# Multidisciplinary Systems Engineering: Architecting the Design Process

*By James A. Crowder, John N. Carbone, Russell Demijohn*

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This book presents Systems Engineering from a modern, multidisciplinary engineering approach, providing the understanding that all aspects of systems design, systems, software, test, security, maintenance and the full life-cycle must be factored in to any large-scale system design; up front, not factored in later. It lays out a step-by-step approach to systems-of-systems architectural design, describing in detail the documentation flow throughout the systems engineering design process. It provides a straightforward look and the entire systems engineering process, providing realistic case studies, examples, and design problems that will enable students to gain a firm grasp on the fundamentals of modern systems engineering. Included is a comprehensive design problem that weaves throughout the entire text book, concluding with a complete top-level systems architecture for a real-world design problem.

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About the Author

**Dr. James A. Crowder:** Dr. Crowder currently serves as a Chief Engineer for Raytheon's Intelligence, Information, and Services Business Unit and Subject Matter Expert (SME) in Autonomous Systems, Artificial Intelligence, and Systems Architecture. He holds a BS in Electrical Engineering, an MS in Electrical Engineering in Signal Processing, an MS in Applied Mathematics, and a PhD in Electrical Engineering and Applied Mathematics. Dr. Crowder has several patents pending in Artificial Intelligence and has over 100 published, peer-reviewed papers. Recent book publishing efforts with Springer Scientific books include: "Artificial Cognition Architectures," "Systems Engineering, Agile Design Methodologies," and "Agile Project Management: Managing for Success," as well as chapters in several books on Big Data, Biomedical Engineering, and Cyber Physical Systems. His professional efforts include serving as a technical advisor and mentor to a STEM school in Douglas Country, Colorado, the Alexandria School of Innovation, as well as a technical reviewer for the Journal of Supercomputing and the Journal of Systemics, Cybernetics, and Informatics. Dr. Crowder has been interviewed, and articles written about his work in Artificial Intelligence, by Popular Science, Defense One, the Washington Post, Discovery News, and has written an article for TechCrunch that was published in June, 2016.

**Russell P. Demijohn:** Mr. Demijohn has worked in aerospace and defense for over 30 years. He currently serves as a Senior Principal Systems Engineer within the Systems Engineering discipline at Raytheon's Intelligence, Information, and Services Business Unit and Subject Matter Expert (SME) in System Requirements, Test-Driven Design, and Operations & Maintenance.Mr. Demijohn holds a BS with specialty in Operations Management and Management Information Systems and his experience includes formulation of acquisition standards and processes, system specifications, concepts of operations (CONOPS), system architectures, system and software development, system integration & test, system transition, as well as well as operations and maintenance in a System of Systems environment. As an

accomplished engineer, he has received numerous awards, including both national and corporate recognition for System of Systems solutions. Mr. Demijohn brings a wealth of education and experience to Multidisciplinary Systems Engineering and is considered an expert in most of the relevant disciplines.

**Dr. John N. Carbone:** Dr. John N. Carbone, an Engineering Fellow, has served Raytheon Company and the defense industry for ~28 years. Dr. Carbone holds a BS in Computer Science, an MS in Engineering, MS equivalent in Software and Systems Engineering, and a PhD in Mechanical Engineering. Dr. Carbone has

several national and international software patents and many peer-reviewed publications. Recent book publishing efforts for Springer Scientific books include topics on Applied Cyber Physical Systems, Biomedical Engineering, Artificial Cognition Architectures and Multi-Disciplinary Systems Engineering. Dr. Carbone's professional efforts include Computer Science board membership and curriculum advisor at Baylor University, Texas Tech University, and Texas A&M Commerce, as well as board membership for the indexed Journal of Integrated Design and Process Science (JIDPS), passionate STEM Facilitator, ACM Member and long standing member of the Society of Design and Process Science (SDPS).

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