

# Digital Manufacturing and Beyond

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## Abstract

The ongoing transformation of manufacturing and service industry offers an opportunity to rethink the design of future enterprises. Evolution of manufacturing from digital to its new form labeled, universal manufacturing, is discussed. Five enablers of universal manufacturing are presented, open manufacturing, manufacturing-as-a-service, shared manufacturing, sustainability, and resilience. These enablers form properties of universal manufacturing, with adaptability and affinity that are emerging. A universal manufacturing enterprise is formed based on the models of distributed manufacturing facilities. The emerging standards for interoperability of systems needed for universal enterprises are introduced. The need for data and modeling standards is articulated. Though no global standard for representation of digital manufacturing models in a cloud has been widely adopted, the existing systems engineering methodologies and languages may support the solution needed. The modeling approach followed in this paper is a bottom-up rather than the top-down usually presented in the literature on modern manufacturing.

## Biography

Dr. Andrew Kusiak is a Professor in the Department of Industrial and Systems Engineering at The University of Iowa, Iowa City. He has chaired two departments, Industrial Engineering, and Mechanical and Industrial Engineering. His current research interests include applications of computational intelligence and big data in manufacturing, automation, renewable energy, sustainability, and healthcare. He has authored or coauthored numerous books and hundreds of technical papers published in journals sponsored by professional societies, such as the Association for the Advancement of Artificial Intelligence, American Society of Mechanical Engineers, Institute of Industrial and Systems Engineers, Institute of Electrical and Electronics Engineers, and other societies. He speaks frequently at international meetings, conducts professional seminars, and consults for industrial corporations. Dr. Kusiak has served in elected professional society positions as well as editorial boards of over fifty journals, including editor positions of five different IEEE Transactions.

Professor Kusiak is a Fellow of the Institute of Industrial and Systems Engineers and the Editor-in-Chief of the Journal of Intelligent Manufacturing.