

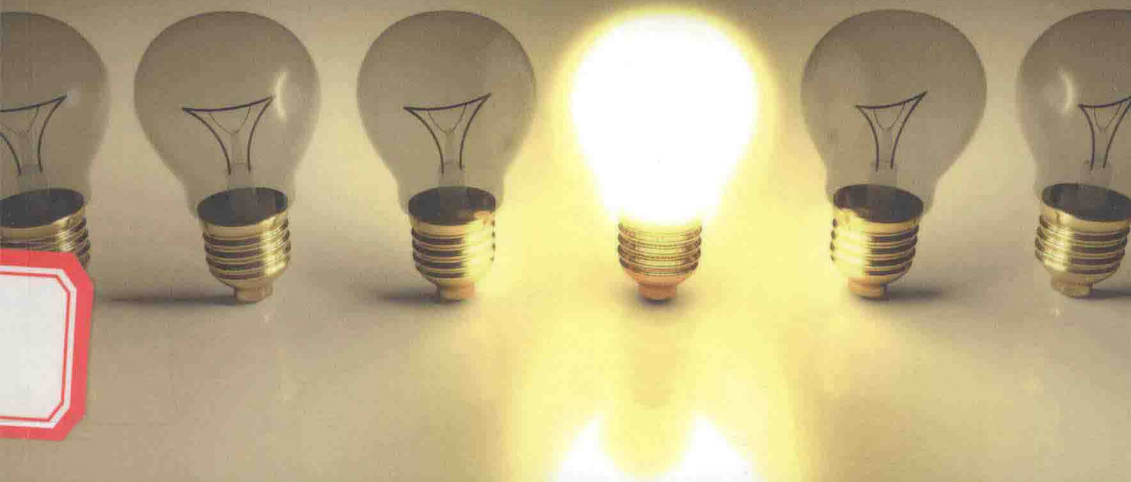
IEEE PCS Professional Engineering Communication Series

Traci Nathans-Kelly, Series Editor

The Fully Integrated Engineer

Combining Technical Ability
and Leadership Prowess

Steven T. Cerri



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and Leadership Prowess

Steven T. Cerri

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Foreword

I've been privileged enough to have been asked to write forewords to a number of books, but I've never been as excited to write a foreword before as I am in writing this one.

First of all, Steven is both a personal friend and a professional colleague of mine, so while I may be biased, in my personal and professional opinion, Steven is a gem. He has unbending integrity and outstanding skills, making him one of the most effective, efficient, and empathetic change agents I've ever seen or worked with in a room of professionals.

My work is centered around the art of change with individuals and organizations. For more than two decades, one of my main areas of focus has been what I call "the personal side of change" in large multinational organizations, as well as in numerous technical fast growth start-ups and more than a few entrepreneurial and family-held businesses around the world. This part of the change process, the personal side, is all about how you get people in the organization to buy into the change process, model and outcome, and furthermore, how to get everyone pulling together in the same direction to take the action necessary to create the intended results.

Regardless of how powerful the strategy and plan of action are for making changes happen in organizations, without the team that needs to implement them working together and taking the appropriate action nothing happens, or worst the organization devolves instead of evolving as planned. This same effect can be seen when trying to develop and launch a new product, or when trying to merge two organizations together, or even in just managing an existing product for maximum return on investment or growth. The team that's responsible for the outcome must do what's necessary to succeed.

The process we use to insure that the kind of successes I refer to above are realized is called *management*. This is where I have a problem with Steven's book, despite my great sense of pleasure in reading it and honor in being asked to write this foreword.

Steven has aimed his book at engineers and technical professionals who are transitioning from being in technical roles to becoming professional managers. In this regard, his book is outstanding on every level; that's not what my challenge with his book is about in any way, shape, or form.

My challenge is that Steven's book may get lost on every other manager and leader in the organization because they may think what he writes about here is only for engineers and technical managers. However, it can and will help them if they read it!

In fact, this may be the best book I've ever read about how to address the personal side of business, which is the skill set every manager and leader in any organization needs

to succeed. It isn't possible to move an organization forward at the current pace of the world without being able to connect with, communicate with, and move people ... and that's exactly what makes this book such a powerful resource.

Steven's book is a fundamental work on how people operate at the level of the beliefs and values that drive their action ... or lead to inaction. He has created a framework he calls, "personal behavioral subroutines" that defines how people get from data in the environment to the actions they take, or not. Then he translates this into a complete program on how to access one's own personal behavioral subroutines, as well as those of others, and step into the space of reorganizing them for success.

He's laid out this material in a series of short chapters with diagrams, explanations, exercises, and examples such that his book reads like a technical training manual for running the behaviors that lead to success in management, but at a level that makes the material remarkably accessible and easy to read, while also making it enjoyable to read. The diagrams alone are worth 10 times the cost of this book, and along with the text will make getting and absorbing what Steven's written, even the most technical concepts he's covered, an absolute walk in the park.

As an author of multiple books I know that this is no mean feat that Steven's accomplished, and hence my pleasure at writing this foreword. Simply put, this book should be in the hands of every organizational leader, manager or would-be manager ... and not on their shelf as some like to say. Instead, I recommend you keep it handy to pick up and review whenever you are unsure of what to do in a situation where you need to lead or guide others to creating outstanding outcomes. Leave it on the corner of your desk or the corner of your nightstand so you can access it at a moment's notice, I think it's both that relevant and that good, that once you've read it yourself you'll be forced to agree with my opinion.

As I said, I'm biased about Steven and his work. I personally know that this book represents the thinking of decades from one of the best minds I've ever encountered on the process of how to develop people in becoming world-class managers. While his record speaks for itself, this book gathers years of observation and insight on the art of management from Steven in a way that surpassed even my high expectation for what it would be before I read it.

I know as a reader, whether you truly are an engineer or a technical professional in a technical role, someone in any role in an organization moving up to a management position for the first time or a seasoned organizational leader or manager with many years of experience behind you already, what you glean from Steven's book from the first reading will be worth hundreds of times the amount of investment in time, energy, and money you put into it. In the next dozen or so readings, what you'll find yourself coming back to will likely make this one of the most valuable business books you'll ever come across or own.

In closing, I have just one final comment: plan on getting more than one copy if you're even thinking about loaning out to anyone, because once you do, you're going to have a very hard time getting it back.

Joseph Riggio, Ph.D.
Founder and President of Applied Behavioral Technologies, Inc.
Princeton, NJ

A Note from the Series Editor

With Steven T. Cerri's *The Fully Integrated Engineer: Combining Technical Ability and Leadership Prowess*, the IEEE Professional Communication Society (PCS), with Wiley-IEEE Press, continues its book series that aims to help engineering practitioners, instructors, and students alike with their technical communication efforts as they impact engineering work. However, *any* manager or project leader will certainly find gems of wisdom in this book, enabling active, positive change in workplace or classroom settings.

In my daily work, I have the privilege to see how engineering undergraduates, graduates, and practicing professionals (all levels) do their work. What intrigued me about Cerri's approach to retooling engineering practice was how spot on he was with the limiting actions that hold engineers back. He sees clearly how years and years of being a good student doesn't necessarily translate into being a good team player in a technical atmosphere beyond school. The breakthrough is how he asks people to recraft their approaches, acknowledging that shifting those old practices can be uncomfortable, and showing people how to methodically overhaul problem areas toward a fresh, collaborative, and productive work life.

Cerri's book combines the best of his many career talents: a career of engineering, an ability to see how engineering work gets done (or not done), and the patience and insight to help others move forward with their work and the satisfaction it can provide. Bringing all of these into alignment, Cerri's book is about good management skills, great communication skills (internal and external, for you have to communicate honestly with yourself before you can communicate well with others), and modes of action in the workplace that bring practitioners closer to solid engineering work.

The series has a mandate to explore areas of communication practices and application as applied to the engineering, technical, and scientific professions. Including the realms of business, governmental agencies, academia, and other areas, this series has and will continue to develop perspectives about the state of communication issues and potential solutions when at all possible.

All of the books in the fast-growing PEC series keep a steady eye on the applicable while acknowledging the contributions that analysis, research, and theory can provide to these efforts. There is a strong commitment from the Professional Communication Society of IEEE and Wiley to produce a set of information and resources that can be carried directly into engineering firms, technology organizations, and academia alike.

For the series, we work with this philosophy: at the core of engineering, science, and technical work are problem solving and discovery. These tasks require, at all levels,

talented and agile communication practices. We need to effectively gather, vet, analyze, synthesize, control, and produce communication pieces in order for any meaningful work to get done. Cerri's insights helps move that mandate forward, and we welcome his contribution to the series.

Traci Nathans-Kelly, Ph.D.

Preface

You are an engineer. You believe you are a good engineer. You received good grades in college. You know how to solve technical engineering problems. You have recently joined the workforce. You are ready to go, and you are convinced you are going to show everyone just how good you really are.

Or...

You have been an engineer for a while. You really like your work but you are being passed over for advancement for lead positions. Others are being promoted and you are told you are not quite ready, but that doesn't make sense to you. You have experience. You have been in the company longer than those who are being promoted instead of you. What is wrong with this picture?

Or...

You have been a lead engineer for a while. A portion of your time you spend performing engineering technical work as an individual contributor and part of your time you spend performing management/lead tasks. You think you are doing well, but when you and your team completed your last project, you were returned to full-time individual contributor technical work. You are no longer a lead. Did you do something wrong? Was this a demotion?

Or...

You are an engineering student and you want to know what to expect once you enter the work environment. You want to know what it will take to be successful once you land that engineering job.

Or maybe...

You are a manager and some of your employees seem to be stuck in a set of behaviors that keep them from contributing to the team in effective ways. Other engineers don't particularly enjoy working with them. They are smart but often work as loners. As their manager, you would like to understand what is holding them back and what you can do to assist them in moving from being purely technical to being a full contributor to the team and maybe even into management.

If any of the above scenarios describe you, then this book is just for you. Throughout my career as an engineer, scientist, manager, and leader, it has become evident that there is a set of thinking processes and behaviors that makes good engineers very good engineers. These are the thinking processes and behaviors that engineering schools teach. However, these so-called "good engineer thinking processes and behaviors" do

not necessarily make you a good team member or contributor or a good lead or a good manager.

I wrote this book because I saw—over and over again—engineers who thought that once they joined an organization, all they had to do to be successful was solve technical problems. They thought that all the organization wanted was their ability to bring engineering and technical solutions to bear. This is just not true. Organizations want more than just your ability to solve technical problems. They want you to be able to work well with others, to be a contributor on a team, to be able to control your behaviors and interact with others so that the team functions smoothly and effectively.

I wrote this book to give you the solutions to the misperception that what makes you a good engineer is sufficient to make you a good engineering employee.

This book describes, in detail, 15 thinking processes and behaviors that make engineers very good engineers. At the same time, these 15 behaviors make good engineers terrible team players, terrible contributors of ideas, and terrible leads and managers.

In this book, I list, describe, and unpack the 15 thought processes and behaviors that make you a good engineer and the 15 counter thought processes and behaviors that must be added to your repertoire in order for you to still be a good engineer while contributing to your team as a leader and manager.

This book is about making a transition from a very good engineer to a complete, fully contributing engineer. It is about making the transition from being a very good engineer to a fully effective lead and manager. I hope that my insights will teach you the skills not learned in college that are critical to your long-term success.

College taught you how to be a successful technical problem-solver. It probably did not teach you how to communicate well with others, or how to lead others, or how to get out of your own way.

In fact, I can't imagine an engineer or technical lead or manager for whom this book is not a perfect fit.

Enjoy!

Steven T. Cerri

Acknowledgments

This book is the culmination of a great deal of effort and input, and thanks are due to a variety of people and organizations.

Thanks go first to those who have made this publication possible. To begin I want to thank Wiley-IEEE Press for embarking on the path of producing a series of books to assist engineers in including in their careers more than engineering. In order to contribute engineering and technical knowledge to the betterment of humanity, more than just technical knowledge is necessary. To that end, Wiley-IEEE Press has developed an engineering and technical communication book series that focuses on providing just such knowledge; knowledge that is not generally taught in engineering curricula and yet, is essential for the successful engineering career. I owe thanks to Mary Hatcher, an original advocate of Wiley-IEEE Press, for initially reaching out to me to offer me this opportunity.

As part of the Wiley-IEEE Press I want to sincerely thank Traci Nathans-Kelly, my editor. Probably no one has ever been better at nudging me along without making me feel nudged. She is very good at what she does. And she allowed me to speak with my voice while at the same time ensuring that I spoke well.

Finally, this book is the culmination of one aspect of my career path and my life. This book is not the result of my interest in a topic and my commitment to conducting research on that topic and then writing a book on what I learned about that topic. There is no formal research in this book. There is only my life, my experience. And to that end, there are many who have contributed to what you will read in the chapters that follow because they have been an integral part and contribution to the experience of my life.

As is the case with most of us, my experience and therefore my career, begins with my family. At ten years old I became interested in rockets. My mother, Adele, would make trips to cigar stores to purchase expensive cigars in aluminum tubes. My father smoked the cigars and I used the aluminum tubes for the shell for my first zinc and sulfur propellant rockets. My father, Ivan, ensured that as my rockets grew in size, weight, and power, the machining and welding necessary were performed professionally at a machine shop, done to my specifications without me having to see a bill for the work. All I knew was that the machinists who worked there would chuckle as an eleven-year-old kid told them what he wanted them to do. And then there was my uncle, Joe, who ten years my elder, was my older brother, surrogate father, and helper in all those things a boy can't go to his parents for. He watched and encouraged me as I dreamt of traveling into space. These three people applauded and supported my choices, without

questioning or judging what I wanted to do. Their support ultimately has led to this book. Thank you.

Engineering should not be a basket of knowledge or a toolbox filled with mathematical, scientific, and engineering tools. Engineering is not merely knowledge. Rather, engineering is a way of thinking. The person who taught me most powerfully to think like an engineer was Professor Alfred E. Andreoli, my fluid dynamics and thermodynamics professor at Cal Poly, San Luis Obispo. By example, by modeling the thought processes he used when he was instructing us, he taught me how to think not just how to know.

Once out of college, as a young engineer, there were two senior engineers and a manager who mentored me and set me on my path to management, leadership, and ultimately the information you find in this book. Tom Logsdon taught me how to be creative with ideas and how to let my mind wander off in order to create. From Tom I learned that any idea was worthy of sunlight. Phillip Harding taught me how to be a good person while enjoying engineering and art and life; and he taught me how to argue powerfully for my position. And Sam Garcia; the Spaniard who left home after high school and sailed on a merchant ship for two years before going to college. Sam taught me how common sense can often outweigh technical information. Sam also taught me how managers think and how to take responsibility for my own work. These three men were critical to my first getting a glimpse of the fact that good engineering is more than just having the right answer to a technical question.

I also am indebted to Susan Ackerman, without whose help and guidance this book would not exist. She taught me the fundamentals of Neruo-Linguistic Programming, which changed my life. Her wisdom, toughness, and gentleness were just what I needed and what she taught me set my career on an expanded pathway.

I owe much to Dr. Joseph Riggio, who is my friend and my teacher. He is a master of change work, of which I only scratch the surface in this book. There are people who intersect our lives and things are never the same. First they become our teachers and then they become our friends. Joe is one of those people, and the magic is that I can never tell when Joe is being my friend and when he is being my teacher.

I owe thanks to Dr. Gary Hansen, past dean of the Technology Management Program (TMP) in the Engineering Department of the University of California, Santa Barbara, California. Dr. Hansen gave me an opportunity to teach my material to a multidisciplinary group of undergraduate and graduate students in the TMP and it was one of the highlights of my career. Some of the material I taught is in this book. While the processes I present in this book were refined over the years as a manager and trainer and consultant, teaching at UCSB allowed me to fully apply these processes to students from a wide variety of disciplines and majors and to see that it works. It works very well, indeed.

I want to thank Christine Testolini-Kopec who always encouraged me while expressing mild surprise when this book became more than just my wistful musings.

Finally, to have a daughter with whom a parent can discuss their life's work as if they are talking to a peer is truly a gift. McKenzie is such a gift. Thank you, McKenzie, for our discussions and your ideas and for being a sounding board for me. You may not

have known it when our discussions were occurring or when I watched you present your ideas to me and to others, but you have truly been a gift to me.

There are many, many more people who have helped me along my path and whose efforts have been instrumental in helping me to produce this book. They have been part of my journey on this topic to this point. Thank you. Thank you all.

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What You Learned in College Is Limiting Your Growth As a Technology Professional

If you are an engineer, scientist, or technologist, at some point in your career, you will realize that what you learned in college is not enough to establish a successful, long-term career. Advancing your career, whether you want to remain technically focused or you want to become a manager, demands that you take off the technology blinders and give up the habits that you perfected as a technologist.

The typical path for engineers, scientists, and technologists once they leave school and enter the workforce is as follows. You begin your career as a technical *individual contributor*. You focus on your own individual contributions and you do your best to do a good job.

If you are successful as an individual contributor, often, you are given additional responsibilities, perhaps as a team lead or project manager of a small project. At some point, after having been given this additional responsibility, you realize that you are not as successful as you thought you would be. People do not listen to your directions, your project schedules slip, your meetings are difficult and ineffective, and you are stressed. Plus, you are not doing nearly as much technical work as you were doing before your “promotion.” You begin thinking, “Just let me get back to my engineering work. That used to be so much more fun.”

This situation is often the result of believing that what you learned as an engineer will also make you a good and successful manager or leader or long-term technologist.

You assume that the behaviors that made you a successful individual contributor will also make you successful as your career advances. They will not.

The first step in getting out of this fix and moving to success is to understand that there is something missing from your current abilities, and, therefore, something needs to be added. You need to make a shift. In order to make this shift, you must understand what you are doing now and what you need to add in order to change your behavior. This book will provide you with that information. It will highlight behaviors that make you a good engineer but will keep you from being successful long-term in related endeavors. It will also provide you with insights into what new beliefs and attitudes you need to add in order to be successful long-term.

When you were trained to be a successful engineer, scientist, or technologist, you learned to look and pay attention to hard, quantifiable, unambiguous, and repeatable data that you generated, analyzed, and counted on to do your work. This is what school taught you and this is what it means to be a competent engineer, scientist, or technologist.

But, as your career grows, you need to grow, too. If you want to be someone who can fully contribute to a team, who can manage projects and others, and who can lead a team or organization, the information that you will have available will often be, at best, fuzzy and less than ideal. In fact, in the non-technical world of effective communication, contribution, management, and leadership, there is often no way to turn that fuzzy, unreliable, and less than adequate data and information into clear, reliable and sufficient data that can lead to certainty in decision-making.

Successful engineers are looking for reliable, unambiguous, quantifiable data. Successful team contributors, leaders, and technical managers know they have (at best) fuzzy, unreliable data. The world of the engineer is built on certainty. The world of the long-term engineer, the manager or leader, is built on the understanding that some decision must be made with a level of uncertainty.

The role of engineers is to build the product, or to solve the problem, based upon quantifiable parameters and data. On the other hand, the role of technical managers or leaders is to drive the organization they lead into an unknown future and to bring together the resources at their disposal/command even when that outcome may seem unreasonable or unreachable to others.

Most engineers believe they can count on improving and perfecting their skills and advancing their careers by taking one step after another, doing what they were taught in school. They believe advancement is a logical step-by-step process into the future.

However, advancing your career represents a broadening of perspective and often involves a **phase shift** in your thinking. And that phase shift is a shift to embrace ambiguity and the lack of a precise, right answer to all questions and problems. It will require making decisions without as much "real" data as you would like. In a nutshell, it will require the application of judgment.

In fact, as an individual technical contributor, you are paid for providing the "right" answer. As a long-term technologist, or manager, or leader, you are paid for the application of your judgment when there is no "right" answer but only answers that work, some better than others.