LEAN ENTERPRISE SYSTEMS

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Using IT for Continuous Improvement

STEVE BELL

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Society has reached the point where one can push a button and be immediately deluged with technical and managerial information. This is all very convenient, of course, but if one is not careful there is a danger of losing the ability to think. We must remember that in the end it is the individual human being who must solve the problems.

Eiji Toyoda, 1983

Contents

Foreword, by Carol Ptak xi

Preface: The Goal of This Book xv

Part One: Building Blocks of the Lean Enterprise 1

1. Lean and IT: the Human Factor 3

A Healthy Process 5
Back to Chicago 7
Where Points of View Intersect 12

2. Realizing the Value of Lean 15

Elimination of Waste 16
Dr. Deming and Continuous Improvement 21
Theory of the Month Club 28
The Economic Impact of Lean 32
Beyond Manufacturing 33
Why Is IT Important for Lean? 36

3. Three Stages of Lean Evolution 37

Stage 1: Lean Operations 38
Stage 2: Lean Enterprise 45
Stage 3: Lean Network 55
Stage 4: IT and Lean Maturity 64

4. Fundamentals of Production and Inventory Management **73**

The Product/Process Continuum 73
Inventory Management Basics 81
Bill of Materials (BOM) 87
Material Requirements Planning (MRP) 89
Sales and Operations Planning (S&OP) 98
Master Production Scheduling (MPS) 102
Capacity Planning 107
The Integrated Planning Process 112
The Lean Transformation 114

5. Lean Planning and Execution **117**

The Need for Careful Planning in a Lean Environment 118
Flow Production Basics 122
The Lean Planning Model 137
Kanban Essentials 140
The Lean Job Shop 152
Discontinuous Scheduling 168
Theory of Constraints (TOC) 174
Bringing It All Together 185
Variations on a Lean Theme: CONWIP, SMP, and POLCA 193
Searching for the Right Scheduling Software? 203
The Transition to Lean 208

Part Two: Building Blocks of Information Systems **215**

6. Charting the Enterprise Software Universe **217**

Enterprise Resource Planning (ERP) 217
Customer Relationship Management (CRM) 222
Product Lifecycle Management (PLM) 229
Product Configurator 238
ERP, CRM, and PLM Working Together 242
The Copernican View 244

7. Integrating the Value Streams **249**

8. Managing Knowledge for Competitive Advantage **269**

Part Three: Managing Change with IT 297

9. The Event-Driven Lean Enterprise 299

Automated Data Capture 299
Event Management 309

10. Linking Strategy with Action: Performance Management 321

The Hunt for ROI 321
The Painful Annual Ritual 326
Sales and Operations Planning 329
Lean Accounting 330
The Balanced Scorecard 333
How Performance Measurement Leads to Performance Management 336
Hoshin Planning 342
The Matrix Organization 347
The Ideal Performance Management System 350

11. Lean IT: Applying Continuous Improvement to Information Systems 355

The Challenges of Traditional IT 356
What is Lean IT? 364
Guiding Change with Lean IT 371
Applying Lean IT to the Lean Enterprise 379

Postscript: Zen and the Art of Lean 387

The Search for Quality 389
A Prescription for Lasting Change 393

Acknowledgments 399

Acronyms 401

Endnotes 405

Index 417

Foreword, by Carol Ptak

Lean Enterprise Systems: Using IT for Continuous Improvement describes the application of Lean principles, with the aid of information technology, to improve the performance of *any* business in *any* industry. Lean methods first emerged in manufacturing with a laser-like focus on waste reduction. Not only was waste reduced, overall productivity and quality improved. The greatest gains were realized in those companies where the primary focus was holistic demand flow rather than simply cost reduction. These companies looked beyond the islands of shop floor productivity, creating real value for the customer by enabling the smooth reliable flow of material and information across the entire enterprise.

Recent events cause us to examine the continued rise in productivity worldwide and question how a competitive advantage can be won and maintained. USA employment in manufacturing peaked at 19 million in 1979 and has been on a downward trend since. The most common cause cited is outsourcing and offshoring to countries like China and the Far East. However the real situation is more overwhelming than that. Between 1995 and 2002 over 31 million factory jobs disappeared from the top 20 global economies. During those same years global productivity increased by 30%, while American productivity increased 20%. This pattern has been seen before in the agriculture industry. In 1810 the population in the US was 11 million with 85% of people in agriculture—it took 9 million people to feed 11 million plus providing substantial exports. In 2001 only 4.8 million US agricultural workers fed 290 million while continuing to provide substantial exports. In addition to this continued rise in manufacturing productivity, significant capacity has been added in China, Korea, Malaysia, Thailand, Vietnam, and the eastern European countries. Not surprisingly the world of scarce capacity in the mid 1990s has been turned

upside down, and now manufacturing capacity is plentiful around the world. (Data source: US Census Bureau and Rochester Center for Economic Research).

The technological world has also evolved dramatically in the last five decades. A tight relationship exists between computing power and the availability of new technological tools. Rudimentary MRP (Material Requirements Planning) systems emerged in the 1950's, and evolved to closed loop MRP as computer systems increased in power to include capacity planning. When financial capabilities were integrated in the 1980's, comprehensive systems developed called MRPII (Manufacturing Resource Planning). Soon after, computers continued to increase in power, making it possible to manage and track all the resources across an enterprise using ERP (Enterprise Resource Planning) systems. By the mid 1990s, the software industry recognized that if scarce capacity could be kept working on the most profitable parts, the manufacturing enterprise should realize dramatic bottom line results. Due to the memory resident calculation capability that was now possible, sophisticated APS (Advanced Planning and Scheduling) systems were developed.

On a parallel path, new ways of doing business have developed. With lessons learned from the early Henry Ford manufacturing days combined with the quality lessons of W. Edward Deming, post-war Japan began to redefine the manufacturing industry. Taiichi Ohno and Shigeo Shingo launched what would later become known as the Toyota Production System. By the late 1970's in the USA the emergence of Just-In-Time was seen with great successes at early adopters such as Hewlett Packard. Manufacturing costs began to shift from labor to materials as manufacturers focused on improving productivity and reducing cost. A few lone voices in the wilderness advocated this different vision of manufacturing. John Costanza began to evangelize Demand Flow™ manufacturing and openly criticized the MRP systems of the day with his "No MRP" buttons. Dick Ling developed and advocated the idea of sales and operations planning to truly exploit capacity for profits—an idea only now seeing support from commercial software. Dr. W. Edwards Deming came back to the USA to begin his quality crusade work after his amazing success transforming the meaning of "Made in Japan" from cheap, poor quality goods to a "Lexus quality" standard. His work was the foundation behind the popular Six Sigma improvement concept today. In 1984, Dr. Eliyahu Goldratt shocked the world with his business book that was a novel, *The Goal*, introducing the Theory of Constraints (or was that a novel that was also a business book?). In either case, it taught the lesson that a focused goal and the constraints to achieve that goal must be identified and managed. How many forget this common sense and suffer for it?

Early adopters of these emerging ideas from the past few decades leveraged pilot projects to learn how to embrace these new business rules. The early results were nothing short of amazing. However, as quickly as the champion for that specific approach left to pursue new opportunities, or as companies were merged and acquired, these successful pilot projects fell by the wayside

and the early improvements quickly deteriorated. Technology was often viewed as part of the non-value added baggage to be eliminated, rather than as simply a tool to help achieve and sustain the positive change. Unfortunately, these innovative approaches often failed to become common practice and the company suffered as a result.

Today, labor is less than 10% of manufacturing cost—down from 60–70% just 50 years ago. The focus on improving labor productivity now often yields insignificant marginal benefit. Companies must learn to compete on their ability to identify profitable opportunities in the marketplace and respond more quickly than their competition. Lead time is now a great challenge; expectations of months are now weeks, weeks are now days, and days are now hours. We are witnessing a startling convergence today of fundamental issues into a perfect storm. Around the globe many companies in many industries are struggling with the very same competitive factors:

- **Customer Power**—access to real-time information through the Internet has irrevocably shifted the global balance of power to the customer. Customers can now demand what they want and the price they are willing to pay.
- **Worldwide Overcapacity**—This is due to productivity gains of established companies from operational improvement and incorporation of automation combined with the addition of significant new capacity in Latin America, China, Asia and Eastern Europe.
- **Market Volatility**—due to the significant reduction of transactional friction from the advances in technology, the world has become a buyer's market. Now there are constantly emerging new demand patterns for sourcing and outsourcing which extend the physical supply chain while simultaneously compressing overall product lifecycles.

There is only one way to establish lasting competitive advantage in this new reality. Each company must exploit their unique capability to develop a win-win relationship with the customer that solves customer problems while providing profit for themselves. The relentless compression of product and transaction lifecycles means that the complex and iterative forecasting, planning, and push scheduling approach must be replaced with a more strategic planning process supported by quick response, demand-driven, Lean manufacturing throughout the supply chain. To survive and thrive in this new world, a company must combine this vision of how their unique capabilities can be profitably exploited to provide value for their customers with clearly aligned business practices and supporting technology.

Lean Enterprise Systems: Using IT for Continuous Improvement describes the synergistic impact of technology and Lean business practices. This book provides in-depth discussion of Lean as well as the requisite technology necessary to sustain the improvement momentum. No longer is it possible to exclude technology from the Lean approach. However, a different kind of

technology is needed. This book describes in depth what that technology should be.

Although the Lean improvement process has its roots in manufacturing, *Lean Enterprise Systems* expands the application of these techniques to all industries. The pragmatic approach taken in this book incorporates best practices and ideas from other management disciplines like Six Sigma, Theory of Constraints, and Sales and Operations Planning into a blended approach. The overall implementation process is fully described with expectations and pitfalls clearly outlined.

Lean Enterprise Systems: Using IT for Continuous Improvement provides a very complete summary of current Lean improvement techniques as well as providing innovative thought leadership. This is a book that should be on the desk of every manager thinking about a Lean project or in the process of implementing Lean. It is a reference that you will consult often. The author has a genuine passion for the subject and it clearly comes through in this work. Read and enjoy!

Carol Ptak, CFPIM, CIRM, Jonah

Carol Ptak is a past president and CEO of APICS and former Vice President of Manufacturing Strategy for Peoplesoft Corporation. She is the author of MRP and Beyond, *and* ERP, Tools, Techniques and Applications for Integrating the Supply Chain *(Second Edition)*. Necessary but not Sufficient *was co-authored by Dr. Eli Goldratt, Eli Schragenheim and Carol Ptak. Most recently she was integral in the update of John Constanza's book* Quantum Leap. *She is the 2005–2006 Executive in Residence at Pacific Lutheran University in Tacoma, Washington.*

Preface: The Goal of This Book

During the two years spent researching and writing this book, I was often asked: "Who is your audience, and what will they take away from this book?" After all, this topic is so vast, bridging the disciplines of operations, information systems, and business management, that without a clear focus it could easily consume hundreds of pages without delivering specific value to an individual, team, or enterprise.

In this book I will demonstrate how the techniques learned from the evolution of Lean Manufacturing, combined with *Lean IT* practices, will continuously improve Lean Enterprise performance in any industry. The goal of this book is to help *all* enterprises, not just those in manufacturing, leverage Information Technology (IT) to improve business performance in ways that add significant value to the customer. IT alone will not solve a company's problems; in fact, if not judiciously applied, IT can introduce more problems than it solves. For an enterprise seeking to achieve *sustainable* competitive advantage, the foundation of all solutions may be found in the continuous improvement of *people*, *processes*, *and technology–in that order*.

This book serves as a practical guide not only for large enterprises, but for small and medium-sized companies that nurture entrepreneurial spirit and innovation. These smaller companies face the same complexity as their larger counterparts, yet they lack the resources to afford dedicated change management teams and expensive enterprise information systems. They cannot absorb the impact of a significant project failure, or even second-rate results.

Lean is no longer just for repetitive manufacturers. Lean techniques and supporting software capabilities have matured, and many enterprises are now extending the benefits first realized in Lean Manufacturing into all industries, including low-volume and high-mix job shop manufacturers, distributors,

retailers, service providers, and others. Necessary for this Lean evolution is the effective and flexible management of information. Information technology tools and techniques have matured, and an enterprise can now achieve agility and return on investment without the frequent and traumatic software replacement cycles of the past. New approaches to Lean IT, many derived from the lessons of Lean Manufacturing, allow us to build long-lived and adaptable information systems that stimulate continuous improvement.

How do we build and then continuously improve IT, so it is capable of enhancing Lean performance without introducing unnecessary complexity and waste? How do we design an information system that enables the enterprise to adapt quickly to sudden threats and market opportunities? How can *Lean IT* help companies deliver excellent customer service and value, and create competitive advantage? How do we develop and nurture an integrated environment of people, processes, and technology that enables us to continuously improve?

Follow me, I'll show you.

HOW THIS BOOK IS ORGANIZED

This book is divided into three parts, exploring how people, processes, and technology combine forces to enable continuous improvement:

In Part 1: Building Blocks of the Lean Enterprise we'll examine how to *improve processes* throughout the value streams of the Lean Enterprise. We'll look at the essentials of Lean, explore continuous improvement techniques, and the advancement of Lean techniques from the shop floor to the global supply chain. We'll discover where, when, and how Lean IT can add substantial value to the Lean Enterprise through integrated processes of planning, scheduling, execution, control, and decision-making, across the full spectrum of operations.

After reading Part 1 you should be able to:

- Develop teams and begin mapping your own value streams, illustrating and quantifying the complementary flows of material and information throughout the enterprise.
- Understand how Lean principles may be applied to reduce supply chain waste and improve performance.
- In Chapters 4 and 5 (which focus on Lean *Manufacturing* techniques) learn to deploy a variety of scheduling, flow, demand pull, and kanban techniques (with appropriate application of software tools) across the entire product/process continuum from repetitive manufacturing to job shops.
- Simplify—and improve—any process, using the power of Lean IT to reduce waste.

In Part 2: Building Blocks of Information Systems we'll examine the many ways that *information technology* can support Lean performance. We'll

explore the primary components of an enterprise information system and explain how these components may be integrated to improve the flow of information supporting value streams. We'll also examine how information systems can help to organize and deliver knowledge when and where needed.

After reading Part 2 you should be able to:

- Understand the general structure of business information systems, developing insights that will help you realize substantial business benefits and ROI from your IT investments.
- Recognize the vital components of an enterprise information system, and interpret the alphabet soup of information technology tools and techniques.
- Consider the fundamental challenges when integrating fragmented systems and processes to build effective value streams.
- Capture, manage, and deliver structured and unstructured information to the right people, at the right place, at the right time, and in the right format, enabling Lean performance through effective knowledge management.
- Understand how the future of the Internet will enable the small or medium-sized enterprise to compete effectively in the global economy.

In Part 3: Managing Change with IT we'll explore how the skillful combination of process and information technology improvements can *empower people* to continuously improve the Lean Enterprise, delivering value to the customer, while enabling the development of competitive advantage.

We'll explore a comprehensive framework for performance measurement and management that aligns strategy with the initiatives of continuous improvement teams, focusing the energy of the enterprise where it matters most—enabling breakthrough performance.

We'll learn how to build real value into IT systems, capitalizing on emerging information technology tools and change management methods, to build a platform upon which components can be added or removed to meet changing needs, continuously improving IT and enterprise agility. We'll explore how to apply continuous improvement techniques to our now-adaptable IT systems to create *Lean IT*.

After reading Part 3 you should be able to:

- Develop an integrated performance management system to guide continuous improvement team initiatives in alignment with strategic goals and objectives.
- Use a new approach to measuring ROI on investments in Lean information systems. This includes balanced measures of operational effectiveness, customer service, and innovation, supplementing the traditional financial measures.

- Demonstrate how decision-support and event-driven exception management tools and techniques can help find and eliminate wasteful practices.
- Design and build agile and continuously improving Lean IT operations.
- Energize individuals and teams through continuous improvement efforts, joining people, process, and technology into a holistic environment for sustainable Lean performance.

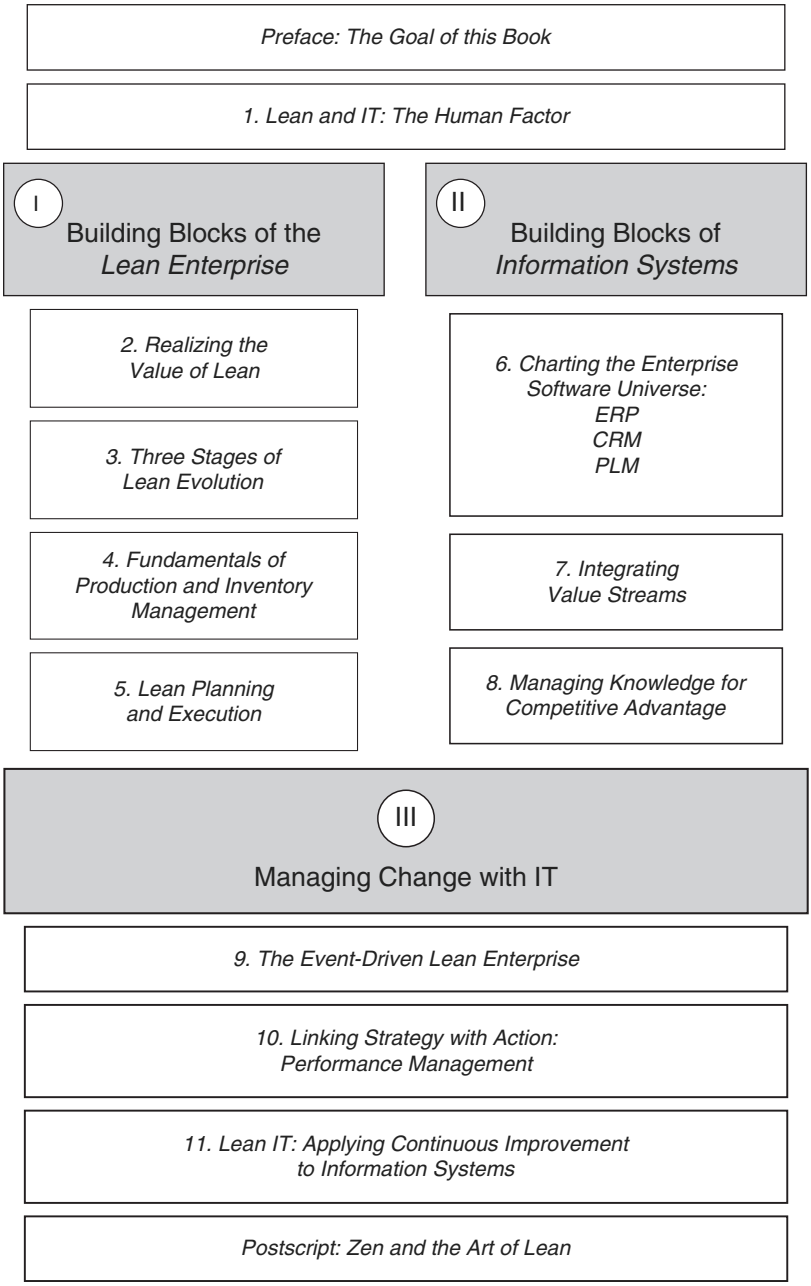
WHO SHOULD READ THIS BOOK?

- **Executives and Managers of Lean Enterprises and Their Supply Chain Partners** seeking a bootstrap education on the application of Lean operations and Lean IT principles to improve performance, apply knowledge, add value, and create competitive advantage.
- **Lean Practitioners** seeking to enrich their knowledge of value-adding IT tools and techniques. By reading this book Lean practitioners will learn to work in partnership with IT teams to enhance performance.
- **Information Systems Practitioners** desiring a richer understanding of Lean tools and techniques so they will more effectively support and sustain continuous improvement initiatives. By reading this book, IT practitioners will benefit by learning to craft value-adding IT initiatives to support Lean operations, while at the same time learning how to develop Lean IT practices.
- **Consultants, Project Managers, and Software Designers** seeking to enhance the value they offer clients by applying these Lean operations and IT techniques.
- **Educators and Students** desiring a comprehensive and practical guide to this rich subject.

The spirit of continuous improvement urges us to keep an open mind and a curious nature, asking questions and exploring new avenues for improvement across the entire Lean Enterprise and the global supply chain. If you are just beginning the journey to Lean, in this book you will learn that IT offers many tools and techniques for improving Lean performance. And if you are an experienced traveler on this path, you will learn that careful consideration of IT may introduce new ideas to advance your improvement efforts, adding substantial value while enhancing competitive advantage.

Let's get started.

Steve Bell, CFPIM
www.steadyimprovement.com


Preface: The Goal of this Book
1. Lean and IT: The Human Factor
I
Building Blocks of the Lean Enterprise
II
Building Blocks of Information Systems
2. Realizing the Value of Lean
3. Three Stages of Lean Evolution
4. Fundamentals of Production and Inventory Management
5. Lean Planning and Execution
6. Charting the Enterprise Software Universe: ERP CRM PLM
7. Integrating Value Streams
8. Managing Knowledge for Competitive Advantage
III
Managing Change with IT
9. The Event-Driven Lean Enterprise
10. Linking Strategy with Action: Performance Management
11. Lean IT: Applying Continuous Improvement to Information Systems
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