

The Entrepreneurial Engineer

The Entrepreneurial Engineer

**Personal, Interpersonal,
and Organizational Skills for Engineers
in a World of Opportunity**

David E. Goldberg

The University of Illinois at Urbana–Champaign



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To the penguins

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Foreword

If there was ever a time for this book it is now. With the United States facing continued pressure to follow the global outsourcing trend, the country must adapt to maintain its edge as a global innovator. But how?

A cultural renaissance that effects the venerable educational and corporate institutions is required. Technology, whether it is bits and bytes or biosciences, has pervaded society and continues to drive progress. The traditional role of the number-crunching or code-writing engineer, who was employed by the thousands by large corporation, is quickly becoming extinct. Trends such as Open Innovation, in which Fortune 1,000 companies are increasingly looking outside for innovation and new intellectual property, are taking hold across the country.

Dr. Goldberg provides the roadmap for engineers of the future to stay at the front of the wave by learning to think more like entrepreneurs. By definition the entrepreneur is accustomed to—if not thrives in—a messy world where innovation and application intersect to produce transformation of products, companies, and industries. Required skills include understanding the business impact of the innovation and communicating ideas in a clear and compelling manner.

However, skills are not enough. The main message of this book—and the secret that Dr. Goldberg is conveying—is that the passion for the idea, doing what you love, and having the persistence required to bring ideas to reality are the fuel of innovation. Without them, the world will not change, and the idea will stay in the notebook.

Consider this book your survival handbook for the rest of your life. Onward and upward!

Tim Schigel
Cincinnati, Ohio

Preface

This book and its predecessor *Life Skills and Leadership for Engineers* (Goldberg, 1995), owe their writing to my first engineering job out of school at what was then a small entrepreneurial engineering-software firm called Stoner Associates, Inc., in Carlisle, Pennsylvania. I remember thinking before I started how technically exciting it was going to be to work on four complex hydraulics computer programs. I remember wondering shortly thereafter if other engineers spent so much of their time writing, talking, selling, meeting, and worrying about building our customer base. At one time, I thought my experience at Stoner Associates was a bit extreme, but I've come to realize that it was a precursor of the experiences that more and more engineers face every year. Today's engineer is challenged by a hectic pace at work, direct involvement in business matters, and by a large amount of personal contact, meetings, reports, and presentations.

The key thesis of this book is that today's engineers are confronted by and expected to participate in a world of opportunity, opportunity driven by technical change, enabled by financial and business prowess, and implemented through skilled, collaborative labors. Although it was never right to send engineers out into the workforce thinking that math, science, and design were the totality of an engineer's portfolio, to do so in today's marketplace is a form of educational malpractice. Fortunately, there is a growing awareness of the need to alert engineers early in their education and in their careers to the importance of mastering a balance of technical and nontechnical skills, and this book aims at the latter kind with the goal of creating a new breed of *entrepreneurial engineers* who mix strong technical skills, business and organizational prowess, and an alert eye to opportunity.

The book is designed for use in a classroom setting or for self-study in a variety of ways: (1) in a one-credit course to be given to undergraduate engineering students a year or so before they graduate, (2) as a supplement to an introductory engineering class for underclass students, (3) as a supplement to a three- or four-credit senior capstone course, (4) as a supplement to a graduate seminar, (5) as part of course materials for corporate training or continuing education for engineers, and (6) for self-study by engineers and their mentors. No particular prerequisites are assumed, although upon occasion common engineering terms are taken for granted, and mathematical ideas from first-year calculus are used.

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