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- **Research Interests:** Design and analysis of computer simulation experiments on models of stochastic systems, particularly statistical efficiency, simulation analytics, simulation optimization, multivariate and nonstationary input modeling, uncertainty quantification and metamodeling. Applications include computer-performance modeling, manufacturing systems, wind and solar energy, financial engineering and transportation.

- **Education**

  Ph.D. (December 1983), M.S. (May 1981), Operations Research, School of Industrial Engineering, Purdue University.

  B.A. (May 1979), Mathematics and Computer Science, DePauw University, Greencastle, Indiana.

- **Professional Experience (University)**

  Associate Professor (1995–1998), Professor (1998–2023), Department of Industrial Engineering and Management Sciences, Northwestern University. Director of Master of Engineering Management Program (1998–2007). Department Chair (2008–2014). Director of Graduate Studies (2016–2017).

  Visiting Professor, City University of Hong Kong (Fall 2014).

  Distinguished Visiting Scholar, Lancaster University Management School (2013–2021).

  Assistant Professor (1984–1989), Associate Professor (1989–1995), Department of Industrial and Systems Engineering and Department of Statistics, The Ohio State University.

  Visiting Assistant Professor, Department of Industrial and Systems Engineering, The Ohio State University (Summer 1984).

  Visiting Assistant Professor, School of Industrial Engineering, Purdue University (Spring 1984).

- **Professional Experience (Industry)**

  Consultant to Sunairio, Inc. for wind and solar power simulation (2021–present).

  Consultant to Obama campaign for election poll staffing (2012).

  Consultant to Whirlpool Corporation for simulation models to coordinate batch manufacturing and flexible assembly of refrigerators (2010).

  Consultant to On Time Systems, Inc. for validiation of large-scale simulation models (2005).

  Consultant to Chas. Levy Company for supply chain analysis (2002–2004).

  Consultant to J. B. Collins Associates for financial engineering models of crop insurance risk (2000–2002).

  Consultant to Dell Computer for production and procurement planning (2000).

  Consultant to Emery Worldwide Airlines, Inc. to audit statistical sampling procedures for estimating mail volume (1999).

  Consultant to Sloan Valve Co. for development of simulation models of a new milling operation (1999).

  Consultant to Norwegian Defense Establishment on simulation experiment design and analysis (1998).

  Consultant to Carsonite International, Inc. for financial planning simulation models (1997).

  Consultant to the Port of Singapore Authority for design of an automated material handling system (1996–1997).

  Consultant to Rockford Powertrain Inc. for financial planning simulation models (1996).

  Consultant to LEXIS-NEXIS for statistical analysis of simulation and computer performance modeling (1991–1997).

  Consultant to Litel Corporation to develop simulation models to forecast customer mix and revenues for long-distance telephone service (1988).

- **Refereed Publications**

  Y. Zhou, E. Malthouse and B. L. Nelson, "Optimising Customer Equity Through Engagement," *Journal of the Operational Research Society* (2024), available online.

  H. Avci, B. L. Nelson, E. Song and A. Wächter, "Using Cache or Credit for Parallel Ranking and Selection," *ACM Transactions on Modeling and Computer Simulation* **33** (2023), 12:1–28.

  L. E. Morgan, B. L. Nelson, A. C. Titman, and D. J. Worthington, "A Spline Function Method for Modelling and Generating a Nonhomogeneous Poisson Process," *Journal of Simulation* **18** (2023), 557–568.

  W. Xie, R. R. Barton, B. L. Nelson and K. Wang, "Stochastic Simulation Uncertainty Analysis to Accelerate Flexible Biomanufacturing Process Development," *European Journal of Operational Research* (2023), available online.

  L. Pei, B. L. Nelson and S. R. Hunter, "Parallel Adaptive Survivor Selection," *Operations Research* **72** (2022), 336–354.

D. J. Eckman, M. Plumlee and B. L. Nelson, "Plausible Screening Using Functional Properties for Simulations with Large Solution Spaces," *Operations Research* **70** (2022), 3473–3499.

L. A. Rhodes-Leader, B. L. Nelson, B. S. Onggo and D. J. Worthington, "A Multi-Fidelity Modelling Approach for Airline Disruption Management using Simulation," *Journal of the Operational Research Society* **73** (2022), 2228–2241.

X. Jiang, B. L. Nelson and L. J. Hong, "Meaningful Sensitivities," *IISE Transactions* **54** (2021), 122–133.

B. L. Nelson, A. T. K. Wan, G. Zou, X. Zhang and X. Jiang, "Reducing Simulation Input-Model Risk via Input Model Averaging," *INFORMS Journal on Computing* **33** (2021), 672–684.

M. Semelhago, B. L. Nelson, E. Song and Andreas Wächter, "Rapid Discrete Optimization via Simulation with Gaussian Markov Random Fields," *INFORMS Journal on Computing* **33** (2021), 915–930.

E. Song, P. Wu-Smith and B. L. Nelson, "Uncertainty Quantification in Vehicle Content Optimization for General Motors," *INFORMS Journal on Applied Analytics* **50** (2020), 225–238.

G. Jiang, L. J. Hong and B. L. Nelson, "Online Risk Monitoring using Online Simulation," *INFORMS Journal on Computing* **32** (2020), 356–375.

L. E. Morgan, B. L. Nelson, A. C. Titman and D. J. Worthington, "Detecting Bias Due to Input Modelling in Computer Simulation," *European Journal of Operational Research* **279** (2019), 869–881.

P. Salemi, B. L. Nelson and J. Staum, "Generalized Integrated Brownian Fields for Simulation Metamodeling," *Operations Research* (2019) **67** (2019), 874–891.

Y. Lin, B. L. Nelson and L. Pei, "Virtual Statistics in Simulation via k Nearest Neighbors," *INFORMS Journal on Computing* **31** (2019), 576–592.

P. Salemi, E. Song, B. L. Nelson and J. Staum, "Gaussian Markov Random Fields for Discrete Optimization via Simulation: Framework and Algorithms," *Operations Research* **67** (2019), 250–266.

E. Song and B. L. Nelson, "Input-Output Uncertainty Comparisons for Discrete Optimization via Simulation," *Operations Research* **67** (2019), 295–597.

Y. Lin and B. L. Nelson, "Variance and Derivative Estimation for Virtual Performance," *ACM TOMACS* **28** (2018), 17:1–20.

B. L. Nelson, "Replicated Computations Results (RCR) Report for "Green Simulation: Reusing the Output of Repeated Experiments," *ACM Transactions on Modeling and Computer Simulation* **27** (2017), 24:1–2.

I. Gerhardt, B. L. Nelson and M. R. Taaffe, "Technical Note: The $MAP_t/Ph_t/\infty$ Queueing System and Multiclass $[MAP_t/Ph_t/\infty]^K$ Queueing Network," *INFORMS Journal of Computing* **29** (2017), 367–376.

W. Xie, R. R. Barton and B. L. Nelson, "Multivariate Input Uncertainty in Output Analysis for Stochastic Simulation," *ACM Transactions on Modeling and Computer Simulation* **27.5** (2016).

E. Song, B. L. Nelson and J. Staum, "Shapley Effects for Global Sensitivity Analysis: Theory and Computation," *SIAM/ASA Journal of Uncertainty Quantification* **4** (2016), 1060–1083.

W. Fan, L. J. Hong and B. L. Nelson, "Indifference-zone-free Selection of the Best," *Operations Research* **64** (2016), 1499–1514 .

S. Lee and B. L. Nelson, "General-Purpose Ranking & Selection for Computer Simulation," *IIE Transactions* **48** (2016), 555–564.

B. L. Nelson, "'Some Tactical Problems in Digital Simulation' for the Next Ten Years," *Journal of Simulation* **10** (2016), 2–11.

P. Salemi, B. L. Nelson and J. Staum, "Moving Least Squares Regression for High-Dimensional Stochastic Simulation Metamodeling," *ACM Transactions on Modeling and Computer Simulation* **26.3** (2016).

J. Luo, L. J. Hong, B. L. Nelson and Y. Wu, "Sequential Procedures for Large-Scale Ranking-and-Selection Problems in Parallel Computing Environments," *Operations Research* **63** (2015), 1177–1194.

E. Song and B. L. Nelson, "Quickly Assessing Contributions to Input Uncertainty," *IIE Transactions* **47** (2015), 1–17.

Y. Lin, E. Song and B. L. Nelson, "Single-Experiment Input Uncertainty," *Journal of Simulation* **9** (2015), 249–259.

L. J. Hong, J. Luo, and B. L. Nelson, "Chance Constrained Selection of the Best, *INFORMS Journal on Computing* **27** (2015), 317–334.

W. Xie, B. L. Nelson, and R. R. Barton, "A Bayesian Framework for Quantifying Uncertainty in Stochastic Simulation," *Operations Research* **62** (2014), 1439–1452.

R. R. Barton, W. Xie and B. L. Nelson, "Quantifying Input Uncertainty via Simulation Confidence Intervals," *INFORMS Joural on Computing* **26** (2014), 74–87.

X. Chen, B. E. Ankenman and B. L. Nelson, "Enhancing Stochastic Kriging Metamodels with Gradient Estimators," *Operations Research* **61** (2013), 512–528.

W. L. Xu and B. L. Nelson, "'Empirical Stochastic Branch-and-Bound for Optimization via Simulation," *IIE Transactions* **45** (2013), 685–698.

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J. Xu, B. L. Nelson and L. J. Hong, "An Adaptive Hyperbox Algorithm for High-Dimensional Discrete Optimization via Simulation Problems," *INFORMS Journal on Computing* **25** (2013), 133–146.

B. L. Nelson and I. Gerhardt, "Modeling and Simulating Nonstationary Arrival Processes to Facilitate Analysis," *Journal of Simulation* **5** (2011), 3–8.

F. Yang, J. Liu, B. L. Nelson, B. E. Ankenman and M. Tongarlak, "Metamodeling for Cycle Time-Throughput-Product Mix Surfaces using Progressive Model Fitting," *Production Planning and Control* **22** (2011), 50–68.

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I. Gerhardt and B. L. Nelson, "Transforming Renewal Processes for Simulation of Nonstationary Arrival Processes," *INFORMS Journal on Computing* **21** (2009), 630–640.

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S. C. Tsai, B. L. Nelson and J. Staum, "Combined Screening and Selection of the Best with Control Variates," in *Advancing the Frontiers of Simulation*, ed. C. Alexopoulos, D. Goldsman and J. R. Wilson (2009), Springer, NY.

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B. Biller and B. L. Nelson, "Evaluation of the ARTAFIT Method for Fitting Time-Series Input Processes for Simulation," *INFORMS Journal on Computing* **20** (2008), 485–498.

V. Lesnevski, B. L. Nelson and J. Staum, "An Adaptive Procedure for Estimating Coherent Risk Measures based on Generalized Scenarios," *Journal of Computational Finance* **11** (2008), 1–31.

J. W. Fowler, S. E. Leach, G. T. Mackulak and B. L. Nelson. "Variance-based Sampling for Simulating Cycle Time-Throughput Curves using Simulation-based Estimates," *Journal of Simulation* **2** (2008), 69–80.

V. Lesnevski, B. L. Nelson and J. Staum, "Simuation of Coherent Risk Measures Based on Generalized Scenarios," *Management Science* **53** (2007), 1756–1769.

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F. Yang, B. E. Ankenman and B. L. Nelson, "Efficient Generation of Cycle Time-Throughput Curves through Simulation and Metamodeling," *Naval Research Logistics* **54** (2007), 78–93.

J. Pichitlamken, B. L. Nelson and L. J. Hong, "A Sequential Procedure for Neighborhood Selection-of-the-best in Optimization via Simulation," *European Journal of Operational Research* **173** (2006), 283–298.

B. L. Nelson and J. Staum, "Control Variates for Screening, Selection and Estimation of the Best," *ACM Transactions on Modeling and Computer Simulation* **16** (2006), 52–75.

H. Wan, B. E. Ankenman and B. L. Nelson, "Controlled Sequential Bifurcation: A New Factor-Screening Method for Discrete-Event Simulation," *Operations Research* **54** (2006), 743–755.

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B. L. Nelson,"50th Anniversary Article: Stochastic Simulation Research in *Management Science*," *Management Science* **50** (2004), 855–868.

B. L. Nelson and M. R. Taaffe, "The $\mathrm{Ph}_t/\mathrm{Ph}_t/\infty$ Queueing System: Part I—The Single Node," *INFORMS Journal on Computing* **16** (2004), 266–274.

B. L. Nelson and M. R. Taaffe, "The $[\mathrm{Ph}_t/\mathrm{Ph}_t/\infty]^K$ Queueing System: Part II—The Multiclass Network," *INFORMS Journal on Computing* **16** (2004), 275–283.

J. Pichitlamken and B. L. Nelson, "A Combined Procedure for Optimization via Simulation," *ACM Transactions on Modeling and Computer Simulation* **13** (2003), 155–179.

B. Biller and B. L. Nelson, "Modeling and Generating Multivariate Time-Series Input Processes using a Vector Autoregressive Technique," *ACM Transactions on Modeling and Computer Simulation* **13** (2003), 211–237.

J. Boesel, B. L. Nelson and S. Kim, "Using Ranking and Selection to 'Clean Up' After Simulation Optimization," *Operations Research* **51** (2003), 814–825.

J. Boesel, B. L. Nelson and N. Ishii, "A Framework for Simulation-Optimization Software," *IIE Transactions* **35** (2003), 221–230.

D. Goldsman, S-H. Kim, W. S. Marshall and B. L. Nelson, "Ranking and Selection for Steady-State Simulation: Procedures and Perspectives," *INFORMS Journal on Computing* **14** (2002), 2–19.

J. O. Miller, B. L. Nelson and C. H. Reilly, "Estimating the Probability that a Simulated System will be the Best," *Naval Research Logistics* **49** (2002), 341–358.

S. Kim and B. L. Nelson, "A Fully Sequential Procedure for Indifference-Zone Selection in Simulation," *ACM Transactions on Modeling and Computer Simulation* **11** (2001), 251–273.

B. L. Nelson, J. Swann, D. Goldsman and W. Song, "Simple Procedures for Selecting the Best Simulated System when the Number of Alternatives is Large," *Operations Research* **49** (2001), 950–963.

B. L. Nelson and S. Banerjee, "Selecting a Good System: Procedures and Inference," *IIE Transactions* **33** (2001), 149–166.

B. L. Nelson and D. Goldsman, "Comparisons with a Standard in Simulation Experiments," *Management Science* **47** (2001), 449–463.

P. P. Ware, T. W. Page and B. L. Nelson, "Automatic Modeling of File System Workloads Using Two-Level Arrival Processes," *ACM Transactions on Modeling and Computer Simulation* **8** (1998), 305–330.

T. Hesterberg and B. L. Nelson, "Control Variates for Probability and Quantile Estimation," *Management Science* **44** (1998), 1295–1312.

J. O. Miller, B. L. Nelson and C. H. Reilly, "Efficient Multinomial Selection in Simulation," *Naval Research Logistics* **45** (1998), 459–482.

M. C. Cario and B. L. Nelson,"Numerical Methods for Fitting and Simulating Autoregressive-to-Anything Processes," *INFORMS Journal on Computing* **10** (1998), 72–81.

J. C. Hsu and B. L. Nelson, "Multiple Comparisons in the General Linear Model," *Journal of Computational and Graphical Statistics* **7** (1998), 23–41.

B. L. Nelson, B. Schmeiser, M. R. Taaffe and J. Wang, "Approximation-Assisted Estimation," *Operations Research Letters* **20** (1997), 109–118.

Y-H. Tao and B. L. Nelson, "Computer-Assisted Simulation Analysis," *IIE Transactions* **29** (1997), 221–231.

M. C. Cario and B. L. Nelson, "Autoregressive to Anything: Time-Series Input Processes for Simulation," *Operations Research Letters* **19** (1996), 51–58.

B. L. Nelson and F. J. Matejcik, "Using Common Random Numbers for Indifference-Zone Selection and Multiple Comparisons in Simulation," *Management Science* **41** (1995), 1935–1945.

F. J. Matejcik and B. L. Nelson, "Two-Stage Multiple Comparisons with the Best for Computer Simulation," *Operations Research* **43** (1995), 633–640.

M. Yuan and B. L. Nelson, "Autoregressive Output Analysis Methods Revisited," Special Issue on Simulation and Modeling of *Annals of Operations Research* **53** (1994), 391–418.

B. L. Nelson, "Robust Multiple Comparisons under Common Random Numbers," Special Issue on Variance Reduction Techniques of *ACM Transactions on Modeling and Computer Simulation* **3** (1993), 225–243.

B. L. Nelson, "Estimating Acceptance-Sampling Plans for Dependent Production Processes," *IIE Transactions* **25** (1993), 11–18.

B. L. Nelson and J. C. Hsu, "Control-Variate Models of Common Random Numbers for Multiple Comparisons with the Best," *Management Science* **39** (1993), 989–1001.

M. Yuan and B. L. Nelson, "Multiple Comparisons With the Best for Steady-State Simulation," Technical Note in *ACM Transactions on Modeling and Computer Simulation* **3** (1993), 66–79.

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B. L. Nelson, "Batch Size Effects on the Efficiency of Control Variates in Simulation," *European Journal of Operational Research* **43** (1989), 184–196.

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B. L. Nelson, "Some Properties of Simulation Interval Estimators Under Dependence Induction," *Operations Research Letters* **6** (1987), 169–176.

B. L. Nelson, "A Perspective on Variance Reduction in Dynamic Simulation Experiments," *Communications in Statistics* **B16** (1987), 385–426.

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- **Books and Book Chapters**

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- **Working Papers**

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- **Proceedings Papers**

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L. Rhodes-Leader, D. J. Worthington, B. L. Nelson and B. S. Onggo, "Multi-fidelity Simulation Optimisation for Airline Disruption Management," *Proceedings of the 2018 Winter Simulation Conference*, 2179–2190.

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B. L. Nelson, "Designing Efficient Simulation Experiments," *1992 Winter Simulation Conference Proceedings*, 126–132.

C. Cash, B. L. Nelson, J. Long, D. Dippold and W. Pollard, "Evaluation of Tests for Initial-Condition Bias," *1992 Winter Simulation Conference Proceedings*, 577–585.

D. Goldsman, B. L. Nelson and B. Schmeiser, "Methods for Selecting the Best System," *1991 Winter Simulation Conference Proceedings*, 177–186.

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W. Yang and B. L. Nelson, "Optimization using Common Random Numbers, Control Variates and Multiple Comparisons with the Best," *1989 Winter Simulation Conference Proceedings*, 444–449.

J. C. Hsu and B. L. Nelson, "Optimization over a Finite Number of System Designs with One-Stage Sampling and Multiple Comparisons with the Best," *1988 Winter Simulation Conference Proceedings*, 451–457.

W. Yang and B. L. Nelson, "Multivariate Estimation and Variance Reduction in Terminating and Steady-State Simulation," *1988 Winter Simulation Conference Proceedings*, 466–472.

B. L. Nelson, "Variance Reduction for Simulation Practitioners," *1987 Winter Simulation Conference Proceedings*, 43–51.

J. C. Hsu and B. L. Nelson, "Control Variates for Quantile Estimation," *1987 Winter Simulation Conference Proceedings*, 434–444.

R. Añonuevo and B. L. Nelson, "Automated Estimation and Variance Reduction for Steady-State Simulations," *1986 Winter Simulation Conference Proceedings*, 871–875.

B. L. Nelson, "Variance Reduction in Computer Simulation," *1986 International Industrial Engineering Conference Proceedings*, 295–303.

B. L. Nelson, "A Decomposition Approach to Variance Reduction," *1985 Winter Simulation Conference Proceedings*, 23–32.

B. L. Nelson and B. Schmeiser, "Variance Reduction: Basic Transformations," *1983 Winter Simulation Conference Proceedings*, 225–258.

- **Newsletter Articles**

B. L. Nelson, "Rockford Powertrain," *Manufacturing Matters*, Northwestern University (Winter 1997).

B. L. Nelson, "Simulation in ISE," *Department of Industrial & Systems Engineering Newsletter*, The Ohio State University (Summer 1988), pp. 1–2.

B. L. Nelson, "Simulation Languages Available at OSU," *The OSU Statistician* **2** (1987), pp. 5–6.

B. L. Nelson, "The Sample Variance of Antithetic Variates," *TIMS College on Simulation Newsletter* **9** (1985), p. 7.

B. L. Nelson, "Member's Corner – Using Gambling to Teach Simulation," *I-Sim News* **19**, 1, (2005), p. 12.

- **Sponsored Research**

"Collaborative Research: Inference on Expensive, Grey-Box Simulation Models," National Science Foundation Grant No. CMMI-2206973 (2022–2025).

"Mobility as a Service Network Optimization via Simulation," General Motors Corporation (2022–2023).

"Mobility as a Service Network Simulation," General Motors Corporation (2020).

"Adaptive Gaussian Markov Random Fields for Large-scale Discrete Optimization via Simulation," National Science Foundation Grant No. DMS-1854562 (2019–2022).

"Green Simulation," National Science Foundation Grant No. CMMI-1634982 (2017–2019).

"Quantifying the Uncertainty Propagation in Vehicle Content Packaging and Pricing Optimization," General Motors Corporation (2016).

"GOALI: Simulation Analytics," National Science Foundation Grant No. CMMI-1537060 (2015–2019).

"Simulation Analytics," Undergraduate Research Assistant Program Grant No. 999URAP136717, Northwestern University (Summer 2015).

"GOALI: Quantifying Input Uncertainty in Stochastic Simulation," National Science Foundation Grant No. CMMI-1068473 (2011–2014).

"Stochastic Kriging: Modeling and Controlling Uncertainty in Simulation," National Science Foundation Grant No. CMMI-0900354 (2009–2012), with B. Ankenman and J. Staum.

"Fuel Injector Production Line Simulation for Delphi," Delphi Corporation (2008), with B. Ankenman.

"Design and Implementation of VBAsim," The Alumnae of Northwestern University (2008–2009).

"Strategic Decision Making Support over the Manufacturing Life Cycle," General Motors R&D Center (2006–2009), with W. Hopp.

"Simulating Coherent Risk Measures," National Science Foundation Grant No. DMI-0555485 (2006–2009), with J. Staum.

"QNATS - The Queueing Network Approximator for Time-Dependent Systems," National Science Foundation Grant No. DMI-0521857 (2005–2008), with M. R. Taaffe.

"Multi-product Cycle Time and Throughput Evaluation via Simulation on Demand," Semiconductor Research Corporation Grant 1224 (2004–2007), with B. Ankenman, J. Fowler and G. Mackulak.

"A Framework for Effective Optimization via Simulation," National Science Foundation Grant No. DMI-0217690 (2002–2006), with S. Andradóttir.

"Procedures for Efficient Cycle Time-Throughput Curve Generation," National Science Foundation Grant No. DMI-0140385 (2002–2004), with B. Ankenman, J. Fowler and G. Mackulak.

"A Simulation Design and Analysis Environment for GM," General Motors R&D Center (2002–2004), with B. Ankenman.

"Resource Requirements for Demand-Responsive Transportation Services," Transportation Cooperative Research Program (2000-2002), with J. Schofer.

"A Simulation Framework for Vehicle Distribution Systems," General Motors R&D Center (2000-2001).

"Advanced Information Technologies on ERP, MES, APS and SCM," JGC Corporation, Japan (1999–2000), with M. Daskin.

"A Comprehensive Framework and Software for Simulation Input Modeling," National Science Foundation Grant No. DMI-9821011 (1999–2001), with J. R. Wilson.

"Comparisons via Stochastic Simulation, with Applications to Manufacturing and Services," National Science Foundation Grant No. DMI-9622065 (1996–2000), with D. Goldsman.

"Scenario Generation and Evaluation via Discrete-Event Simulation," JGC Corporation, Japan (1996–1998).

"Mathematical Analysis of AGV Deployment and Routing," Port of Singapore Authority (1996–1997), with David Simch-Levi (PI).

"Production Planning and Control for Rockford Powertrain," Rockford Powertrain, Rockford, IL (1996–1997).

"Monte Carlo Evaluation of Multiple Comparison Procedures Used in Computer Simulation Experiments," Ohio Supercomputer Center Grant #PAS811-1 (1993).

"Multiple Comparisons for Optimization via Simulation," National Science Foundation Grant No. DDM-8922721 (1990–1994), with J. C. Hsu.

"Analysis of Equipment Sequencing and Tracking Systems for Switching Manufacturing at AT&T Columbus," AT&T-Ohio State Task Order Agreement (1991), with C. H. Reilly.

"Combined Variance Reduction and Output Analysis in Stochastic Simulation," National Science Foundation Grant No. ESC-8707634 (1987–1989).

"Toward Algorithmic Application of Variance Reduction in Simulation Experiments," Office of Research and Graduate Studies, The Ohio State University (1985–1986).

- **Professional Affiliations**

Association for Computing Machinery

American Statistical Association

Institute of Industrial Engineers (Fellow)

Institute for Operations Research and the Management Sciences (Fellow)

Omega Rho

- **Research Awards**

2022 Outstanding Simulation Publication Award from the INFORMS Simulation Society for the paper "Plausible Screening Using Functional Properties for Simulations with Large Solution Spaces," *Operations Research* **70** (2022), 3473–3499. with D. J. Eckman and M. Plumlee.

2019 David F. Baker Distinguished Research Award from the Institute of Industrial and Systems Engineers.

Honorable Mention, Best Theory Paper 2019 Winter Simulation Conference, for Morgan, et al. "A Spline-based Method for Modelling and Generating a Nonhomogeneous Poisson Process."

2015 Outstanding Simulation Publication Award from the INFORMS Simulation Society for the papers "A Bayesian Framework for Quantifying Uncertainty in Stochastic Simulation," *Operations Research* **62** (2014), 1439–1452, and "Quantifying Input Uncertainty via Simulation Confidence Intervals," *INFORMS Joural on Computing* **26** (2014), 74–87, both with W. Xie and R. R. Barton.

Best paper, Operations, of *IIE Transactions* for "Empirical Stochastic Branch and Bound for Optimization via Simulation," *IIE Transactions* **45** (2013) 685–698, with W. L. Lu.

2013 Outstanding Simulation Publication Award from the INFORMS Simulation Society for the paper "Stochastic Kriging for Simulation Metamodeling," *Operations Research* **58** (2010), 371–382, with B. E. Ankenman and J. Staum.

Best paper, Operations, of *IIE Transactions* for "Fully Sequential Selection Procedures with Control Variates," *IIE Transactions* **42** (2009), 71–82, with S. C. Tsai.

Best paper, Operations, of *IIE Transactions* for "Selecting the Best System when Systems are Revealed Sequentially," *IIE Transactions*, **39** (2007), 723–734, with L. J. Hong.

"Methods for Selecting the Best System," *Proceedings of the 1991 Winter Simulation Conference*, 177–186, selected as one of 10 Landmark Papers from the first 40 years of the conference.

2006 Outstanding Simulation Publication Award from the INFORMS Simulation Society for the paper "Using Ranking & Selection to 'Clean Up' after Simulation Optimization," *Operations Research* **51** (2003), 814–825, with J. Boesel and S.-H. Kim.

Research Award, Operations Research Division of IIE (1997). This is a career research award.

First Place, Institute of Industrial Engineers Graduate Research Award (1982).

- **Teaching Awards**

Cole-Higgins Award for Teaching Excellence, McCormick School of Engineering and Applied Science, Northwestern University (2021–2022).

IISE Modeling & Simulation Division Award for Excellence in Teaching (2019).

McCormick School of Engineering and Applied Science Teacher of the Year Award, Northwestern University (1997-1998, 2006–2007).

IIE Operations Research Division Award for Excellence in the Teaching of Operations Research (2004).

Northwestern Alumni Association Excellence in Teaching Award (2003).

ASG Faculty Honor Roll, Northwestern University (2002, 2003, 2007).

Senior Choice Award: Outstanding Professor, given by the IEMS Senior Class of 2001.

Graduate Teaching Award, Student INFORMS Chapter, Department of Industrial Engineering and Management Sciences, Northwestern University (1995–1996, 1996–1997, 1997–1998, 1999–2000, 2000–2001, 2002–2003, 2005–2006, 2006–2007, 2012–2013).

Honorable mention, McCormick School of Engineering and Applied Sciences Teacher of the Year Award, Northwestern University (1996-97).

Alumni Award for Distinguished Teaching, a university-wide award from The Ohio State University (1994). This is the highest award for teaching given by the university; includes induction into the OSU Academy of Teaching.

Charles E. MacQuigg Award for Outstanding Teaching, a college-wide award from the College of Engineering, The Ohio State University (1992).

Alpha Pi Mu Outstanding Faculty Award, voted by the Department of Industrial and Systems Engineering seniors, The Ohio State University (1989, 1995).

- **Other Honors and Awards**

2022 Lifetime Professional Achievement Award from the INFORMS Simulation Society.

Fellow, Institute of Industrial Engineers (2011).

Fellow, Institute for Operations Research and the Management Sciences (2005).

McCormick Excellence Award, Robert R. McCormick School of Engineering and Applied Science (2006).

INFORMS College on Simulation Distinguished Service Award (2003).

General Electric Graduate Fellowship (1981–1982).

Purdue University Graduate Fellowship (1979–1981).

B.A. Summa Cum Laude, Phi Beta Kappa (1979).

- **Invited Presentations**

Plenary Lectures

Keynote Lecture, INFORMS Simulation Society Workshop, Hong Kong, July 2024

Keynote Lecture, INFORMS Annual Meeting, November 2020.

Plenary Lecture, 13th International Conference in Monte Carlo & Quasi-Monte Carlo Methods in Scientific Computing, Rennes, France, July 2018.

Alan B. Pritsker Scholars Distinguished Lecture, Purdue University, April 2018.

Keynote address, Winter Simulation Conference, December 2017.

Keynote address, Operations Research Society 7th Simulation Workshop, Worcestershire, England, April 2014.

Titans of Simulation Lecture, Winter Simulation Conference, December 2013.

Omega Rho Distinguished Lecture, INFORMS Annual Meeting, November 2011.

Keynote speaker, Asian Simulation and Modeling Conference, Bangkok, Thailand, January 2009.

Keynote speaker, IIE Annual Conference and Expo, Vancouver, Canada, May 2008.

Plenary speaker, 2007 INFORMS Simulation Society Workshop, Fontainebleau, France, July 2007.

Keynote speaker, International Workshop on Mathematical Methods and Tools in Computer Simulation, St. Petersburg, Russia, May 1994.

U.S. Universities

Air Force Institute of Technology, Arizona State, Arkansas, Auburn, Carnegie Mellon, Central Florida, Cornell, DePauw, George Mason, Georgia Tech, Illinois, Iowa State, Maryland, Michigan, Minnesota, Missouri University of Science & Technology, MIT, Naval Postgraduate School, North Carolina State, Northeastern, Northwestern, Ohio State, Oklahoma State, Penn State, Pittsburgh, Purdue, Rochester Institute of Technology, Virginia Tech, Texas A&M, Texas-Austin, Wisconsin-Madison

International Universities

Cambridge (England), Lancaster (England), Loughborough (England), Southampton (England), Chinese University of Hong Kong, City University of Hong Kong, Hong Kong University of Science & Technology, Hong Kong Polytechnic University, Vrije Universiteit Amsterdam (Netherlands), Tilburg (Netherlands), Université de Montréal (Canada), INSEAD (France), Dagstuhl (Germany), Shanghai Jiao Tong (China), Asian Institute of Technology (Thailand), Chulalongkorn (Thailand), Kasetsart (Thailand)

Non-academic

Amazon, General Motors R&D, Imperial Oil, MITRE Corporation, Norwegian Defense Establishment, SAS Institute, Simio LLC

- **Software Contributions**

  Ranking-and-selection algorithms included in commercial simulation software products Arena, OptQuest and Simio.

  Shapley effects algorithms included in CRAN R package "sensitivity."

  Co-author with X. Jiang of input-model averaging CRAN R package "FMAdist."

  Input uncertainty algorithms included in commercial software Simio.

  MORE plot included in commercial software Simio and Simul8.

- **National and International Service (selected)**

  Member, INFORMS Simulation Society Lifetime Professional Achievement Award Committee (2023–present).

  Member, INFORMS Joint National Meeting Keynote Selection Committee (2023).

  Member, Philip McCord Morse Distinguished Lecturership Award Selection Committee of INFORMS (2019).

  Member, *Operations Research* Editor-in-Chief selection committee (2017).

  Member, NSF Sponsored Working Group on Operations Research Response to the NAE Grand Challenges (2012–2013).

  Vice-President (2010–2011), President (2012–present) of the Association of Chairs of Operations Research Departments (ACORD).

  Co-organizer, "Accelerating Industrial Productivity via Deterministic Computer Experiments and Stochastic Simulation Experiments," Isaac Newton Institute for Mathematical Sciences, September 5–9, 2011.

  Trustee, Winter Simulation Conference Foundation (2008–2012).

  Co-organizer, NSF Workshop on Simulation Optimization, May 24–25, 2010.

  Area Editor, *Surveys in Operations Research and Management Science* (2009–2011).

  Editor-in-Chief, *Naval Research Logistics* (2006–2008).

  External reviewer for Department of Management Science and Engineering, Stanford (2017), Department of Industrial and Manufacturing Engineering, Penn State (2013); Operations Research and Industrial Engineering Program, Texas-Austin (2013); Mathematics Department, College of William & Mary (2009); Department of Operational Sciences, Air Force Institute of Technology (2008).

  Board Member representing INFORMS, Winter Simulation Conference Board of Directors (2000–2007).

  Past Simulation Area Editor for *Operations Research*; past Associate Editor for *ACM Transactions on Modeling and Computer Simulation*; past Associate Editor for *Naval Research Logistics* and *Operations Research*.

Program Chair, 1997 Winter Simulation Conference; Associate Program Chair, 1996 Winter Simulation Conference; Track Coordinator, 1993 Winter Simulation Conference; Proceedings Editor, 1991 Winter Simulation Conference; Publicity Chair, 1989 Winter Simulation Conference.

President (1992–1994), Vice-President (1990–1992), Secretary-Treasurer (1988–90) and *Newsletter* Editor (1986–1988) of The Institute of Management Sciences College on Simulation (now INFORMS Simulation Society).

National Science Foundation review panel (1990, 1992, 2000, 2001, 2003, 2004, 2009, 2010, 2012); proposal reviewer for the National Science Foundation (1987, 1989, 1990, 1991, 1996).

INFORMS Simulation Society Lifetime Professional Achievement Award Committee (2011–present), INFORMS Simulation Society Outstanding Publication Committee (2002–2004), INFORMS Simulation Society Outstanding Service Award Committee (2005–2007), INFORMS Impact Prize Committee (2004). Nicholson Prize Committee (1996).

Book reviewer for *Journal of the American Statistical Association* **84**, p. 334 (1989).

Book reviewer for *Journal of Quality Technology* **21**, p. 291–292 (1989).

Book reviewer for Macmillan, Addison-Wesley, McGraw-Hill and West Educational Publishing, and Princeton University Press.

- **Local Service Northwestern (selected)**

Undergraduate Studies Committee (2020–2023).

Client Project Challenge Committee (2017–2019).

Director of Graduate Studies (2016–2017).

MMM Director search committee member, 2009–2010.

Chair, Patterson Chair in Transportation search committee (2006–2007)

Program Review Subcommittee member (2006)

McCormick Promotion and Tenure Committee (2001–2008, 2016–2017)

IEMS Steering Committee (2002–2007)

IEMS Strategic Planning Committee (2003–2004)

Director, Master of Engineering Management Program (1998–2007)

MEAS Future Planning Committee member (1997–1999)

MEAS Engineering First Committee member (1995–1997)

IEMS Undergraduate Curriculum Committee member (1995–1998)

IEMS Graduate Committee member (1996–2002)

IEMS Program Review Committee Chair (1996–1997)

- **Local Service Ohio State (selected)**

Graduate Studies Co-chair, Department of Industrial, Welding and Systems Engineering (1994–1995).

Consolidated Chair Search Committee, Department of Industrial, Welding and Systems Engineering (1994).

College of Engineering Computing Committee (1992–1993).

Department of Industrial and Systems Engineering Nominating Committee for Promotion and Tenure (1990, 1991, 1993).

Chair, Department of Industrial and Systems Engineering Computing Committee (1990–1991).

Chair, Department of Industrial and Systems Engineering Self-Study Committee for Program Review (1988–1990).

Chair, Department of Industrial and Systems Engineering Seminar Series (1987–1988).

Department representative for Graduate and Professional Schools Visitation Day for Minority Students (1985).

- **Postdoc, Graduate and Undergraduate Student Advising**

Ph.D.s and Postdocs (placement)

Graham Laidler, "Simulation Analytics for Deeper Comparisons," Spring 2023 (TRAFFIC Wildlife Conservation Programme).

Linda Pei, "Novel Parallel Adaptive Survivor Selection Framework for Large-Scale Simulation Optimization," Spring 2022, (postdoc University of Texas-Austin).

David Eckman (postdoc), Spring 2021 (Texas A&M University).

Mark Semelhago, "Computational Aspects of Discrete Optimization via Simulation with Gaussian Markov Random Fields," Fall 2020 (Amazon).

Xi Jiang, "Reducing and Measuring Input Model Risk in Stochastic Simulation," Fall 2020 (SAS Institute).

Luke Rhodes-Leader, "Multi-Fidelity Modelling Approach for Airline Disruption Management using Simulation," Spring 2020 (Lancaster University).

Lucy Morgan, "Quantifying and Reducing Input Modelling Error in Simulation," Fall 2018 (*The Doctoral Award 2019 from the OR Society of the UK*; Lancaster University).

Huiyin Ouyang (postdoc), Summer 2017 (University of Hong Kong).

Eunhye Song, "Incorporating Input Model Risk in Simulation Optimization and Uncertainty Quantification," Spring 2017 (Penn State University).

Yujing Lin, "Simulation Analytics for Input Uncertainty & Virtual Statistics," Spring 2017 (Amazon Research).

Wei Xie, "Statistical Uncertainty Analysis for Stochastic Simulation," Spring 2014 (Northeastern University).

Peter Salemi, "Gaussian Markov Random Fields and Moving Least Squares for Metamodeling and Optimization in Stochastic Simulation," Summer 2014 (MITRE Corporation).

Xi Chen, "Enhancing Stochastic Kriging Metamodels for Computer Simulation," Summer 2012 (Virginia Tech).

Mustafa Tongarlak, "Design of Experiments and Metamodeling for Stochastic Simulation," Winter 2011 (Bogazici University, Turkey).

Soonhui Lee, "Modeling Issues and Algorithms for a Class of Optimization Problems and Improving Fleet Utilization for Carriers," Fall 2011 (Hankuk University of Foreign Studies, South Korea).

Ming Liu, "Efficient Simulation in Financial Risk Management," Summer 2010 (Magnetar).

Hai Lan, "Two-Level Simulation of Expected Shortfall: Confidence Intervals, Efficient Simulation Procedures, and High-Performance Computing," Summer 2010 (Shanghai Jiaotong University, China).

Jie Xu, "Flexibility, Lifecycle Planning and Simulation-based Optimization in Integrated Supply Chains," Fall 2009 (George Mason University).

Wendy L. Xu, "Flexibility, Lifecycle Planning and Simulation-based Optimization in Integrated Supply Chains," Fall 2009 (ExxonMobil R&D).

Ira Gerhardt, "Stochastic Modeling and Simulation of Nonstationary Queueing Networks Using Markovian Processes," Spring 2009 (Manhattan College).

Shing Chih Tsai, "Control-Variate Methods for Selecting the Best Simulated System," Summer 2007 (National Cheng Kung University, Taiwan).

Feng Yang, "Efficient Generation of Cycle-Time Throughput Curves via Simulation for Manufacturing," Spring 2006 (West Virginia University).

Hong Wan, "Simulation Factor Screening with Controlled Sequential Bifurcation," Summer 2004 (*Third Place Pritsker Dissertation Award from IIE*, North Carolina State University).

L. Jeff Hong, "Discrete Optimization via Simulation: Algorithms and Error Control," Spring 2004 (Fudan University, China).

Juta Pichitlamken, "A Combined Procedure for Optimization via Simulation," Spring 2002 (*Honorable mention Dantzig Award from INFORMS*, Kasetsart University, Thailand).

Bahar Biller, "A Comprehensive Input-Modeling Framework and Software for Stochastic, Discrete-Event Simulation Experiments," Summer 2002 (Carnegie Mellon University).

Seong-hee Kim, "Highly Efficient Selection Procedures for Computer Simulation," Spring 2001 (Georgia Tech).

Justin Boesel, "Search and Selection for Large-Scale Stochastic Optimization," Spring 1999 (*Dantzig Award winning dissertation from INFORMS*, MITRE Corporation).

J. O. Miller, "Efficient Multinomial Selection in Simuation," Winter 1997 (Air Force Institute of Technology).

Marne C. Cario, "Modeling and Generating Dependent Inputs for Discrete-Event Simulation," Spring 1996 (Delphi Packard Electric Systems).

Yu-Hui Tao, "A Framework for Computer-Assisted Simulation Experiment Design and Analysis," Summer 1995 (National University of Kaohsiung, Taiwan).

Frank J. Matejcik, "Heteroscedastic Multiple Comparison Procedures for Computer Simulation," Autumn 1992 (South Dakota School of Mines and Technology).

Mingjian Yuan, "Time-Series-Analysis Methods for a Single System and Multiple Comparisons in Steady-State Simulation," Autumn 1991 (National Yuanlin Institute of Technology, Taiwan).

Wei-Ning Yang, "Multivariate Estimation and Variance Reduction for Terminating and Steady-State Simulation," Summer 1989 (National Taiwan Institute of Technology, Taiwan).

M. S. (thesis) Students

Anthony Sharon, "The Effectiveness of Jackson Networks as Control Variates for Queueing Network Simulation," Winter 1986.

Rowena Añonuevo, "Automated Estimation and Variance Reduction via Control Variates for SIMSCRIPT II.5 Simulations," Autumn 1987.

Mingjian Yuan, "Efficient Closed-Queueing Network Simulation Using CAN-Q Control Variates and Stochastic Initialization," Spring 1987.

Yu-Hui Tao, "A Standard Simulation Test Bed for Testing Simulation Procedures," Spring 1989.

Lynne Goldsman, "Batching Strategies for Multiple Comparisons in Steady State Simulation," Spring 1990.

Senior Honors Thesis Students

Donald P. Warsing, "Generation of Acceptance Sampling Plans for Time-Dependent Processes," Spring 1989.

J. David Dittmann, "Evaluation of Heteroscedastic Multiple Comparison Procedures," Winter 1995.

Jamie Wieland, "Odds-Ratio Indifference-Zone Selection Procedures for Bernoulli Populations," Spring 2001.

Carl Allen, "The Impact of Network Topology On Rational-Function Models of the Cycle Time-Throughput Curve," Spring 2004.

Yixian (Amy) Wang, "Myths of STEM Major Shortage: How Does Secondary Education Impact Students' Choice of Graduating Majors?" Spring 2020.

- **Courses Taught**
  - **Northwestern University**
    Masterclass: Ranking & Selection for Simulation Optimization `http://users.iems.northwestern.edu/~nelsonb/RSMasterclass.html`

    IEMS 303 Statistics
    IEMS 304 Statistical Methods for Data Mining
    IEMS 315 Stochastic Models and Simulation
    IEMS 317 Discrete-Event Systems Simulation
    IEMS 394 Client Project Challenge
    IEMS 435 Introduction to Stochastic Simulation
    IEMS 415 Computer Simulation for Risk and Operations Analysis
    IEMS 460-1 Stochastic Models I
    IEMS 465 Simulation Design and Analysis
    IEMS 490 Optimization via Simulation
  - **City University of Hong Kong**
    A Graduate-Level Introduction to Stochastic Simulation, October 2014.
  - **Lancaster University**

Masterclass Experiment Design & Analysis for Dynamic, Stochastic Simulation, December 2012, March 2015, March 2016, March 2017, March 2018

STOR 606 Stochastic Simulation, Fall 2019, Fall 2020, Fall 2021

– **The Ohio State University**

IND ENG 513 Applied Waiting Line Analysis

IND ENG 534 Principles of Industrial Engineering

IND ENG 554 Introduction to Discrete System Simulation (undergraduate)

IND ENG 703 Stochastic Processes Used in Systems Engineering I

IND ENG 704 Introduction to Discrete System Simulation (graduate)

IND ENG 814 Stochastic Processes Used in Systems Engineering II

IND ENG 843 Operations Research II

IND ENG 854 Advanced Simulation Design and Experimental Procedure

IND ENG 881 Seminar in Industrial Engineering

IND ENG 900.03 Seminar in Operations Research: Statistical Methods and Analysis of Statistical Methods for Dynamic Simulation

IND ENG 900.03 Seminar in Operations Research: Input Modeling

– **University of Minnesota**

SciC 8003 Modeling, Optimization and Statistics

– **Purdue University**

IE 190 Introduction to Industrial Engineering

IE 230 Statistical Control I

IE 231 Computers and Computer Methods

– **Indiana Vocational-Technical College**

STATISTICS 8210 Introduction to Statistics