



## **The Future of the Commodity MEMS Design and Manufacturing**

**Stephen R. Breit, PhD**  
**Vice President, Engineering**  
**Coventor, Inc.**

Coventor has been developing tools for modeling MEMS sensors for nearly two decades. Through addressing the modeling challenges of leading MEMS companies and R&D organizations around the world, we have gained visibility on trends that could lead to disruptive changes in the commodity MEMS business. The trends include commoditization of MEMS, proliferation of MEMS process technology, consolidation of advanced CMOS manufacturers, and increasing integration of heterogeneous technologies, i.e. More-than-Moore integration. These trends provide strong motivation for mainstream CMOS foundries to enter MEMS manufacturing. We could well be at the beginning of a transition in the MEMS business similar to the one that occurred in the CMOS industry: from integrated device manufacturers to a fabless/foundry business model. For MEMS as for CMOS, the transition will require a design automation flow that provides a platform for process design kits (PDKs) that foundries can supply to their fabless customers. We'll describe the challenges of MEMS design automation in comparison to electronic design automation, and the evolution of MEMS design tools. Then we'll describe progress toward a design automation flow and PDKs for MEMS sensors based on a proven fabrication process, and challenges that remain to make MEMS PDKs a reality. The talk will conclude with speculations on how the entry of mainstream foundries offering standardized MEMS processes supported by PDKs could play out over the coming years.

### **About the Speaker**

Stephen (Steve) Breit is responsible for overseeing development and delivery of Coventor's industry-leading software tools for MEMS design automation and virtual fabrication of MEMS and semiconductors. Steve also manages the Coventor's team of field applications engineers who support customers in the MEMS industry. Prior to joining Coventor in August 2000, Steve was Director of Embedded Technology for Dragon Systems where he was responsible for embedding speech recognition software in mobile devices and cars. He previously held technical management positions at Kendall Square Research, a supercomputing startup, and BBN Systems and Technologies where he focused on high-performance scientific computing and hydroacoustics research. The common thread in Steve's career has been developing and marketing ground-breaking physics-based simulation software for entrepreneurial organizations. He has been a frequent presenter at conferences and authored numerous technical papers in the fields of fluid dynamics, hydroacoustics, high-performance computing and MEMS design and simulation. Steve holds a number of patents on simulation systems. Steve received a Ph.D. in Ocean Engineering from Massachusetts Institute of Technology and a BS in Naval Architecture and Marine Engineering from Webb Institute.