

## ACKNOWLEDGEMENTS

There is a seldom noticed, tarnished, bronze plaque hanging outside one of the dormitories at the State University of New York Maritime College that states “Let each become all that he is capable of becoming.” During my cadet years, I walked by that plaque several times each day, frequently reading and contemplating the meaning of these words. These words were so profound to me that I adopted them as my compass for my life’s direction. It is these words that have guided me to write this dissertation and to achieve a Doctorate of Philosophy in Industrial and Systems Engineering.

Accomplishments are rarely achieved without assistance from others. Of course my professors and fellow students can share in my educational achievement, because I gleaned a significant amount of knowledge from them. However, when considering those educators who make substantial (dare I say life altering) contributions to ones academic career, the number of individuals becomes smaller. One person who made a major contribution to my educational direction is Ms. Marilyn Hedges. Ms. Hedges was the Engineering Administrative Assistant at Virginia Tech’s Northern Virginia Graduate Center when I was at a crossroads in my academic career. In 1993, Virginia Tech discontinued the Geodetic Engineering Program. I enrolled in that program in 1992, and thought that I had a clear plan of study that would eventually lead me to a Masters Degree. However, with the Geodetic Engineering Courses eliminated, I was confused how to proceed with my education, if at all. Ms. Hedges suggested that I consider the Systems Engineering Program. At the time, I didn’t know anything about systems engineering, nor did I think I had an interest, but reluctantly accepted the brochure that she offered. After reading that brochure and some introductory information about the discipline, my interest grew and I changed my major to Systems Engineering. If it weren’t for that chance meeting with Ms. Hedges, I probably wouldn’t be writing this acknowledgment today.

Most of my academic career at Virginia Tech was at the Northern Virginia Graduate Center. I have found the Industrial and Systems Engineering Program at the Northern Virginia Graduate Center to be a seamless extension of the on-campus programs. The success of this excellent program can be directly attributed to two individuals – Prof. Ken Harmon, and Dr. Kostas Triantis. These two educators are pioneers in creating opportunities for students at Virginia Tech’s Extension Campuses across the Commonwealth of Virginia. When I had my first televised course during the Fall Semester 1993, all TV courses originated from Blacksburg. Over the years technological advancements have allowed courses to originate from any of Virginia Tech’s remote sites. Today, the Systems Engineering Program graduates more off-campus

students than the on-campus program does. Any off-campus graduate from Virginia Tech's Industrial and Systems Engineering Program undoubtedly owes their academic success to Prof. Ken Harmon and Dr. Kostas Triantis.

In January 1995 I walked into Dr. Kostas Triantis' Measurement and Evaluation of Productivity Course. Little did I know on that cold January evening that I was meeting the person who would have the most profound impact on my academic career. Dr. Triantis became not only my professor, but my mentor and most of all my friend. He became the chairman of my Masters Degree Thesis Committee. One afternoon shortly after receiving my Masters Degree, I approached Kostas and asked him what he thought about pursuing a Ph.D. in Industrial and Systems Engineering. He initially appeared to be stunned by such a suggestion, but was very supportive of me continuing my education, and agreed to be the chairman of my dissertation committee. During the past five years, Kostas gave me encouragement while navigating the research doldrums, guidance when I started to drift off-course, and hope when the journey seemed endless. In the end, I think that together we have made a revolutionary contribution (as demonstrated in this dissertation) to the field of the evaluation of system performance. While my career as a student is ending, I look forward to having Kostas as my mentor, colleague, and friend.

In August 1998, I had the privilege of my employer sending me to Virginia Tech, full time, for two years. The transition from working full time to being a full time student, and then back again is not an easy one. However, thanks to the efforts of my supervisor, Mr. Scott Mooney, the transitions were much easier than expected. Scott not only kept me abreast of changes that were occurring in the work place during my absence. Due to his attention to detail, I was able to focus on my education and not worry about the mundane, but necessary, tasks such as searching for information concerning new health care for my family. Scott also served as a member of my dissertation committee. This task was above and beyond his normal duties. However, I found his insights and knowledge to be invaluable to my research.

I also would like to thank my other dissertation committee members for the insights that they provided to this dissertation. Dr. Brian Kleiner kept me honest with respect to the research process. The process is the essence of research, but can be overlooked when one becomes engrossed with the research's technical problem. Dr. Pat Koelling's expertise in model validation was key to this research. Emphasis on this important part of my model made my research more defensible. Dr. Elias Carayannis from George Washington University brought his experience in technology insertion, and was able to share insights not only from a different university, but also from a different perspective – business.

This academic success belongs to my family as much as it does to me. Both of my children were born during this era of my life. Wyatt (now four years old) learned how to crawl during the two weeks when I was taking my preliminary examination. Wyatt somehow knew when I was about to lose my sense of humor, and would crawl to me. After ten months of seeing Wyatt just sitting, his crawling was the funniest thing that I have ever seen. When working long hours to finish my dissertation, Noah (now 19 months old) knew when I needed a break before I did, and would invite me to play. I always found myself refreshed after playing with the boys. While I regret the time I spent away from Wyatt and Noah while working towards this degree, they have taught me what is really important in life-them.

Last but not least, I want to thank my wife, Robin. I started on the path towards a graduate degree two months before we were married. During this 10 ½ year journey, she earned three degrees (one from Northern Virginia Community College, and two from George Mason University), moved from a condo in Fairfax, to a house in Manassas, to an apartment in Blacksburg, back to our house in Manassas, and most recently to our home in Haymarket, and had two children. She has been my unending support, confident of my abilities even when I wasn't. This academic achievement would not have been possible, or even desirable, without Robin's love and devotion. She deserves this achievement more than I do. I love her, and am extremely proud of her.

Warren Vaneman

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