

Michael D. Siegel
Principal Research Scientist
Director Cybersecurity at MIT Sloan
Sloan School of Management
Massachusetts Institute of Technology
Cambridge, MA 02139
(617) 620-6294 (m)
msiegel@mit.edu

Education

- 1989 Ph.D. in Computer Science, Boston University, Boston, MA.
- 1985 M.A. in Computer Science, Boston University, Boston, MA.
- 1980 M.S. in Engineering, Department of Mechanical Engineering, University of Wisconsin-Madison.
- 1977 BS in Engineering, Trinity College, Hartford, CT.

Academic and Research Positions

- 2016- Director, Cybersecurity at MIT Sloan
- 1993- Principal Research Scientist, Sloan School of Management, Massachusetts Institute of Technology. Research areas include cyber security, databases, distributed systems, vulnerability markets, cyber risk metrics, bug bounty programs, business models connected to cyberattacks, “Internet of Things” endpoint security, cybersecurity workforce development, cybersecurity strategy and management, intelligent integration of information systems, data analytics, data semantics, web-based information extraction and integration, global risk management, information security, financial applications, improving operations and management using dynamic modeling, and health information systems.
- 1998 Senior Lecturer, Sloan School of Management, Massachusetts Institute of Technology, “ Information Technology for Financial Services.”
- 1989-1993 Research Scientist, Sloan School of Management, Cambridge, MA. Research areas include distributed heterogeneous information systems, knowledge discovery, technology and risk management, and management of data semantics. Instructor for Information Technology II.

- 1989 Research Associate, Boston University, Boston, MA. Post-doctoral research position. Research areas: rule-based semantic query optimization, intelligent database systems and knowledge discovery in databases.
- 1987 Member Technical Staff, Knowledge-Based Systems Department, GTE Laboratories, Waltham, MA. Research and design of heterogeneous database systems.
- 1985-1986 Lecturer, Northeastern University, Boston, MA. Instructor for the graduate course in database theory.
- 1985 Computer Scientist, Computer Corporation of America (Xerox Advanced Information Technology), Cambridge, MA. Research and design of highly available distributed database systems.
- 1983-1989 Research Assistant, Boston University, Boston, MA. Research under National Science Foundation Grants IST-8214662, IST-8408551 and IST-8710137. Research areas: query optimization, distributed database systems, natural language database updates, and knowledge discovery in databases.
- 1978-1980 Research Assistant, Solar Energy Lab, University of Wisconsin-Madison. Research areas: systems analysis, simulation, and development of simplified design methods for photovoltaic systems.

Administrative Positions

- 2016- Director, Cybersecurity at MIT Sloan (CAMS), Sloan School of Management, Massachusetts Institute of Technology.
- 2014-2016 Associate Director of the Interdisciplinary Consortium for Improving Critical Infrastructure Cybersecurity (IC)³, Sloan School of Management, Massachusetts Institute of Technology.
- 2006-2010 Director Special Interest Group on Digital Health. Center for Digital Business at MIT
- 2001-2004 Director Global Financial Services Special Interest Group. Center for eBusiness at MIT
- 1996-1999 Co-Director, Finance Research Center (FRC).
- 1992-1996 Associate Director, International Financial Research Services Center (IFSRC).
- 1992- Associate Director, Productivity from Information Technology (PROFIT).

1992 Co- Director, Working Group on Risk Management, International Financial Services Research Center.

Reviewed Publications

- 2024 Delvecchio, T.; Zeijlemaker, S.; De Bernardis, G. and Siegel, M. (2024). Revolutionizing Board Cyber-Risk Management Using Collaborative Gaming. In Proceedings of the 10th International Conference on Information Systems Security and Privacy, ISBN 978-989-758-683-5, ISSN 2184-4356, pages 112-119.
- 2023 Zeijlemaker, S. & Siegel, M. (2023). “Six governance principles for cyber resilience: What the Board Needs to Know about Cyber Risk”, One Conference 2023, 2023, October 3 - 4, The Hague, The Netherlands.
- 2023 Zeijlemaker, S., Hetner, C., & Siegel, M., (2023, June, 2). “4 Areas of Cyber Risk That Boards Need to Address”, Harvard Business Review.
- 2023 R. Pal, S. Madnick, and M. Siegel. “Trading in Catastrophe Bonds Can Boost Security Improving Cyber (Re-)Insurance Markets.” In the Proceedings of Americas Conference on Information Systems, 2023 (AIS Press), Panama.
- 2023 R. Pal, R. Sequeira, and M. Siegel. “ A Mathematical Theory to Quantify Cyber-Resilience in IT/OT Networks”. In Proceedings of Winter Simulation Conference (an INFORMS event), 2023 (IEEE Press), Texas, USA
- 2023 R. Pal, R. Sequeira, S. Zeijlemaker, and M. Siegel.” A Network Theory to Quantify and Bound Cyber-Risk in IT/OT Systems”. In Proceedings of Winter Simulation Conference (an INFORMS event), 2023 (IEEE Press), Texas, USA.
- 2023 Zeijlemaker, S. & Siegel, M. (2023). Capturing the Dynamic Nature of Cyber Risk: Evidence from an Explorative Case Study, Hawaii International Conference on System Sciences (HICSS) – 56, 2023 January 3rd – January 6th, Hawaii.
- 2022 Zeijlemaker, S.; Siegel, M., & Dobrygowski, D. (2022, November, 15). “As cyber attacks increase, here's how CEOs can improve cyber resilience”. World Economic Forum, Cyber Security Working Group.
- 2022 Zeijlemaker, S., Siegel, M., Khan, S., Goldsmith, S. “ How to align cyber risk management with business needs”. World Economic Forum, Cyber Security Working Group.

- 2022 R. Pal, R. Sequeira, Y. Zhu, A. Marotta, M. Siegel, and E. Hua. "How Suboptimal is Work-From-Home Security in IT/OT Enterprises? A Strategic Organizational Theory for Managers". Accepted for publication in the ACM Transactions on Management Information Systems, 2022.
- 2021 Shaharyar Khan, Alberto Volpatto, Geet Kalra, Jonathan Esteban, Tommaso Pescanoce, Sabino Caporusso, and Michael Siegel, "Cyber Range for Industrial Control Systems (CR-ICS) for Simulating Attack Scenarios", Italian Conference on Cybersecurity 21, April 07–09, 2021.
- 2021 Keman Huang, Stuart Madnick, Fang Zhang, Michael Siegel, "Varieties of public–private co-governance on cybersecurity within the digital trade: implications from Huawei’s 5G", *Journal of Chinese Governance*, May 2021.
- 2020 Matthew Maloney, Michael Siegel, and Gregory Falco, "Cyber-Physical System Security Automation through Blockchain Remediation and Execution (SABRE)", *The 18th IEEE International Conference on Pervasive Intelligence and Computing* Calgary, CA. August 2020.
- 2019 Matthew Maloney, Elizabeth Reilly, Michael Siegel, and Gregory Falco, "Cyber Physical IoT Device Management", *The 12th IEEE International Conference on Internet of Things (iThings-2019)* July 2019
- 2019 Keman Huang, Michael Siegel, Keri Pearlson, Stuart Madnick, "Casting the Dark Web in a New Light" , *Sloan Management Review (SMR)*, June 2019.
- 2019 Elizabeth Reilly, Matthew Maloney, Michael Siegel, Gregory Falco, A Smart City IoT Integrity-First Communication Protocol via an Ethereum Blockchain Light Client" , *1st International Workshop on Software Engineering Research & Practices for the Internet of Things (SERP4IoT 2019)*
- 2019 Mohammad S. Jalali, Jessica P. Kaiser, Michael Siegel, and Stuart Madnick, "The Internet of Things Promises New Benefits and Risks: A Systematic Analysis of Adoption Dynamics of IoT Products" (IEEE CRS)
- 2018 Siegel, M. et. al, *Cyber Insurance as a Risk Mitigation Strategy*, The Geneva Association, MIT, and The Boston Consulting Group. https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/cyber_insurance_as_a_risk_mitigation_strategy.pdf
- 2018 Mohammad S. Jalali, Michael Siegel, Stuart Madnick, "Decision-making and biases in cybersecurity capability development: Evidence from a

- simulation game experiment" , *The Journal of Strategic Information Systems*, September 2018.
- 2018 Huang, K. Siegel, M, Madnick, S. "A Framework for Systematically Understanding the Cyber Attack Business", *ACM Computer Surveys*, Volume 51 Issue 4, August 2018.
- 2018 Ellis, R., Huang, K., Siegel, M., Moussouris, K., Houghton, J. Chapter 4, "Fixing a Hole: The Labor Market for Bugs", *New Solutions for Cybersecurity*, MIT Press, January 2018
- 2017 Madnick, S. Jalali, M. Siegel, M. et al, "Measuring Stakeholders' Perceptions of Cybersecurity for Renewable Energy Systems," *International Workshop on Data Analytics for Renewable Energy Integration (DARE 2016)*, Springer International Publishing AG 2017, W.L. Woon et al. (Eds.): DARE 2016, LNAI 10097, pp. 67–77, 2017.
- 2016 Houghton, J., Siegel, M., Jalali, M., Campbell, A., and Fialho, D., "The Impact of Sales-practice Startup Dynamics on Sales-force Productivity," *The Proceedings of the 34st International Conference of the System Dynamics Society*. Delft, Netherlands, July 2016.
- 2016 Houghton, J., Siegel, M., Madnick, et al, "Beyond Keywords: Tracking the Evolution of Conversational Clusters in Social Media", *Sociological Methods and Research*, October 2017.
- 2016 Huang, K. Siegel, M. et al S, "Poster: Diversity or Concentration? Hackers' Strategy for Working across Multiple Bug Bounty Programs," *IEEE Symposium on Security and Privacy 2016 (IEEE S&P 2016)*
- 2015 Houghton, James, and Siegel, M. "Advanced Data Analytics for System Dynamics Models using PySD " In the Proceedings of the 33rd International Conference of the System Dynamics Society. Cambridge, MA. July 2015
- 2014 Houghton, J., Siegel, M., and Vukovic, M. "Towards a Model for Resource Allocation of API Value Networks" *The Intelligent Service Cloud Workshop*, 2014.
- 2014 Houghton, J., Siegel, M., Wirsch, A., Moulton, A., Madnick, S. , Goldsmith, D. "A Survey of Methods for Data Inclusion in System Dynamics Models." In the Proceedings of the 32nd International Conference of the System Dynamics Society. Delft, Netherlands, 2014.
- 2013 Houghton, J., Goldsmith, D., and Siegel, M. "Modeling the Influence of Narratives on Collective Behavior." In the Proceedings of the 31st

International Conference of the System Dynamics Society. Cambridge, MA, July 21 – 25, 2013.

- 2012 Goldsmith, D., and Siegel, M. “Cyber Politics: Understanding the use of Social Media for Dissident Movements in an Integrated State Stability Framework.” Proceedings of the 2012 International Conference on Advances in Social Networks Analysis and Mining - Workshop on Multi-Agent Systems and Social Networks. Istanbul, Turkey.
- 2011 Goldsmith, D., and Siegel, M. “Improving Health Care Management Through the Use of Dynamic Simulation Modeling and Health Information Systems.” Proceedings of the 29th International Conference of the System Dynamics Society. Washington, DC, July 24 – 28, 2011
- 2010 Goldsmith, D., and Siegel, M. “Improving Strategic Management of Hospitals: Addressing Functional Interdependencies within Medical Care.” *International Journal of Information Technologies and Systems Approach*, October 2010.
- 2010 Siegel, M., and Goldsmith, D. “Simulation Modeling for Cyber Resilience.” *Proceedings of the MIT-Harvard Conference on Cyber International Relations: Emergent Realities of Conflict and Cooperation*.
- 2008 Hongwei Zhu, Stuart E. Madnick, Michael D. Siegel, Enabling global price comparison through semantic integration of web data, *International Journal on Electronic Business*, IJEB 6(4), 319-353.
- 2008 Gannon, T, Siegel, M., Madnick, S., Sabbouth, M., Moulton, A., Zhu, H. “Framework for the Analysis of the Adaptability, Extensibility, and Scalability of Semantic Information Integration and the Context Mediation Approach,” *Hawaii International Conference on System Sciences - 42*, Hawaii, 2008
- 2008 Masanori, A., Goldsmith, D., Siegel, M. “Improving Strategic Management of Hospitals: Addressing Functional Interdependencies within Medical Care,” *American Medical Informatics Association Conference*, Washington, D.C., 2008
- 2008 Morrison, B., Goldsmith, D. “Grappling with Dynamic Complexity in Military Planning: The System Dynamics Approach,” *International System Dynamics Conference*, Athens, Greece, 2008
- 2007 Choucri, N., Goldsmith, D., Madnick, S., Morrison B., Siegel, M. “Using System Dynamics to Model and Better Understand State Stability,” *System Dynamics Conference*, Cambridge, MA, 2007
- 2007 Masanori, A., Goldsmith, D., Siegel, M. “Improving Hospital Operations Using Bar-Code Capture Data and System Dynamics Modeling

- Techniques,” *System Dynamics Conference*, Cambridge, MA, January 2007
- 2006 Choucri, N., Electris, C., Goldsmith, D., Mistree, D., Madnick, S., Morrison, J., Siegel, M., Sweitzer-Hamilton, M. “Understanding & Modeling State Stability: Exploiting System Dynamics,” *System Dynamics Conference*, Cambridge, MA, 2006
- 2006 Nazli Choucri, Christi Electris, Daniel Goldsmith, Dinsha Mistree, Stuart Madnick, J. Bradley Morrison, Michael Siegel, Margaret Sweitzer-Hamilton, “Understanding & Modeling State Stability: Exploiting System Dynamics,” *System Dynamics Conference*, Cambridge, MA, January 2006
- 2005 Nazli Choucri., S. Madnick, M. Siegel, “Linkage Between Pre- and Post-Conflict: Exploiting Information Integration & System Dynamics,” *IEEE Aerospace Conference*, Big Sky, MT, March 2005
- 2004 Zhu, H., S. Madnick, M. Siegel et al, “Effective Data Integration in the Presence of Temporal Semantic Conflicts” Conference on Temporal Representation and Reasoning, July 2004.
- 2004 Choucri, N., S. Madnick, A. Moulton, M. Siegel, H Zhu, “Information Integration for Counter Terrorism: The Requirement for Context Mediation” *IEEE Aerospace Conference*, Big Sky, MT, March 2004.
- 2002 Zhu, H., S. Madnick, M. Siegel. “The Interplay of Web Aggregation and Regulations” (with H. Zhu and M. Siegel), *Proceedings of the IASTED International Conference on Law and Technology (LAWTECH 2002)*, Cambridge, MA, November 6-8, 2002 [CISL #2002-17].
- 2002 Fujii, H., T. Okano, S. Madnick, M. Siegel. “E-Aggregation: The Present and Future of Online Financial Services in Asia-Pacific”, *Proceedings of the Sixth Pacific Asia Conference on Information Systems (PACIS-2002)*, Tokyo, Japan, September 3-4, 2002 [CISL #2002-06].
- 2002 Hansen, M., S. Madnick, M. Siegel. “Process Aggregation using Web Services”, *Proceedings of the Workshop on Web Services, e-Business, and the Semantic Web: Foundations, Models, Architecture, Engineering and Applications*, (WseBT’02, Toronto, Canada), May 2002 [CISL #2002-05], also to be published in *Lecture Notes in Computer Science*, Springer-Verlag, New York.
- 2002 Moulton, A., S. Madnick, M. Siegel. “Semantic Interoperability in the Securities Industry: Context Interchange Mediation of Semantic Differences in Enumerated Data Types”, *Proceedings of the Second International Workshop on Electronic Business Hubs: XML, Metadata*,

Ontologies, and Business Knowledge on the Web (WEBH2002), Aix En Provence, France, September 6, 2002 [CISL #2002-10].

- 2002 Moulton, A., S. Madnick, M. Siegel. "Context Interchange Mediation for Semantic Interoperability and Dynamic Integration of Autonomous Information Sources in the Fixed Income Securities Industry", *Proceedings of the Workshop on Information Technology and Systems* (WITS), Barcelona, Spain, December 14-15, 2002 [CISL #2002-20].
- 2001 Moulton, A., S. Madnick, M. Siegel. "Cross-Organizational Data Quality and Semantic Integrity: Learning and Reasoning about Data Semantics with Context Interchange Mediation" (with A. Moulton and M. Siegel), *Proceedings of the American Conference on Information Systems* (AMCIS, Boston), August 2001 [SWP #4167:4183-01, CeB #108, CISL #01-04].
- 2001 Madnick, Stuart and M Siegel, "Seizing the Opportunity : Exploiting Web Aggregation," *MISQ Executive, Vol 1, No. 1, March 2002, pp. 35-46.* [SWP #4351, CeB #144, CISL #01-13].
- 2000 Bresson, Stephane, C. Goh, N. Levina, A. Shah, and M. Siegel, "Context Knowledge Representation and Reasoning in the Context Interchange System," *The International Journal of Artificial Intelligence, Neural Networks, and Complex Problem-Solving Technologies*, Volume 12, Number 2, September 2000, pp. 165-180, [SWP #4133, CISL #00-04].
- 1999 Goh, Cheng, Stephane Bresson, Stuart Madnick, and Michael Siegel , "Context Interchange: New Features and Formalisms for the Intelligent Integration of Information," *Transactions on Information Systems*, Publication expected in July 1999.
- 1998 Moulton, Allen, Stephane Bresson, Stuart Madnick, and Michael Siegel , "Using an Active Conceptual Model for Mediating Analytic Information Interchange in the Fixed Income Securities Industry," *Proceedings of the 17th International Conference on Conceptual Modeling (ER'98)*, Singapore.
- 1998 Moulton, Allen, Stuart Madnick, and Michael Siegel , "Context Interchange on Wall Street," *Proceedings of the International Conference on Cooperative Information Systems (CoopIS'98)*, N.Y.
- 1997 Marshall, Chris and Michael Siegel , "Value at Risk: Implementing a Risk Measurement," *Journal of Derivatives*, Spring, 1997.
- 1997 Bresson, Stephane, Cheng Goh, Tom Lee, Stuart Madnick and Michael Siegel, "A Procedure for Mediation of Queries to Sources in Disparate

- Contexts," *Proceedings of the International Logic Programming Symposium*, Port Jefferson, N.Y.
- 1997 Madnick, S., S. Bressan, K. Fynn, C. Goh, T. Pena, and M. Siegel, "Overview of a Prolog Implementation of the Context Interchange Mediator," *Proceedings of the Fifth International Conference and Exhibition on the Practical Applications of Prolog*, London, England.
- 1996 Lee, Jacob and Michael Siegel, "An Ontological and Semantical Approach to Source-Receiver Interoperability," *Decision Support Systems*, Vol. 18, No. 2.
- 1996 Marshall, Chris and Michael Siegel, "VaR: Implementing a Risk Measurement Standard," *Wharton Conference on Risk Management in Banking*, Philadelphia, Pa.
- 1996 Lee, Jacob, Stuart Madnick, and Michael Siegel, "Conceptualizing Semantic Interoperability: A Perspective from the Knowledge Level," *International Journal on Cooperative Information Systems*, Accepted for publication.
- 1995 Goh, Cheng, Stuart Madnick, and Michael Siegel, "Context Interchange: Overcoming the Challenges of Large-Scale Interoperable Database Systems in a Dynamic Environment," In *Proceedings of the Third International Conference on Information and Knowledge Management*, Gaithersburg, MD, pp 337--346.
- 1994 Sciore, Edward, Michael Siegel and Arnie Rosenthal, "Using Semantic Values to Facilitate Interoperability Among Heterogeneous Information Systems," *ACM Transactions on Database Systems*, Vol. 19, No. 2.
- 1994 Siegel, Michael, Edward Sciore and Stuart Madnick, "Context Interchange in a Client-Server Architecture," *Journal of Systems and Software*, Volume 27, No. 3.
- 1992 Siegel, Michael, Edward Sciore and Sharon Salveter, "Automatic Rule Derivation for Semantic Query Optimization," *ACM Transactions on Database Systems*, Vol. 17, No. 4.
- 1992 Sciore, Edward, Michael Siegel and Arnon Rosenthal, "Context Interchange using Meta-Attributes," In *Proceedings of the First International Conference on Information and Knowledge Management*, Baltimore, MD.
- 1991 Siegel, Michael and Stuart Madnick, "A Metadata Approach to Resolving Semantic Conflicts," In *Proceedings of the 17th International Conference*

On Very Large Databases, Barcelona, Spain (Also Sloan School of Management Working Paper #3252-91-MSA).

- 1990 Sciore, Edward and Michael Siegel, "Heuristic-Based Semantic Query Optimization," In *Proceedings of the Fifth Jerusalem Conference on Information Technology*, Jerusalem, Israel.
- 1988 Siegel, Michael, "Automatic Rule Derivation for Semantic Query Optimization," In *Proceedings of the Second International Conference on Expert Database Systems*, Tysons Corner, VA.
- 1986 Lynch, Nancy, Barbara Blaustein and Michael Siegel, "Correctness Conditions for Highly Available Distributed Database Systems," In *Proceedings on Distributed Computing*, Calgary, Canada (Also MIT Tech Report TR-364).
- 1982 Siegel, Michael and Peter Deduck, "A Methodology for Determining Preferred Residential Passive Solar Systems," In *Proceedings of the American Section Meeting of the International Solar Energy Society*, Houston, TX.
- 1981 Siegel, Michael and William Beckman, "A Simplified Design Method for Photovoltaic Systems," *Solar Energy Journal*, Pergamon Press, England, Vol.26, No.5.
- 1980 Siegel, Michael and William Beckman, "Simplified Design Methods for Photovoltaic Systems," In *Proceedings of the American Section Meeting of the International Solar Energy Society*, Phoenix, AZ.

Workshop Publications

- 2003 Siegel, M. et al , "COntext INterchange (COIN) System Demonstration", *Workshop on Semantic Integration, Second International Semantic Web Conference*, Sanibel Island, Florida. October 2003.
- 2000 Firat, A. , Madnick, S., Siegel, M. , "The Caméléon Web Wrapper Engine", *Proceedings of the VLDB2000 Workshop on Technologies for E-Services*, September 14-15, 2000 [SWP #4128, CISL #00-03].
- 2000 Firat, A. , Madnick, S., Siegel, M. , "The Caméléon Approach to the Interoperability of Web Sources and Traditional Relational Databases," *Proceedings of the Workshop on Information Technology and Systems*, December 2000.

- 1995 Kon, Henry, Stuart Madnick, and Michael Siegel, "Good Answers from Bad Data: a Data Management Strategy," In *Proceedings of the 5th International Workshop on Information Technologies and Systems*, Amsterdam, Netherlands.
- 1995 Daruwala, Adil, Cheng Goh, Scott Hofmeister, Karim Hussein, Stuart Madnick, and Michael Siegel, "The Context Interchange Network Prototype," In *Proceedings of the IFIP WG2.6 Sixth Working Conference on Database Semantics (DS-6)*, Atlanta, GA.
- 1994 Lee, Jacob and Michael Siegel, "An Ontological and Semantical Approach to Source-Receiver Interoperability," In *Proceedings of the 4th International Workshop on Information Technologies and Systems*, Vancouver, B.C.
- 1993 Reddy, Malireddy, Michael Siegel, and Amar Gupta, "Towards An Active Schema Integration Architecture for Heterogeneous Database Systems," In *Proceedings of the International Workshop on Research Issues on Data Engineering: Interoperability in Multidatabase Systems (RIDE-IMS93)*, Vienna, Austria.
- 1992 Sciore, Edward, Michael Siegel and Arnon Rosenthal, "Using Semantic Values for Semantic Interoperability," In *Proceedings of the Scientific Database Management Workshop*, Salt Lake City, UT.
- 1991 Heiler, Sandra, Michael Siegel and Stanley Zdonik, "Heterogeneous Information Systems: Understanding Integration," In *Proceedings of the First International Workshop on Interoperability in Multidatabase Systems*, Kyoto, Japan.
- 1991 Rosenthal, Arnon and Michael Siegel, "An Architecture for Practical Metadata Integration," In *Proceedings from the Workshop on Information Technologies and Systems*.
- 1991 Siegel, Michael, Stuart Madnick and Amar Gupta, "Composite Information Systems: Resolving Semantic Heterogeneities", In *Proceedings from the Workshop On Information Technologies and Systems*, Boston, MA (Also Sloan School of Management Working Paper #3357-91-MSA).
- 1989 Siegel, Michael and Stuart E. Madnick, "Schema Integration using Metadata," In *Proceedings from the NSF Workshop on Heterogeneous Database Systems*, Chicago, IL (Also Sloan School of Management Working Paper #3092-88-MS).

- 1989 Stuart E. Madnick, Y. Richard Wang, Michael Siegel et al, "Composite Information Systems," In *Proceedings from the NSF Workshop on Heterogeneous Database Systems*, Chicago, IL (Also Sloan School of Management Working Paper #3157-90).

Miscellaneous Publications and Invited Lectures

- 2020 Siegel, M., Chen, K., Kuruvila, T., "The Cyber Risk Cube: A New Tool for Cybersecurity Risk Management. *Massachusetts Institute of Technology Cybersecurity at MIT Sloan Working Paper*.
- 2015 Moussouris, K. and Siegel, M., "The Wolves of Vuln Street: The 1st Dynamic Systems Model of the 0day Market," RSA Conference, April, 2015
- 2010 Siegel, M., and Goldsmith, D. "'Managing and Valuing a Corporate IT Portfolio Using Dynamic Modeling of Software Development and Maintenance Processes" MIT Center for Digital Business Research Brief, Volume XII.
- 2010 Masanori, A., Goldsmith, D., Siegel, M. "Improving Hospital Operations Using Hospital Information Systems and System Dynamics Modeling Techniques" MIT Center for Digital Business Research Brief, Volume XI
- 2005 Hongwei Zhu, Stuart Madnick, Michael Siegel, "Policy for the Protection and Reuse of Non-Copyrightable Database Contents, "
- 2002 Melo de Brito Carvalho, T.C., M. Siegel. "Return on Investment from Online Banking Services: An Analysis of Financial Account Aggregation", Cambridge, MA, August 2002 [SWP #4384-02, CISL #2002-12].
- 2001 Choucri, N., Hagseta, F., Madnick, S., Moulron, A. Siegel, M. and H. Zhu, "Laboratory for Information Globalization and Harmonization Technologies: A New Research Initiative", November 2001 [CISL #01-12].
- 2000 Madnick, S., Siegel, M. , Frontini, M. , Khemka, S., Chan, S., Pan, H., "Aggregators: Traveling the *Fast Lane* on the Information Highway", February 2000 [SWP #4139, CISL #00-06].
- 2000 Madnick, S., Siegel, M. , Frontini, M. , Khemka, S., Chan, S., Pan, H., "Surviving and Thriving in the New World of Web Aggregators",

- submitted to *Harvard Business Review*, December 2000 [SWP #4138, CISL #00-07].
- 1998 Michael Siegel, "Evolution of Financial Applications," Latin American Conference on Banking Automation," Lima, Peru, November 1998.
- 1997 Marshall, Chris and Michael Siegel, "Value at Risk: Implementing a Risk Measurement," Chapter in *VaR Understanding and Applying Value-at-Risk*, Risk Publications, London, England.
- 1997 Marshall, Chris and Michael Siegel, "Value at Risk: Implementing a Risk Measurement," Invited Speaker, Federal Reserve Conference on Banking Structure and Competition, Chicago, IL., May 1997.
- 1997 Bressan, S., C. Goh, K.Fynn, M. Jacobisiak, K. Hussein, H. Kon, T. Lee, S. Madnick, T. Pena, J. Qu, A. Shum and M. Siegel, "The Context Interchange Mediator Prototype," *SIGMOD 1997*.
- 1996 Marshall, Chris and Michael Siegel, "Implementing Value at Risk: Vendors' Perspectives," *Risk Magazine: Special Edition on Value-at-Risk*, May 1996.
- 1991 Siegel, Michael, Edward Sciore and Sharon Salveter, "Knowledge Discovery in a Self-Adaptive Database System," *Knowledge Discovery in Databases*, AAAI Press. (Also in *Proceedings from the Workshop on Knowledge Discovery in Databases IJCAI-89*).
- 1991 Siegel, Michael and Stuart Madnick, "Context Interchange: Sharing the Meaning of Data," *Sigmod Record Special Issue on Semantic Heterogeneity*, Vol. 20, No. 4.
- 1990 Siegel, Michael and Stuart E. Madnick, "Identification and Resolution of Semantic Conflicts using Metadata," Sloan School of Management Working Paper #3102-89-MSA.
- 1989 Siegel, Michael and Stuart E. Madnick, "Maintaining Valid Schema Integration in Evolving Heterogeneous Database Systems," *IEEE Office Knowledge Engineering: Special Issue on Information Sharing in Heterogeneous Data and Knowledge Base Systems*, Vol. 3, No. 2.
- 1987 Siegel, Michael, "A Survey of Heterogeneous Database Systems," *GTE Laboratories Technical Note TN87-174.1* and Boston University Report TR87-011.

Other Professional Positions

2004-	Expert consulting, financial services software, patent litigation
2003-2005	Advisor for Life Harbor Portfolio Management software firm. Acquired by Vestmark.
2000	Executive Education sessions for British Telecom, Willis Insurance, Program for the Americas
2000	Chief Scientist, Web Aggregation Software, Arsdigita Corporation
1999	Founder, iAggregate (merged with Arsdigita in 2000)
1998	Consultant, Analysis Group Inc. System analysis.
1996-1997	Consultant, American Management Systems. Risk Management Practice.
1997	Arriva Software, Founder, Vice President.
1996	Consultant, Deutsche Bank, Morgan Grenfeld. Analysis of Foreign Exchange Trading Systems.
1995	Course development and presentation, Sequent Computing, Executive course on information technology and business.
1993-1994	Consultant, ABN Amro Bank. Analysis of Financial Risk Management Systems.
1992	Speaker, Digital Equipment Corporation Seminar Series. Presentations on information technology requirements for risk management and the FDICIA Act of 1991. Attendees include major banks, law and accounting firms, and federal regulators.
1991-1992	Consultant, EJV Partners, N.Y., N.Y. Assist in the development of an object-oriented fixed income database system for use by member firms; Goldman Sachs, Morgan Stanley, First Boston, Citicorp, Shearson-Lehman, and Salomon Brothers.
1990	Consultant, General Motors, Detroit, MI. Analysis of distributed database management system for production, marketing and sales.
1990-1997	Information Technology Associates, President.

- 1990 Consultant, Xerox Advanced Information Systems, Cambridge, MA. Heterogeneous database systems research and applications.
- 1989 Consultant, Evaluation Associates, Inc., Norwalk CT. Database design, financial software specification and distributed system design.
- 1989 Consultant, Dawai Securities of America, New York, NY. Design and development of a database management system and application program to assist warrant traders.
- 1987-1989 Consultant, Investment Management Controls, New York, NY. Managed the conversion of operations from a time-sharing system to a local area network, database design, financial software specification, and management responsibilities.
- 1985-1987 Seminar Instructor, Digital Equipment Corporation, Educational Services Division, Bedford, MA. Instruction in OPS5, expert system development and artificial intelligence.
- 1985-1986 Database Consultant, Gradient Corporation, Cambridge, MA. Designed and developed databases for Environmental Protection Agency Superfund projects.
- 1983-1985 Computer Graphics and Database Consultant, Cambridge Analytical Associates, Boston, MA. Designed and prepared computer graphics and databases for Environmental Protection Agency Superfund projects.
- 1981-1983 Staff Engineer, JBF Scientific, Wilmington, MA. Simulation and analysis of electrical and thermal energy systems, prepared proposals, reports and seminars.
- 1983 Professional Engineer, State of Wisconsin No. E-22176.
- 1977-1978 Project Engineer, E. F. Siegel & Associates, Ltd., Baltimore, MD. Designed and supervised the installation of heating and air-conditioning systems for commercial and industrial buildings.

Patents

- 2001 “Querying and Retrieving Semi-Structured Data from Heterogeneous Sources,” PAT. NO. 6,282,537, 1999.
- 1999 “Data Extraction from World Wide Web Pages” with Stuart Mandick, PAT. NO. 5,913,214, 1996.

1999

“Querying Heterogeneous Data Sources Distributed over a Network Using Context Interchange” with Stuart Madnick, PAT. NO. 5,953,716, 1996.