

INCOSE Spotlight

INCOSE Spotlight on . . . Wolter J. Fabrycky

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Name: Wolter J. Fabrycky, PhD, PE

Titles and organizations: Lawrence Professor Emeritus at Virginia Tech and Chairman of Academic Applications International

Place of birth: Queens, New York (US)

Current residence: Blacksburg, Virginia (US)

Domain: Industrial and Systems Engineering

Studied: Industrial and General Engineering

Year joined INCOSE: 1990 (Charter Member No. 21)

Roles in INCOSE: Board of Directors 1995–97, Associate Editor for the *INCOSE Systems Engineering* journal since 1998, Fellow Award in 1999, Pioneer Award in 2000, and the Accreditation Board for Engineering and Technology (ABET) Board of Directors since 2008

Years in systems engineering: 45

What did you want to do for a job when you were a little kid? I wanted to understand how things worked, but I also wanted to live and work on a farm. My dad became a sharecropper in Florida in the 1930s, but that soon failed. Then in 1949, he moved us from New York to a worn-out farm in Arkansas, where I finished high school by taking vocational agriculture.

What inspired you to become a systems engineer? I was appointed in 1968 by Virginia Tech [VT] Dean of Engineering Willis Worcester to organize an interdepartmental faculty group for systems engineering. At the time, I was directing the VT Operations Research Center. It impressed me that our dean would organize engineering into a matrix with 13 classical departments overlaid by five interdisciplinary Technical Interest Groups to enhance collaborative interaction.

This led me to learn about and develop systems engineering, and then to lead this emerging interdisciplinary for VT and beyond. I was inspired by the challenge to extend the largely analysis- and optimization-based specialty of

operations research to consider the entire system lifecycle. Our emphasis was on operational problem avoidance through the early employment of design synthesis over the system lifecycle. We demonstrated that systems engineering is more than systems analysis. Unfortunately, too often the terms “systems analysis” and “operations research” are incorrectly referred to as systems engineering.

What was your path to becoming a systems engineer? Becoming an Arkie farm boy was pure drudgery. So I enrolled in pre-engineering in 1951 and transferred to Wichita State to finish a bachelor’s degree in industrial engineering in 1957. At the same time, I worked for Cessna Aircraft. I completed a master’s in industrial engineering at Arkansas in 1958, and stayed on to teach engineering graphics and industrial engineering until 1960. Committed to academia, I earned a PhD in general engineering at Oklahoma State in 1962 and stayed on as an OSU Okie faculty member. In 1965, I became a Hokie professor at Virginia Tech, which quickly led to my emphasis on systems engineering.

Can you briefly explain your role as founding chairman of systems engineering at Virginia Tech? My role as systems engineering chairman was to define systems engineering as a graduate-level academic interdisciplinary, organize an interdepartmental advisory committee, and select practicing engineers as students. In 1976, I passed the chairmanship on to Benjamin Blanchard, so I could join the VT central administration as university dean of research. That position included responsibility for the Virginia Agricultural Experiment Station. It was interesting how my farm and VoAg [vocational agriculture] background suddenly became very important!

What may others not know about the book Systems Engineering and Analysis that you coauthored? I want to let all systems engineers know that *Systems Engineering and Analysis*, first published in 1981, is now in its fifth (30th anniversary) edition. Many systems engineers are still using and making references to the out-of-date editions. Also, note that my venerable colleague Blanchard and I are beginning to seek a coauthor for the sixth edition, as encouraged by Pearson Prentice Hall.



What professional accomplishments are you most proud of? I'm proud to be with Pearson Prentice Hall as a textbook author and series editor for more than 50 years (see *INSIGHT* vol. 15, no. 1). Also, I was happy to discover the Design Dependent Parameter (DDP) paradigm for "stumbling through" the system design space, permitting mutually exclusive design alternatives to be evaluated on an equivalent basis over the system lifecycle. Parameters are rarely mentioned, and DDPs are completely ignored in operations research, but are now becoming the key to integrating the full potential of operations research within the systems engineering process.

What trends do you see in your domain? There is a rapidly emerging interest within the engineering profession to integrate system concepts and thinking into most domains of engineering. I call this Domain Centric Systems Engineering as contrasted to Systems Centric Systems Engineering, INCOSE style. That trend is timely and good to observe. But, I see and fear the awarding of graduate degrees in systems engineering to individuals who have not earned an ABET-accredited degree in engineering, or its equivalent. Exceptions are to be expected, but they should not become commonplace.

How has INCOSE benefitted you? INCOSE began as NCOSE 18 years after VT awarded its first systems engineering master's degree. Since then, INCOSE has secured global validation for the interdiscipline of systems engineering, and confirmed the wisdom of Dean Worcester at VT, as well as of Dean Martin and Wayne Wymore in Arizona, who first established systems engineering in academia. Further, the advent of INCOSE gave me the opening to establish an international honor society for systems engineering, the Omega Alpha Association (see <http://www.omegalpha.org>).

What do you like to do outside of work? I'm one of those individuals who has little interest in things outside of work and my family. One exception is that I admire and follow the Austrian School of Economics, through the Ludwig von Mises Institute and the Foundation for Economic Education. This school is, in my opinion, the best economic underpinning for systems engineering and also for the subject of engineering economics, for which I coauthored the Pearson Prentice Hall *Engineering Economy* textbook, now in its ninth edition.

I also purchased a 95-acre farm here in Hokieland in 2000. I have now adopted a mission statement involving the production of natural produce under the business name iFarmVA. Perhaps, this is as an emotional response to my time on farms in Florida and Arkansas. 🍎