The Convergence of Engineering Disciplines in Modern Product Development

Bret Greenstein (IBM) - *bgreenst@us.ibm.com*
Amit Fisher (IBM) - *amfisher@us.ibm.com*
Clas Jacobsen (United Technologies Research Center) - *JacobsCA@utrc.utc.com*
Alberto Sangiovanni Vincentelli (University of California at Berkeley) - *alberto@eecs.berkeley.edu*
Don Gelosh (Worcester Polytechnic Institute) - *dsgelosh@wpi.edu*

Abstract. Hear a panel of experts discuss challenges of bringing together software development and electrical engineering in a traditionally mechanical-centric world, and how new concepts, tools, and processes are needed and being developed to deal with the challenge. Whether or not we_re ready, technology advances are breaking down the silos between engineering disciplines. Traditional approaches to product development tend to be discipline-centric, and are not designed to view design decisions outside of their own domain. Successful product development organizations must view the design and the impact of design decisions across all engineering disciplines_to understand the impact of one discipline on another. Given the complexity of modern products, this can be a significant challenge. A systems engineering approach looks at product behavior and functionality across multiple engineering disciplines, helping to understand how the disciplines interact together. Traditional approaches focus on the mechanical engineering aspects as documented in detailed design, and then look at the effects of electronics and software. Without the rigor of systems engineering, it_s difficult to understand how all the disciplines truly interact, for instance, how to propagate the effect of a change in one discipline to another. Innovative product design calls for organizations to converge engineering disciplines using the guidance obtained from systems engineering principles, facilitated by new methods and tools.

Biography

Bret Greenstein (IBM) - bgreenst@us.ibm.com
Bret Greenstein is the Vice President of Complex and Embedded Systems for IBM. Prior to this position he was based in Shanghai, China and was the Vice President of Business Transformation & Information Technology for IBM_s Growth Market Unit. Bret originally joined IBM_s Microelectronics Division in 1988 to work on manufacturing systems and automation. Since that time, Bret has held numerous positions in Systems and Technology Group, Global Technology Services, Business Transformation Outsourcing, and Corporate Functions working in marketing, technology development, service delivery, and in the office of the CIO. He has spent his career focused on enabling growth and transformation for IBM and its clients through the use of technology.He holds a Bachelor of Science degree in Electrical Engineering and a Master of Science degree in Manufacturing Systems Engineering, both from Rensselaer Polytechnic Institute. He also holds a graduate certificate in Technical Japanese through the University of Wisconsin.

Amit Fisher (IBM) - amfisher@us.ibm.com
Amit Fisher. As IBM Rational's Technical Client Relationship Manager, Amit Fisher is in charge of promoting and pushing forward new innovative Systems Engineering solutions in the Aerospace and Defense, Automotive and Electronic industries. Prior to joining IBM Software Group, Amit held the position if a senior manager at IBM Research for more then eight years, , where he worked closely with selective IBM clients in developing new approaches for complex systems design and analysis, business optimization and transformation solutions. Over his career in IBM Research, Amit engaged with various IBM clients with specific focus on A&D clients such as Israel Aerospace Industries, EADS, and UTC, where he co-developed innovative solutions. During 2012 Amit was appointed to be a member of IBM Industry Academy, the most prestigious IBM Industry forum that pushes forward the IBM_s industry solutions agenda. Prior to joining IBM,

Amit served as Information Systems engineer officer at the Israeli Air Force, where he designed and led complex development projects in supply chain management and service management.Amit has a B.Sc. degree in Industrial Engineering and Management and a M.SC. degree in Information System Engineering from the Technion, Israel.

Clas Jacobsen (United Technologies Research Center) - JacobsCA@utrc.utc.com
Dr. Jacobson is Chief Scientist for the United Technologies Systems & Controls Engineering (UTSCE) organization. In this role he works with the UTC business units to ensure capability in systems engineering and controls is available for product development. . Prior to his role as Chief Scientist for UTSCE he worked as the Chief Scientist, Controls for UTC and before that at the United Technologies Research Center (UTRC) in management and technical positions since 1995. He has held positions at UTRC as Director of the Carrier Program Office responsible for creating and managing projects in a stage gate project planning and execution process and also Director of the Systems Department at UTRC responsible for capability in the areas of systems engineering. Dr. Jacobson received his Ph.D degree in electrical engineering in 1986 from Rensselaer Polytechnic Institute. He was an Associate Professor at Northeastern University in Boston from 1986-1995.

Alberto Sangiovanni Vincentelli (University of California at Berkeley) - alberto@eecs.berkeley.edu
Dr. Alberto Sangiovanni-Vincentelli holds the Edgar L. and Harold H. Buttner Chair of Electrical Engineering and Computer Sciences at the University of California at Berkeley. He obtained an electrical engineering and computer science degree ('Dottore in Ingegneria') summa cum laude from the Politecnico di Milano, Milano, Italy in 1971. In 1980-1981, he was a Visiting Scientist at the Mathematical Sciences Department of the IBM T.J. Watson Research Center and in 1987, a Visiting Professor at MIT. He was a co-founder of Cadence and Synopsys, the two leading companies in the area of Electronic Design Automation. He is a member of the Board of Directors of Cadence, Sonics, Expert Systems, Accent, a former ST Microelectronics-Cadence joint venture he helped founding, and of KPIT Cummins.He has consulted with governments and major corporations around the world, and has received numerous honors for his work including the IEEE/RSE Maxwell Award _for groundbreaking contributions that have had an exceptional impact on the development of electronics and electrical engineering or related fields_.He is an author of over 780 papers, 17 books and 2 patents in the area of design tools and methodologies for large-scale systems.. Dr. Sangiovanni-Vincentelli is a Fellow of the IEEE and a Member of the National Academy of Engineering.

Don Gelosh (Worcester Polytechnic Institute) - dsgelosh@wpi.edu
Dr. Don Gelosh is the first Director of Systems Engineering Programs for Worcester Polytechnic Institute (WPI) and the Corporate and Professional Education (CPE) division. Dr. Gelosh has over 36 years of systems engineering experience from the US Air Force, government, industry, and academia. Dr. Gelosh advances the overall state of practice for systems engineering through his efforts with the International Council on Systems Engineering (INCOSE) and the Systems Engineering Division of the National Defense Industrial Association. Prior to this assignment, Dr. Gelosh was the Deputy Director for Workforce Development, serving under the Deputy Assistant Secretary of Defense for Systems Engineering at the Pentagon, and provided expertise in workforce development, competency models and assessments, and knowledge management. While serving in the Air Force, Dr. Gelosh performed systems engineering on the Space Shuttle as a member of NASA_s Vehicle Integration and Test Team where he was responsible for communications and payload integration and ensuring the Shuttle was ready for launch. Dr. Gelosh also taught electrical and computer engineering at the Air Force Academy in the early 90_s and later served as Deputy Department Head for Electrical and Computer Engineering at the Air Force Institute of Technology. Dr. Gelosh received his PhD in Electrical Engineering from the University of Pittsburgh in 1994, a MS in Computer System Design from the University of Houston at Clear Lake in 1989, and a BS in Electrical Engineering from the Ohio State University in 1981. He holds an INCOSE CSEP-Acquisition certification and is Defense Acquisition Corps Level III certified in Systems Engineering.