



# Business Systems Engineering

MANAGING  
BREAKTHROUGH CHANGES  
FOR PRODUCTIVITY  
AND PROFIT

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**GREGORY H. WATSON**

*Author of Strategic Benchmarking*

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BREAKTHROUGH CHANGES  
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*To Jeff and Ginger Watson, my twin brother and his wife of over 25 years, in appreciation for their shared values, mutual commitment, and long-standing, supportive, loving relationship that has produced a great outcome: three wonderful young men—  
Ted, Steven, and Brian.*

# Acknowledgments

*To hold on to the Way of the present—  
To manage the things of the present,  
And to know the ancient beginning,  
This is called the beginning of the thread of the Way.*

Lao Tzu, *Te-Tao Ching*

Each of us is the product of his or her history, environment, and relationships. We develop our own working style through role modeling things that we observe and like in others. This means that no book is the individual product of a single author, but is the result of many interactions with a variety of mentors and colleagues. In particular, this book is the product of many experiences that began during my service in the United States Navy, developed into a business focus at Hewlett-Packard, blossomed into a managerial perspective at Compaq, and matured into a broader executive viewpoint at Xerox. I have been blessed with many wonderful experiences in each of these organizations and am grateful for the opportunities that I have had to participate, observe, and learn from others.

Dr. C. Jackson Grayson deserves a special acknowledgment for his continuing encouragement and support. Jack has been an inspiration to me both personally and professionally. His driving dedication to the improvement of the United States economy through the application of quality principles has been a major influence on my own thought processes. In particular, he has helped me to understand the business impact of quality in terms of productivity. Thanks, Jack.

Many others also deserve a word of thanks—especially some colleagues from Xerox. Dick Leo, my boss at Xerox, provided a wonderfully stimulating environment for rethinking quality and business relationship issues within the context of Paul Allaire's architectural changes of Xerox. Over the past two years, I have had some wonderful

conversations with members of the Xerox quality community: Dick Palermo, John Swaim, Art Coles, John Cooney, Mark Shimelonis, Dottie Elias, Masataka Yoshizawa, Dave Terry, John Thomas, Tom Lynch, Denny Gerbassi, Kevin Lewis, Sam Malone, Mike Haravich, Tim Gilbert, Rich Menefee, and John Hansen. They have helped to hone my understanding of management and change initiatives that are facilitated through the combination of strategic benchmarking, quality assessment, and policy deployment. In addition to these direct colleagues, discussions with some of the individuals who have implemented the systems approach to business process engineering have been helpful including: Ennala (Ram) Ramcharandas, Constantine Kazatas, Claudette Ettenberg, Mary Colecera, Cindy Gordon, Bill Joiner, and Ted Richman. Many of these discussions and considerations have spilled over to influence my way of thinking about the management of business change. Norm Rickard deserves a special expression of appreciation in his role as president of Xerox Business Services for the quality way in which he has developed an empowered environment for individuals to grow and contribute to the future success of Xerox through productivity enhancements.

This book was developed through the encouragement of Mike Hamilton, senior editor at John Wiley & Sons, who saw the need for a more detailed description of the "hot topic" called Business Process Reengineering. This work has profited from the efforts and insights of those whose earlier books have preceded it. In particular, this book supports and further refines the concepts found in Michael Hammer's popular book, *Reengineering the Corporation*, that brought broad exposure for the practice of Business Process Reengineering. As Mike Hammer has been the evangelist preaching the need for radical redefinition of business processes, it is my hope that this book will extend the "religion" into a business practice that is capable of being grasped by all organizations.

I would like to provide a brief explanation of the reason I selected the writings of Lao Tzu to introduce each chapter. Lao Tzu is an anonymous "old master" who wrote the *Te-Tao Ching* or "the book of the way and its power" around 300 B.C. He addressed this book of poems as a guide to the thinking of those who would take leadership positions in Chinese society. The underlying current is about the responsibility of leadership for making change happen on a grand scale. I selected some of the excerpts from this religious text to introduce common themes that appear in business today. Many of the challenges

facing the leaders of early China are the same challenges that face senior management as we approach the twenty-first century. I appreciate what the “old master” recorded in his poetic musings on the nature of change and wanted to share them with the readers of this book.

Preparing real case studies is one way to ground the ideas of a subject in the basis of reality. I owe much gratitude to the following individuals who provided insights and assistance in the development of the case studies: Paul Schattenberg, Phil Grossman, Bill Flynn, George McCall, Ken Graham, Linda Bond, and Rebecca P. Cartall—all of USAA; and Bob Beach, Nemo Azmanian, and Nora Hahn of Compaq.

In addition to those who have stimulated my thoughts, a whole cast of characters has provided support from the pragmatic perspective of producing a book. In particular, I would not have been able to produce this book without the dedicated case study writing support from Gary Taylor, a freelance writer in Kerrville, Texas, and a friend from shared days at Compaq Computer Corporation. I also appreciate the efforts of Joy Holland of the American Productivity & Quality Center, who provided able assistance in background research. The management of the administrative details of publishing a book go well beyond my abilities to research or keyboard on a word processor. Special appreciation goes to Impressions for their support in guiding this book to its final form.

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Gregory H. Watson  
*Victor, New York*

# Preface

*As soon as we start to establish a system, we have names.  
And as soon as there are set names,  
Then you must also know that it's time to stop.  
By knowing to stop—in this way you'll come to no harm.*

Lao Tzu, *Te-Tao Ching*

It seems that every magazine or journal I pick up today has a leading story on the subject of Business Process Reengineering. Ever since Michael Hammer's 1990 article in *Harvard Business Review* ("Reengineering Work: Don't Automate, Obliterate," July/August 1990) announced the topic and promoted the phrase—Business Process Reengineering (BPR)—it has grown in both popularity and application. Because he came from an information technology background, Hammer focused on information technology—computer systems and software—as the driver of Business Process Reengineering. Since this initial statement of the subject, interest has grown to include other professions: Industrial engineers, quality managers, and human resource managers all have jumped on the "reengineering" bandwagon. Each community has taken a parochial perspective to the subject, seeking to carve out a niche in the overall reengineering effort. But, no matter what perspective has been taken initially, the final result appears to have a similar emphasis; it takes a cross-disciplinary and cross-functional approach toward reengineering to enable it to address the needs of the entire organization. This includes aligning customer needs with business processes to eliminate waste and cost, and to reduce cycle time, thereby driving the improvement of productivity that provides an opportunity to achieve the business goals of both profitable revenue growth and market share expansion. And, of course, the end result is one that everyone agrees is good for almost any organization.



That's why Business Process Reengineering is a hot topic in today's business discussions. Everyone has questions, opinions, stories, or myths about the subject. So why add another book to those already released? Because I found the previous books to be missing some basic linkages to organizational principles—and some of those have proven themselves over the years. In short, I believe that we should firmly ground our “advances” in their historical context, before we rush to embrace a “new” approach to organizational development.

This book is different from the previous writings on the subject of reengineering primarily because I regard the term “reengineering” a misnomer. I believe that the term *business systems engineering* is a more accurate description of the work activity that is needed in most organizations. Moreover, I prefer a systemic or holistic organizational view by merging the contributions of all business change support disciplines into a single, unified approach for delivering breakthrough business systems change. And finally, I build upon the language and methods of the Total Quality Management (TQM) worldwide movement as the context for change that most major business organizations have adopted and deployed throughout their ranks. By building upon the language and methods already placed within many working team structures, this approach finds many natural allies who can readily accept the methods and are therefore more willing to focus on delivering the desired changes.

This book is divided into five parts. In the first part, the roots of business systems engineering are described: learning, change management, innovation, productivity, competitiveness, and quality. This part demonstrates that business processes can be represented as open systems that are capable of improvement and adaptation. In the second part, the foundations of business systems engineering are described: its needs, structure, and elements. This part demonstrates how to represent business processes as systems in order to identify needs and select initiatives for strategic change. In the third part, tools of business systems engineering are presented: process analysis methods for work redesign, benchmarking for external learning, information technology advances that have changed the workplace, and policy deployment that is used to coordinate, implement, and review breakthrough change efforts. This part demonstrates how to make the change happen through the coordinated use of analytic tools. The fourth part of this book provides a potpourri of case studies that grounds this theory of business systems engineering in reality and describes how various or-

ganizations have applied aspects of this methodology. A survey of the automotive industry illustrates how change within one company can influence the actions of competitors. A second case study illustrates how Motorola used the principles of systems engineering to increase the competitiveness of its pocket pager line in the mid-1980s. A third case study illustrates the need for rapid action when faced with rapidly changing market conditions, as Compaq Computer Corporation needed to redo its entire business within less than a year. A final case study illustrates how United Services Automobile Association (USAA) has learned from its past “reengineering” efforts to build its strategic change upon the foundation of its quality methodologies. These case studies illustrate how companies have made system-level changes happen using some of the tools that are described in the prior section. The final part describes lessons learned from these case studies, presents an implementation methodology, and then pinpoints the most pressing management challenges for strategic business change in today’s economic environment. This part provides an economic basis for a new perspective on productivity that is based on a systems approach and recognizes the contribution of the knowledge worker.

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PART I

Introduction



# I

## Learning: The Root of Change

*Disaster is that on which good fortune depends,  
Good fortune is that in which disaster's concealed.  
Who knows where it will end?  
For there is no fixed "correct."  
The "correct" turns into "deviant";  
And "good" turns into "evil."  
People's state of confusion  
Has certainly existed for a long time.*

Lao Tzu, *Tz-Tao Ching*

### **REENGINEERING OR ENGINEERING?**

What is "reengineering" and how can we "reengineer" a business process if we have never engineered it in the first place? I faced this interesting dilemma when I was attempting to develop a training course on the subject of Business Process Reengineering (BPR) for use at Xerox Corporation. I discovered that Xerox was using seven different approaches to reengineering—one for each consultant who had captured its business! In order to provide clarity of language for all of the Xerox employees who had long-standing experience using the tools of Leadership Through Quality, I devised a simplified approach building upon this methodology. This resulted in a simplified, work-process centric model for engineering the business as a holistic system. It is built upon the tools and processes of both industrial and quality engineering that were deployed to support the efforts of Xerox teams

in the continuous improvement of their business processes. As if to confirm the approach that I defined at Xerox, Robert C. Stempel, former chairman and chief executive officer of General Motors, made the following observation: “As companies we have to do more than reengineer the work process, we must create a whole new attitude about how we learn. . . . For example the word ‘reengineering’ is nothing more than a wholesale acknowledgment that we did not do it right the first time. More importantly, it gives us permission or official sanction to do it again. Of course, speaking as an engineer, it also assumes that we engineered it in the first place.”<sup>1</sup>

While discussing this systems engineering approach to business with senior management from other companies two trends became clear: first, that an information-technology centric approach to Business Process Reengineering was dissatisfying and, second, that a systems engineering approach was more congruent with Total Quality Management (TQM) language and methods. This observation raises two very interesting questions. First, should it be important to build change methods upon an organization’s history of lessons learned? While others may argue that it is time to move beyond TQM—some say by eliminating TQM practices—I believe that the benefits to organizational restructuring should be grounded in what has come before. The second question is also provocative: How is a holistic, business-process centric approach distinguished from the more popular information-technology centric approaches that are commonly discussed today? The answer to the first question is embedded within the concepts of adult learning theory, while the answer to the second question is found by contrasting the systems engineering methodology against the mainstream, information-technology centric thinking about process reengineering. Let’s begin our discussion on the methodology of business systems engineering by looking at the concepts behind learning organizations and reviewing some of the literature on Business Process Reengineering.

Adult learning theory holds that the experience of discovery is the best teacher for adult learners and that grounding new learning in past experience is a solid approach to getting people to learn how to change. Learning involves change—in particular, it is a continuing process of change within individuals by constantly restructuring experience to create an environment in which people recognize the lessons that they need to learn and apply them within the context of their own need. Learning has become recognized as a process of active, rather



than passive, inquiry by the participants. Over the years, the emphasis on learning has shifted from the model where the role of the teacher is “subject authority” to a model where the teacher is the “facilitator of learning.”<sup>2</sup>

Thus, adult learning theory helps us to answer the first question: By anchoring the process of “reengineering” in the historical lessons learned by individuals who have been practicing TQM, we are providing an experiential context to which the vast majority of employees can relate as opposed to the more technical focus of the information-technology centric approach, which tends to generate technophobia among a great majority. In simpler terms, the systems engineering approach provides a natural transition from TQM applications of continuous improvement at the process level to the systems level of breakthrough change. There is continuity in the methodologies of TQM and systems engineering even though its application may be slightly different.

This leads naturally to the second question: What is the difference between these two approaches—process reengineering and systems engineering?

Michael Hammer, the leading proponent of Business Process Reengineering, defines it as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as quality, cost, service and speed.”<sup>3</sup> At the heart of his definition is the idea of *discontinuous thinking*—“identifying and abandoning the outdated rules and fundamental assumptions that underlie current business operations.”<sup>4</sup> Hammer seeks ambitious solutions that provide breakthrough levels of improvement, encourages reengineers to start with a clean sheet of paper rather than the old process and structure (which wasn’t working anyway), and recognizes that information technology is the key enabler that allows organizations to do work in radically different ways. The fact that a process wasn’t engineered in the first place, however, does not mean that it is ineligible for treatment by “reengineering.”

The first major distinction between the ideas of Business Process Reengineering and the systems engineering approach was hinted at in the preface to this book. Hammer and Davenport<sup>5</sup> both provide methods of reengineering that are developed from the perspective of the chief information officer. They present information technology as the solution to as yet undefined problems—they put the technology in the driver’s seat and seek solutions where it can apply. The approach