

Exponent®
Engineering & Scientific Consulting

Nathan Soderborg, Ph.D., CRE, CSSBB

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Professional Profile

Dr. Soderborg provides consulting services related to quality, statistics, risk analysis, process improvement, reliability engineering, and mathematical modeling. His experience spans product development, testing, manufacturing, data analytics, and operations across a variety of industries.

Dr. Soderborg works with organizations proactively to assess existing practices and instill systems that improve product and process quality. He provides analysis for quality defense and the demonstration of due diligence in management of product and process risk. He uses statistics and data science to quantify risks and investigate and solve manufacturing and operational problems.

His work in statistics includes analysis of field, warranty, and survey data, reliability and hazard analysis, sampling plans, regression, response surface modeling (RSM), statistical process control (SPC), and design of experiments (DOE) — with a special emphasis on design and analysis of computer experiments (DACE). He has an extensive background in process improvement and failure mode avoidance methods, including Six Sigma, Failure Mode and Effects Analysis (FMEA), Robust Design, and Design for Reliability.

As a Six Sigma Master Black Belt at Ford Motor Company, Dr. Soderborg was a primary architect of the company's Design for Six Sigma (DFSS) methodology and deployment. DFSS helps organizations respond to the voice of the customer (VOC), analyze product risks, and prevent failure modes through application of state-of-the art engineering and statistical methods. At Ford, Dr. Soderborg led teams of certified Black Belts in solving problems related to current and future vehicle programs. He trained engineers, mentored management, conducted design reviews, and institutionalized lessons learned across the company. He served as technical chair of the committee that championed analytic reliability and robustness methods and supervised development of software for design and analysis of computer experiments as well as variation simulation analysis based on Monte Carlo simulation.

Dr. Soderborg is an experienced developer of statistical engineering training and has taught multiple courses related to product quality and reliability improvement methods. The American Society for Quality included Dr. Soderborg as a principal author and developer in the team that produced the Society's 5-day DFSS training course. His research has focused on how to make practical improvements in product development through the effective use of checklists, system engineering, lean failure mode avoidance, and robustness optimization.

Academic Credentials & Professional Honors

M.S., Engineering and Management, Massachusetts Institute of Technology (MIT), 2001

Ph.D., Mathematics, University of Michigan, Ann Arbor, 1991

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B.S., Mathematics, Brigham Young University, 1986

President, Detroit Section of the American Statistical Association, 2016

Outstanding Oral Presentation Award, SAE World Congress, April 13-15, 2010

U.S. Department of Education Graduate Fellowship, 1989-1991

Guest Researcher, University of Helsinki, sponsored by National Science Foundation, 1989

Phi Kappa Phi

Spencer W. Kimball Presidential Scholarship, BYU, 1981-1986

National Merit Scholarship Finalist, 1981

Licenses and Certifications

Six Sigma Black Belt Certification (CSSBB)

ASQ Certified Reliability Engineer (CRE)

Prior Experience

Six Sigma Master Black Belt and Supervisor, Ford Motor Company, 1994-2009

Chief Technical Officer, Nexus QPS, 2007-2009

Consultant, Decision Consultants, 1991-1994

Professional Affiliations

American Society for Quality—ASQ (senior member)

American Statistical Association—ASA

Society for Industrial and Applied Mathematics—SIAM

Society of Automotive Engineers—SAE

Patents

Patent 7,219,068: Method and System for Product Optimization, May 15, 2007 (with C. Zelek, J. King, M. Vora, T. Brockers).

Patent 6,931,366: Method and Apparatus for Analyzing a Design, August 16, 2005 (with S. Wang, A. Sudjianto, D. Buche, D. Li, M. Vora, S. Jiang, X. Liu).

Patent 5,361,628: System and Method for Processing Test Measurements from a Combustion Engine for Diagnostic Purpose, November 7, 1994 (with K. Marko and B. Bryant).

Patent 5,305,635: System and Method for Filtering a Misfire Detection Data Stream to Yield Optimum Measurement of Misfire Rate, April 26, 1994 (with J. James and T. Feldkamp).

Publications

Soderborg N. 5 whys: five questions posed to a lean & six sigma leader. Lean & Six Sigma Review, November 2022; 32.

Soderborg N. Better before bigger data. Six Sigma Forum Magazine February 2017; 5-7.

Product Quality Outcomes Analytics Working Group (incl. Soderborg N). Feasibility and effectiveness of analytics for medical device product quality outcomes. Medical Device Innovation Consortium Case for Quality Program, September 2016; http://mdic.org/cfq/resource-center-for-sustained-quality.

Soderborg N, Use (and misuse) of statistics and data management in toxic tort cases. DRI Annual Meeting, Proceedings p. 489-506, October 2015.

Soderborg N, Walsh M, McEntire S. Use of statistics in the courtroom: Views of two lawyers and a scientist. 2014 Annual Meeting of the Federation of Defense and Corporate Counsel, Products Liability Section, July 29, 2014.

Lange R, Jacuzzi E, Soderborg N, Pearce H. Injury mitigation technology applications and the relationships to vehicle mass, price, and fuel economy. 22nd International Technical Conference on the Enhanced Safety of Vehicles (ESV), Paper 11-0114, 2011.

Lange R, Soderborg N, Pearce H, Balavich K, Huang S. Side impact airbag efficacy, injury mitigation performance in vehicle models with and without side impact air bags and inflatable head protection. 22nd International Technical Conference on the Enhanced Safety of Vehicles (ESV), Paper 11-0115, 2011.

Balavich K, Soderborg N, Lange R, Pearce H. Deployment characteristics of seat mounted side impact airbags. 22nd International Technical Conference on the Enhanced Safety of Vehicles (ESV), Paper 11-0358, 2011.

Soderborg N. Statistical significance: Principles for application of statistics in litigation. Michigan Defense Trial Counsel e-letter, Issue No. 4, January 2011.

Soderborg N. The role of design for six sigma in successful product development. SAE World Congress 2010; SAE-2010-01-0711. (Presented as a technical keynote).

Singh J, Jugulum R, Soderborg N, Whitney DE, Frey DD. Streamlining robust parameter design efforts. J Des Res 2007; 5:435-448.

Singh J, Frey DD, Soderborg N. Noise strategy in robust design: What aspects of noise factors are important in quality engineering? Qual Eng 2006; 18:367-377.

Singh J, Frey DD, Soderborg N, Jugulum R. Compound noise: Evaluation as a robust design method. Qual Reliab Eng Int 2007; 23:387-398.

Soderborg N. Challenges and approaches to design for six sigma in the automotive industry. SAE World Congress 2005; SAE-2005-01-1211.

Thomas R, Soderborg N, Borders S. Using CAE to find and avoid failure modes: A steering wheel "nibble" case study. SAE World Congress 2005; SAE-2005-01-1399.

Farooq I, Pinkerton J, Abramczyk J, Barnes E, Culbertson P, Gearhart C, Pan L, Soderborg N, Yang H, Weishaar J. Model of IIHS side impact torso response measures using transfer function equations. SAE World Congress 2005; SAE-2005-01-0291.

Soderborg N. Design for six sigma at Ford. Six Sigma Forum Mag Nov 2004; 15-22.

Soderborg N, Crawley EF, Dori D. System function and architecture: OPM-based definitions and operational templates. Communications of the ACM 2003; 46:67-72.

Soderborg N. Representing systems through object-process methodology and axiomatic design. Master's Thesis, Massachusetts Institute of Technology, 2002.

Soderborg N. A characterization of domains quasiconformally equivalent to the unit ball. Michigan Math J 1994; 41:363-370.

Soderborg N. An ideal boundary for domains in n-space. Ann Acad Sci Fenn (Annals of the Finnish Science Academy) Series A. I. Mathematica 1994; 19:147-165.

Soderborg N. Quasiregular mappings with finite multiplicity and Royden algebras. Indiana University J Math 1991; 40:1143-1167.

Soderborg N. Quasiregular mappings and Royden algebras. Ph.D. Thesis, University of Michigan, 1991.

Presentations

Soderborg N., Brown T., Acceptance Sampling: A Tutorial, American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 25, 2025.

Soderborg N., Striving Toward a High Reliability Organization by building on a Lean Six Sigma Foundation, American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 19, 2024.

Soderborg N., Statistical Problem Solving in Industry: The People Side of the Process, Quality Productivity and Research Conference, Houston TX, June 6, 2023.

Soderborg N., Brown T., Practical Principles for Test Planning and Sampling, American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 27, 2023.

Soderborg N., Brown T., Gage R&R Re-examined: When is a measurement system acceptable? American Society for Quality Ann Arbor Section meeting, Ann Arbor MI, March 7, 2022.

Soderborg N., Brown T., Gage R&R Re-examined: When is a measurement system acceptable? American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, March 1, 2022.

Soderborg N. Better before Bigger Data: Laying a Foundation for Successful Analytics. Detroit Chapter, American Statistical Association, Detroit, MI, April 12, 2021.

Soderborg N., Maximizing Insight from Data Mining and Analysis through Traceability. American Society for Quality Lean and Six Sigma Conference, Virtual Conference, March 2, 2021.

Soderborg N., Brown T., Telling Effective Stories with Quality Dashboards, Quality 4.0 Summit, Virtual Conference, September 29, 2020.

Soderborg N., Analytics in Manufacturing Troubleshooting: A Case Study. American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 25, 2020.

Soderborg N., Brown T., Operational and Analytic Dashboards: Visualizing Complex Organizational Data. American Society for Quality, Quality 4.0 Summit, Dallas TX, November 19, 2019.

Soderborg N., Harnessing the Power of Data: It’s about Finding and Telling Stories-“Q-talk.” American Society for Quality, Quality 4.0 Summit, Dallas TX, November 19, 2019.

Soderborg N., Preventing Failures in Major Projects: FMEA and Supporting Tools-workshop. Stanford Center for Professional Development Project Leadership Institute: Delivering High-Risk Complex Projects, Fermi National Accelerator Laboratory, September 12, 2019.

Soderborg N., Better before Bigger Data: Laying a Foundation for Successful Analytics. Best Practices for Operational Excellence Conference, Columbus, Ohio, September 11, 2019.

Soderborg N. Using Warranty Data in Problem Solving: The Basics. American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, March 5, 2019.

Soderborg N. Good vs. Big Data: Laying a Foundation for Successful Analytics. American Society for Quality Ann Arbor Section meeting, Ann Arbor MI, February 4, 2019.

Soderborg N. Good vs. Big Data: Laying a Foundation for Successful Analytics. American Society for Quality, Quality 4.0 Summit, Dallas TX, November 12, 2018.

Soderborg N. Quality's Big Data Leadership Role-"Q-Talk." American Society for Quality, Quality 4.0 Summit, Dallas TX, November 12, 2018.

Soderborg N. Good vs. Big Data: How Data Quality Affects Project Success. American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 26, 2018.

Soderborg N. Good vs. Big Data: How Data Quality Affects Project Success. American Society for Quality Enterprise Presentation Series (webinar), February 20, 2018.

Soderborg N. Introduction to design & analysis of computer experiments. American Society for Quality Lean and Six Sigma Conference, Phoenix AZ, February 28, 2017.

Soderborg N. Statistics in the courtroom. Kentucky Defense Counsel Young Lawyers Section Continuing Legal Education Seminar, Lexington KY, September 7, 2016.

Soderborg N. Statistics in the courtroom. Minnesota Defense Lawyers Association Trial Techniques Seminar, Duluth MN, August 19, 2016.

Soderborg N. Statistics in the courtroom. Wisconsin Defense Counsel Summer Conference, Wisconsin Dells WI, August 4, 2016.

Soderborg N. Checklists for designing in quality: fundamental tools for DFSS. American Society for Quality Lean and Six Sigma Conference, Phoenix, AZ, March 1, 2016.

Soderborg N. How data analysis and visualization helped solve a product launch quality crisis. American Society for Quality section meeting, Ann Arbor, MI, November 2, 2015.

Soderborg N. Learning from an innovation crisis: checklists to ensure quality and guide analysis. American Statistical Association Spring Research Conference, Cincinnati, OH, May 21, 2015.

Soderborg N. Following data from the factory floor: a root cause and validation journey. Detroit Chapter, American Statistical Association, Detroit, MI, October 14, 2014.

Soderborg N. Statistics for litigators: Principles for application. Lucas County Bar Association, Toledo, OH, April 21, 2014.

Soderborg N. Statistics for litigators: Principles for application. Ohio Association of Civil Trial Attorneys CLE Webinar, March 26, 2014.

Soderborg N. Statistics in the courtroom: What they mean and what they don't. Illinois Association for Defense Trial Counsel Young Lawyers Division, CLE Program, November 16, 2012.

Soderborg N. Statistics in the courtroom: Applications for litigation. Kansas Association of Defense Counsel, 2011 Annual Conference, Kansas City, MO, December 3, 2011.

Soderborg N. Principles for application of statistics in litigation (and elsewhere). Michigan Defense Trial Counsel, 2010 Winter Meeting, Troy, MI, November 5, 2010.

Soderborg N, Huang S, Pearce H, Balavich K, Lange R. An estimate of side impact air bag effectiveness in fatality reduction. SAE 2010 Government/Industry Meeting, Washington, D.C., January 26-29, 2010.

Pearce H, Soderborg N, Balavich K, Lange R. Injury control technology insertion patterns during 1998 to 2000. SAE 2010 Government/Industry Meeting, Washington, D.C., January 26-29, 2010.

Soderborg N. What six sigma can teach us about improving reliability engineering. 14th Annual International Conference on Industrial Engineering Theory, Applications & Practice, Anaheim, CA, October 18-21, 2009.

Soderborg N. Design and analysis of computer experiments. Workshop, WCBF 4th Annual Design for Six Sigma Conference, Las Vegas, NV, February 9-11, 2009.

Soderborg N. Lean product development. WCBF 4th Annual Design for Six Sigma Conference, Las Vegas, NV, February 9-11, 2009.

Soderborg N. Implementing structures and processes for lean six sigma in product development. WCBF Global Lean, Six Sigma and Business Improvement Summit, Orlando, FL, October 15, 2008.

Soderborg N. DFSS in product development: Does one size fit all? American Society for Quality section meeting, Ann Arbor, MI, November 5, 2007.

Soderborg N. Measuring the financial and non-financial benefits of DFSS. WCBF Global Six Sigma Summit, Las Vegas, NV, October 25, 2007.

Soderborg N. Design and analysis of computer experiments: DFSS applications at Ford. Ford Computer-Aided Optimization and Robustness Conference, Dearborn, MI, September 27, 2007.

Soderborg N. Transfer functions: Where do they come from? Marcus Evans 4th Annual Design for Lean Six Sigma Conference, New Orleans, LA, January 15-17, 2007.

Soderborg N. DFSS in product development: Does one size fit all? WCBF 2nd Annual Design for Six Sigma Conference, Las Vegas, NV, September 13-14, 2006.

Soderborg N. DFSS tools for failure mode avoidance. Marcus Evans Design for Six Sigma Conference, Memphis, TN, January 17-18, 2006.

Singh J, Frey DD, Soderborg N. Evaluating compound noise as a method to improve robustness. ASME International Design Engineering Technical Conference & Computers and Information in Engineering Conference, IDETC2005-84828, Long Beach, CA, September 24-28, 2005.

Soderborg N. Using design for six sigma to drive scientific and statistical engineering. John Deere 2005 Six Sigma Conference: Driving Results with Six Sigma, Moline, IL, May 10, 2005.

Soderborg N. DFSS: The right tools at the right time. International Quality & Productivity Center Six Sigma Summit, Miami, FL, January 27-28, 2004.

Soderborg N. Integrating design for six sigma with your six sigma initiative. International Quality & Productivity Center Six Sigma Summit, Miami, FL, January 21-22, 2003.

Soderborg N, Crawley EF, Dori D. System definition for axiomatic design aided by object-process methodology. 2nd International Conference on Axiomatic Design, Cambridge, MA, June 10-11, 2002.

Lee J, Li D, Liu X, Sudjianto A, Vora M, Wang, S, Soderborg N. An approach to robust design employing computer experiments. 27th Design Automation Conference—ASME Design Engineering Technical Conferences, Pittsburgh, PA, September 9-12, 2001.

Liu X, Soderborg N. Improving an existing design based on axiomatic design principles. 1st International Conference on Axiomatic Design, Cambridge, MA, June 21-23, 2000.

Li D, Liu X, Sudjianto A, Vora M, Wang S, Soderborg N. An approach for computer experiment based robust design. 5th Society of Science and Applied Technology International Conference on Reliability & Quality in Design, Las Vegas, NV, August 11-13, 1999.

Soderborg N. Applications and challenges in probabilistic and robust design based on computer modeling. Spring Research Conference on Statistics in Industry and Technology, Minneapolis, MN, June 2, 1999.

Soderborg N, James J, Marko K. The geometric moving average in OBD-II misfire detection. On-Board Diagnostic Technologies section, SAE International Congress and Exposition, Detroit, MI, February 28, 1994.

Soderborg, N. A characterization of domains quasiconformally equivalent to the unit ball. American Mathematical Society/Mathematical Association of America Winter Meeting, Cincinnati, OH, January 15, 1994.

Marko K, Bryant B, Soderborg N. Process control and diagnostics: An evolutionary approach based on adaptive learning. U.S.-Korea Vibration Engineering Conference, Korea Advanced Institute of Technology, March 1993.

Marko K, Bryant B, Soderborg N. Neural network application to comprehensive engine diagnostics. IEEE International Conference on Systems, Man, and Cybernetics, Chicago, IL, October 1992.

Editorships & Editorial Review Boards

Editorial Review Board member, ASQ's Lean & Six Sigma Review magazine, 2016-present