk Advisory Tools”, National Aeronautics and Space Administration, Co-PI, \$396,000 for 2006–2008

“System Dynamics Modeling for Sustainable Enterprise Executive Roundtable”, USC Center for Sustainable Cities, PI, \$5,000 M&S for 2008

“A Model of Options and Costs for Reliable Autonomy”, National Aeronautics and Space Administration, Human and Robotic Technology Program, Co-PI, \$384,375 for 2005–2006 for the USC portion

“Prometheus Software Tool Evaluation”, Northrop Grumman Space Technology, \$80,000, Co-PI, 2005

“Empirical Research on High Dependability Computing”, National Aeronautics and Space Administration, Co-PI, total contract value \$2,198,872, funded 2001–2004

“CEBASE Support of Future Combat Systems”, Army and DARPA, Research Lead, total contract values of \$3,161,49 funded 2001–2004 and \$566,452 funded 2002–2004

“Teledyne Software Cost Model Development”, Teledyne Systems, Research Lead, \$40,000, 1994

University Service

Academic Associate, Systems Engineering Curriculum 311, 2015 - Present

Course Coordinator, SE4003 Software Systems Engineering, Systems Engineering Dept., 2008 - Present

Course Coordinator, SE3011 Engineering Economics and Cost Estimation, Systems Engineering Dept., 2017-Present

Chair, NPS Faculty Council Scholarship Committee, 2017

Committee Member, NPS Faculty Council Scholarship Committee, 2016

Committee Member, Systems Engineering Dept. Hiring Committee, March 2016 - December 2016, 2017

Committee Member, Software Engineering (SWE) Ph.D. Committee, 2009 - Present

Honors and Awards

[Jeff Grady Award](#), INCOSE San Diego Chapter, for “Advancing Systems Engineering Knowledge”, 2025

Best Paper Award, IEEE Empirical Software Engineering and Measurement Conference, 2017

[Lifetime Achievement Award in Systems and Software Cost Estimation](#), USC Center for Systems and Software Engineering, for “Innovative Development of a Wide Variety of Cost, Schedule and Quality Models and Simulations”, 2016

Best Paper Award, International Cost Estimating and Analysis Association Conference, 2015

Best Paper Award, International Cost Estimating and Analysis Association Conference, 2014

Biography listed in the Marquis Who’s Who as an engineering educator at NPS, 2009

Nomination from Litton Guidance and Control Systems Division VP for corporate-wide Litton Software Excellence Award, 1999 (award decision pending when left company)

Honorable Mention, Litton Advanced Technology Achievement Award (all Litton divisions), 1996

Best Paper Award, Sixth International Conference on Applications of Software Measurement, 1995

Co-recipient, Litton Data Systems Continuous Measurable Improvement major award, 1995

Best Paper Award, Litton Software Technology Management Conference (all Litton divisions), 1994

Best Graduate Student Paper Award, Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 1988

First Place Winner, 1988 UCLA Crump Prize for research in medical engineering from Crump Institute for Medical Engineering, 1988

Received General Dynamics Excel Award for generation of mission data and on-board tape for advanced flight test program, 1982

First Place Winner, national technical paper contest sponsored by Gearhart Industries, 1981

Chosen twice to represent the University of Dayton in "Who's Who Among Students in American Universities and Colleges", 1980, 1981

Dean's Honor List, University of Dayton, 1977–1981

Tau Beta Pi National Engineering Honor Society, 1978

Pi Tau Sigma National Mechanical Engineering Honor Society, 1978

Professional Service

Professional Organization Board

Vice-President of Technical Development, INCOSE San Diego Chapter, 2019

Vice-President of Chapter Development, INCOSE San Diego Chapter, 2018

Past-President, INCOSE San Diego Chapter, 2017

President, INCOSE San Diego Chapter, 2016

President-Elect, INCOSE San Diego Chapter, 2015

Treasurer, INCOSE San Diego Chapter, 2014

Journal Editorial Boards

Editorial Board, [Journal of Cost Analysis and Parametrics \(JCAP\)](#), 2012 – 2017

Editorial Board, International Journal of Information Technology and the Systems Approach, 2007-2009

Journal Referee and Reviewer

Systems Engineering, 2020, 2025 (SYS-25-069)

System Dynamics Review, 2017 (SDR-17-0015)

Journal of Software: Evolution and Process, 2017 (JSME-16-0191)

IEEE Transactions on Software Engineering, 2009, 2010, 2011, 2014, 2023 – 2024 (TSE-2023-12-0618, TSE-2014-34-0054, TSE-2012-04-0093, TSE-2011-03-0066, TSE-2009-12-0406)

IEEE Systems Journal, 2013 (ISJ-RE-13-02596)

IEEE Software, 2009

Empirical Software Engineering, 2010, 2014 (EMSE-D-14-00093, EMSE430 2010)

Journal of Software Maintenance and Evolution: Research and Practice, 2009

Journal of Cost Analysis and Parametrics, 2013 (UCAP-2013-0001)

ACM Transactions on Software Engineering and Methodology, 2011 (TOSEM-2011-0093).

Information and Software Technology, 2010, 2014 (INFOSOF-D-10-00109, INFOSOF-D-13-0044)

International Journal of Computer Integrated Manufacturing, 2009 (TCIM-2010-IJCIM-0105)

International Journal of Information Technologies and Systems Approach, 2009

Previous reviews for IEEE Transactions on Software Engineering, IEEE Software, IEEE Computer, Journal of Software: Evolution and Process, Journal of Systems and Software, System Dynamics Review, others, 1996-2008

Conference Chairmanship

Program Co-Chair, International Conference on Software Process (ICSP), 2009

Publicity Chair, International Conference on Software Process (ICSP), 2008

Registration Chair, International Symposium on Empirical Software Engineering (ISESE), 2004

Program Chair, International Forum on COCOMO and Systems/Software Cost Modeling, 1998-2001

Conference Program Committee Membership

Program Committee Member, International Conference on Systems and Software Process (ICSSP), 2011–2015, 2017

Program Committee Member, Conference on Systems Engineering Research (CSER), 2012–2015

Program Committee Member, Actionable Analytics Workshop at IEEE Automated Software Engineering (ASE), 2015

Program Committee Member, International Forum on COCOMO and Systems/Software Cost Modeling, 1994–Present

Program Committee Member, International Conference on Software Process (ICSP), 2007–2010

Program Committee Member, Software Process Simulation Modeling Workshop, 1998–2000, 2003, 2005–2006

Program Committee Member, International Symposium on Empirical Software Engineering (ISESE), 2004

Program Committee Member, International Conference on COTS-Based Software Systems (ICCBSS), 2004

Program Committee Member, Feedback and Evolution in Software and Business Processes (FEAST) Workshop, 2000

Program Committee Member, California Software Symposium, 1997–1999

Conference - Other

Reviewer for several papers submitted to the Barry W. Boehm Symposium, 2011

Reviewed conference papers for Engineering Education and Educational Technologies (EEET 2010), 2010

Conference Tutorials Organized

R. Madachy, R. Longshore, and R. Bell,. Tutorial: Open Source System Modeling with Python and Generative AI. In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.

R. Madachy and R. Bell. Tutorial: Developing Custom LLMs for Systems Engineering. In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.

R. Madachy and R. Longshore. Tutorial: Open Source System Modeling with Python. In *Proceedings of the 34th International Symposium of INCOSE*, Dublin, Ireland, 2025.

D. Houston and R. Madachy, “Tutorial: Understanding the Dynamics of Software Projects: An Introduction to Software Process Modeling and Simulation”, Proceedings of the 2014 International Conference on Software and System Process, IEEE, Nanjing, China, 2014

R. Madachy and R. Valerdi, “Tutorial: Systems Engineering and Total Ownership Cost Estimation”, Proceedings of the 22nd Annual INCOSE International Symposium, Rome, Italy, July 2012

Workshops and Panels Organized

R. Madachy, R. Valerdi, , G. Wang, B. Brown, and M. Wheaton. Panel: Cost Impacts of Generative AI in Systems Engineering Processes (Moderated by R. Madachy). In *Proceedings of the 35th International Symposium of INCOSE*, Ottawa, Canada, 2025.

B. Clark and R. Madachy, “COCOMO III workshop”, Proceedings of the 30th International Forum on COCOMO and Systems/Software Cost Modeling, Washington, DC, November 2015

B. Boehm and R. Madachy, “Workshop: Empirical Specification and Evaluation of the Ilities”, Proceedings of the 2013 International Software Engineering Research Network Meeting, Baltimore, MD, 2013

B. Clark, R. Madachy, “DoD Software Resource Data Reports (SRDRs) and Cost Data Analysis Workshop”, Proceedings of the 27th International Forum on COCOMO and Systems/Software Cost Modeling, Pittsburgh, PA, 2012

R. Turner, R. Madachy, “Improving Systems Engineering Effectiveness Using Kanban-based Scheduling and a Service-oriented Approach”, Proceedings of IEEE SysCon, March 2012

R. Madachy and R. Valerdi, “Estimation Curriculum Development Workshop”, Proceedings of the 26th International Forum on COCOMO and Systems/Software Cost Modeling, Los Angeles, CA, 2011

B. Clark and R. Madachy, “Air Force Estimation Guidebook Workshop”, Proceedings of the 26th International Forum on COCOMO and Systems/Software Cost Modeling, Los Angeles, CA, 2011

B. Clark and R. Madachy, “SRDR Data Analysis Research Workshop”, Proceedings of the 25th International Forum on COCOMO and Systems/Software Cost Modeling, Los Angeles, CA, 2010

B. Clark and R. Madachy, “Software Metrics Unification & Software Productivity Domains”, Proceedings of the 24th International Forum on COCOMO and Systems/Software Cost Modeling, Cambridge, MA, 2009

R. Madachy, “Panel: Systems Engineering Management and the Relationship of Systems Engineering to Project Management and Software Engineering”, 13th Annual NDIA Systems Engineering Conference, 2010

R. Madachy, “Panel: Comparisons of Estimation Tools for Next-Generation Processes” at the 23rd International Forum on COCOMO and Systems/Software Cost Modeling, 2008

R. Madachy, R. Valerdi, ”Expert COSYSMO Workshop”, 24th International Forum on COCOMO and Systems/Software Cost Modeling, 2009

Other Professional Service

Representing NPS for the International Software Engineering Research Network (ISERN), 2008 – Present

Co-chairman of Los Angeles Software Process Improvement Network steering committee 1996–1998

Professional Organizations

Institute of Electronic and Electrical Engineers (IEEE) (Senior Member)

International Council on Systems Engineering (INCOSE)

Association for Computing Machinery (ACM)

American Institute of Aeronautics and Astronautics AIAA (lapsed)

Expert Witness and Litigation Service

United States v. Huawei Technologies

United States District Court for the Eastern District of New York, Court Case No. 1:18-cr-00457, 2023

Republican Party of New Mexico v. Tolouse Oliver New Mexico District Court, Class Action Suit, Court Case No. D-506-CV-202200041, 2023

Voterlabs, Inc. v. Ethos Groups Consulting Services, LLC
United States District Court for the District of Delaware, Case No. 19-524-RGA, 2020

EPES Software, Inc. v. Seed Technologies
Tulsa County District Court, Case No. CJ-2011-4574, 2015-2016

Ticket Innovations, Inc. v. Ticketmaster
Los Angeles County Superior Court, Case No. BC 327228, 2008

Business to Business Markets, Inc. (B2B) v. Kshema Technologies Ltd.
Los Angeles County Superior Court, Case No. BC280932, 2009-2010

Can-Auto Inspections Inc. and Can-Auto Services Inc. v. Vascor, Ltd.
S.C.B.C Action No. S-073725, Vancouver Registry, 2010