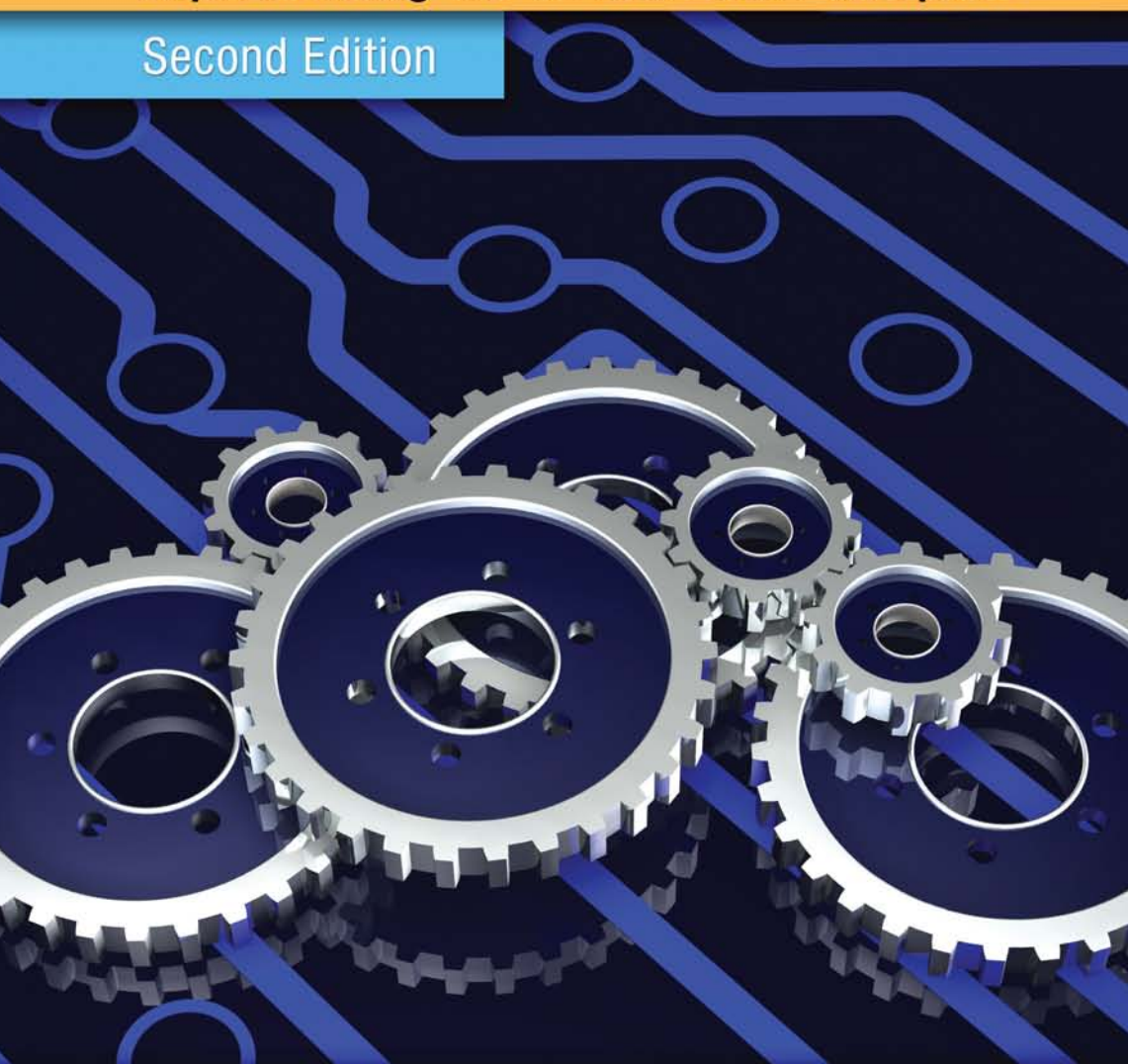


# Lean Performance ERP Project Management

Implementing the Virtual Lean Enterprise

Second Edition



**Brian J. Carroll**

# **Lean Performance ERP Project Management**

## Series on Resource Management

### **Rightsizing Inventory**

*by Joseph L. Aiello*  
ISBN: 0-8493-8515-6

### **Integral Logistics Management: Operations and Supply Chain Management in Comprehensive Value-Added Networks, Third Edition**

*by Paul Schönsleben*  
ISBN: 1-4200-5194-6

### **Supply Chain Cost Control Using Activity-Based Management**

*Sameer Kumar and Matthew Zander*  
ISBN: 0-8493-8215-7

### **Financial Models and Tools for Managing Lean Manufacturing**

*Sameer Kumar and David Meade*  
ISBN: 0-8493-9185-7

### **RFID in the Supply Chain**

*Judith M. Myerson*  
ISBN: 0-8493-3018-1

### **Handbook of Supply Chain Management, Second Edition**

*by James B. Ayers*  
ISBN: 0-8493-3160-9

### **The Portal to Lean Production: Principles & Practices for Doing More With Less**

*by John Nicholas and Avi Soni*  
ISBN: 0-8493-5031-X

### **Supply Market Intelligence: A Managerial Handbook for Building Sourcing Strategies**

*by Robert Handfield*  
ISBN: 0-8493-2789-X

### **The Small Manufacturer's Toolkit: A Guide to Selecting the Techniques and Systems to Help You Win**

*by Steve Novak*  
ISBN: 0-8493-2883-7

### **Velocity Management in Logistics and Distribution: Lessons from the Military to Secure the Speed of Business**

*by Joseph L. Walden*  
ISBN: 0-8493-2859-4

### **Supply Chain for Liquids: Out of the Box Approaches to Liquid Logistics**

*by Wally Klatch*  
ISBN: 0-8493-2853-5

### **Supply Chain Architecture: A Blueprint for Networking the Flow of Material, Information, and Cash**

*by William T. Walker*  
ISBN: 1-57444-357-7

### **ERP: Tools, Techniques, and Applications for Integrating the Supply Chain**

*by Carol A. Ptak with Eli Schragenheim*  
ISBN: 1-57444-358-5

### **Introduction to e-Supply Chain Management: Engaging Technology to Build Market-Winning Business Partnerships**

*by David C. Ross*  
ISBN: 1-57444-324-0

### **Supply Chain Networks and Business Process Orientation**

*by Kevin P. McCormack and William C. Johnson with William T. Walker*  
ISBN: 1-57444-327-5

### **Collaborative Manufacturing: Using Real-Time Information to Support the Supply Chain**

*by Michael McClellan*  
ISBN: 1-57444-341-0

### **The Supply Chain Manager's Problem-Solver: Maximizing the Value of Collaboration and Technology**

*by Charles C. Poirier*  
ISBN: 1-57444-335-6

### **Lean Performance ERP Project Management: Implementing the Virtual Supply Chain**

*by Brian J. Carroll*  
ISBN: 1-57444-309-7

### **Integrated Learning for ERP Success: A Learning Requirements Planning Approach**

*by Karl M. Kapp, with William F. Latham and Hester N. Ford-Latham*  
ISBN: 1-57444-296-1

### **Basics of Supply Chain Management**

*by Lawrence D. Fredendall and Ed Hill*  
ISBN: 1-57444-120-5

### **Lean Manufacturing: Tools, Techniques, and How to Use Them**

*by William M. Feld*  
ISBN: 1-57444-297-X

### **Back to Basics: Your Guide to Manufacturing Excellence**

*by Steven A. Melnyk and R.T. Chris Christensen*  
ISBN: 1-57444-279-1

### **Enterprise Resource Planning and Beyond: Integrating Your Entire Organization**

*by Gary A. Langenwalter*  
ISBN: 1-57444-260-0  
ISBN: 0-8493-8515-6

# **Lean Performance ERP Project Management**

**Implementing the Virtual Lean Enterprise**

**Second Edition**

**Brian J. Carroll**



**Auerbach Publications**

Taylor & Francis Group

New York London

---

CRC Press is an imprint of the  
Taylor & Francis Group, an **informa** business

CRC Press  
Taylor & Francis Group  
6000 Broken Sound Parkway NW, Suite 300  
Boca Raton, FL 33487-2742

© 2007 by Brian J. Carroll. Performance Improvement Consulting.  
CRC Press is an imprint of Taylor & Francis Group, an Informa business

No claim to original U.S. Government works  
Version Date: 20131009

International Standard Book Number-13: 978-0-8493-0533-7 (eBook - PDF)

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The authors and publishers have attempted to trace the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission to publish in this form has not been obtained. If any copyright material has not been acknowledged please write and let us know so we may rectify in any future reprint.

Except as permitted under U.S. Copyright Law, no part of this book may be reprinted, reproduced, transmitted, or utilized in any form by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying, microfilming, and recording, or in any information storage or retrieval system, without written permission from the publishers.

For permission to photocopy or use material electronically from this work, please access [www.copyright.com](http://www.copyright.com) (<http://www.copyright.com/>) or contact the Copyright Clearance Center, Inc. (CCC), 222 Rosewood Drive, Danvers, MA 01923, 978-750-8400. CCC is a not-for-profit organization that provides licenses and registration for a variety of users. For organizations that have been granted a photocopy license by the CCC, a separate system of payment has been arranged.

**Trademark Notice:** Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

**Visit the Taylor & Francis Web site at**  
**<http://www.taylorandfrancis.com>**

**and the CRC Press Web site at**  
**<http://www.crcpress.com>**

---

# Contents

---

**Figures.....xi**  
**Foreword ..... xv**  
**Preface.....xxvii**  
**Acknowledgments .....xxxvii**  
**About the Author ..... xli**

**PART I: INTRODUCTION TO LEAN PERFORMANCE**

**Chapter 1 Foundations of Lean Performance .....3**  
    When the ERP Project Manager Is the Lean Champion .....3  
    The Organizational Consequences of Mass Production .....8  
    The Origin of Lean Production.....10  
    What Is Lean Production? .....14  
    Why Aren’t More Firms Lean?.....16  
    What Is Required to Become Lean?.....18  
**Chapter 2 Extending Lean Performance Foundations .....21**  
    Implementing Lean Cross-Functional Processes .....21  
        Lean Quality Management .....23  
        Lean Maintenance.....24  
        Lean New Product Introduction .....25  
        Lean Design and Engineering.....26  
        Lean Accounting.....27  
**Chapter 3 Lean Performance Methodology .....33**  
    What Is the Virtual Lean Enterprise?.....33  
    Lean and ERP: Why Can’t We All Just Get Along?.....35  
    The Failure of ERP Implementations ..... 42  
    Lean and Six Sigma ..... 44  
    Why Should Our Enterprise Be Lean? .....45  
    The Three Levels of Lean Business Process Management .....49

Lean Business Process Strategic Level: Lean Policy Deployment .....	50
Lean Business Process Organizational Level: Lean Process Innovation .....	53
Lean Business Process Activity Level: Lean Performance Implementation .....	62
What Is Lean Performance? .....	66
How Does Lean Performance Improve Processes? .....	68
Why Lean Performance Is the Best Lean Methodology .....	69
<b>Chapter 4 Lean Cross-Enterprise Processes.....</b>	<b>81</b>
What Is Lean Commerce? .....	81
Lean Customer Relationship Management .....	88
Lean Production Smoothing .....	90
Lean Supply-Chain Management.....	100
Lean Performance China Strategy.....	103
Supporting a Lean Factory Flow .....	104
Toyota Production System and Lean Commerce.....	108
Implementing a Virtual Lean Enterprise.....	110
<b>Chapter 5 Lean Principles, Tools, and Practices .....</b>	<b>113</b>
Lean Cultural Principles .....	113
Process-Oriented Thinking Means What Before How .....	115
Product Quality Results from Process Quality.....	115
Every Process Needs a Process Standard.....	116
The Process Owners and Operators Are the Process Experts .....	117
The Next Process Is Your Customer .....	119
Loyalty to People Enables Continuous Improvement .....	119
Process Data and Measurements Drive Process Continuous Improvement.....	122
Lean Cultural Principles Checklist .....	122
Process-Oriented Thinking Means What Before How .....	122
Product Quality Results from Process Quality.....	123
Every Process Needs a Process Standard.....	124
The Process Owners and Operators Are the Process Experts .....	125
The Next Process Is Your Customer .....	126
Loyalty to People Enables Continuous Improvement .....	126
Process Data and Measurements Drive Process Continuous Improvement.....	128
Lean Transformational Principles .....	129
Precisely Specify Value by Product or Family .....	129
Identify the Value Stream for Each Product .....	129
Make Value Flow Without Interruption .....	129
Let Customer Pull Value from the Process Owner .....	129
Pursue Perfection .....	129

Lean Transformational Principles Checklist .....	130
Precisely Specify Value by Product or Family .....	130
Identify the Value Stream for Each Product .....	130
Make Value Flow Without Interruption .....	131
Let the Customer Pull Value from the Process Owner .....	131
Pursue Perfection .....	131
Lean Diagnostic Tools .....	132
3 MUs .....	132
5 Ss .....	137
5 Ws-1 H .....	142
4 Ms .....	146
Lean Performance Practices .....	152
Management Policy Deployment .....	152
Lean Performance Teams .....	154
Visual Management .....	155
Lean Performance Analysis .....	155
<b>Chapter 6 Steering a Lean Performance Project .....</b>	<b>161</b>
Management in the Lean Performance Project .....	161
Advocate .....	162
Champion .....	162
Sponsor .....	162
Communicator .....	162
Motivator .....	163
Team Builder/Team Player .....	163
Educator/Developer .....	163
Change Agent .....	163
Facilitator/Coach/Catalyst .....	164
Mediator/Negotiator .....	164
Completing the Lean Performance Assessment .....	166
Lean Performance Assessment .....	167
Lean Enterprise Future State .....	167
In Our Future Lean Enterprise .....	171
Enterprise Lean Vision Elements (Add/Change to Fit Your Lean Enterprise) .....	172
Our Process Owners (Managers and Supervisors) .....	173
Company Readiness .....	173
Opportunity to Make Lean Applications .....	176
Company Capability to Become Lean .....	177
Lean Performance Project Constraints .....	180
Analyzing Lean Performance Assessment Results .....	183
Preparing for the Lean Performance Project .....	184



## PART II: LEAN PERFORMANCE PLANNING MODULES

<b>Chapter 7 Deploying Management Policy Module .....</b>	<b>189</b>
Management Tasks .....	189
Organizing the Steering Committee .....	189
Confirming the Lean Vision .....	191
Identifying and Deploying Lean Business Policies .....	191
Identifying and Deploying Lean Project Strategies.....	192
Defining the Project Mission.....	195
Defining the Project Scope.....	196
Setting Up the Project Organization .....	197
Identifying and Deploying the Project Objectives .....	199
Conducting Steering Committee Meetings.....	203
<b>Chapter 8 Evaluating and Selecting Software Module.....</b>	<b>209</b>
Management Tasks .....	212
Organize the Software Evaluation and Selection Project Team .....	212
Project Team Tasks .....	213
Organize the Project Office and Conference/Education Room .....	213
Determine Key Lean Software Features Workshop Attendees.....	213
Review All Lean Strategy/Policy/Project Objectives LPA Masters.....	214
Conduct Process Area Workshops .....	214
The 9 Forms of Office MUDA Checklist .....	215
The 5 Ss in the Office Checklist .....	216
The Office 5 Ss Checklist .....	217
5 Ss in the Computer Room Checklist.....	219
Conduct Key Lean Software Features Workshops.....	220
Process Stream Key Lean Features Checklist.....	221
Prepare a Draft of the Key Lean Software Features Checklist .....	223
Report Progress to Management Steering Committee.....	223
<b>Chapter 9 Managing Project Module .....</b>	<b>229</b>
Project Team Tasks .....	229
Maintaining the Project Summary Bar Chart .....	229
Maintaining Project Communications .....	229
Maintaining the Project Plan .....	230
Maintaining an Open Issues Resolution Process .....	230
Maintaining the Project Organization .....	235
Maintaining the Quality Assurance Process.....	236
Reporting Progress to the Steering Committee .....	239
<b>Chapter 10 Developing Lean Performance Teams Module.....</b>	<b>241</b>
Project Team Tasks .....	241
Finalizing Projects and Strategies .....	241

Developing the Site Configuration.....	242
Identifying All Processes .....	244
Developing Site Teams .....	254
Developing Lean Performance Team Training.....	254
Reporting Progress to the Steering Committee .....	265
What Follows Lean Performance Planning?.....	265

## **PART III: LEAN PERFORMANCE IMPROVEMENT MODULES**

### **Chapter 11 Improving Process Performance Module.....273**

Management Tasks .....	273
Maintaining Lean Performance Teams .....	273
Conducting Steering Committee Meetings.....	274
Project Team Tasks .....	275
Lean Performance Team Education .....	275
Human Resource Team Tasks.....	278
Finance Team Tasks .....	286
Engineering Team Tasks .....	288
Materials Team Tasks.....	292
Operations Team Tasks.....	294
Information Team Tasks .....	296
Lean Commerce Team Tasks .....	299
Completing Lean Performance Analysis .....	304
Challenging Processes Checklist .....	320
Producing Work Instructions .....	329

### **Chapter 12 Integrating Systems Module.....337**

Project Team Tasks .....	337
Installing Hardware and Software.....	337
Initiating the System .....	338
Setting Up System Security .....	338
Creating Test and Training Environments .....	339
Creating Production Databases .....	339
Testing System Setup .....	339
Managing the Data Conversion Process .....	339
Evaluating Additional Software Packages and Interfaces.....	340
Conducting Process-Oriented System Design .....	342
Summarizing Proposed Modifications .....	342
Completing Hardware and Communications Analysis .....	344
Preparing Detailed Design Specifications.....	344
Managing Outsourced Programming.....	345
Defining Interface and Database Testing .....	346

<b>Chapter 13 Testing Improved Processes Module .....</b>	<b>347</b>
Project Team Tasks .....	347
Objectives of Testing.....	347
Prototype and Pilot Testing.....	348
Establishing the Test Team .....	348
Test Team Kick-Off Meeting .....	355
Process Test.....	356
Stress Test.....	360
Process Workflow and Work Instruction Update .....	361
Conducting the User Training Program.....	362
What Follows Lean Performance Improvement?.....	362

## **PART IV: CONTINUOUS LEAN PERFORMANCE MODULES**

<b>Chapter 14 Implementing Improved Processes Module .....</b>	<b>365</b>
Management Tasks .....	365
Maintaining Lean Performance Teams .....	365
Implementing Lean Performance Management.....	368
Continuously Deploying Lean Policy and Strategy .....	372
Auditing Lean Performance .....	374
Project Team Tasks .....	376
Completing the Implementation Readiness Assessments.....	376
Verifying System Integration.....	377
Counting Down to Implementation.....	377
Implementing Improved Processes .....	378
Providing Additional Training .....	378
Providing Production Start-Up Support.....	378

<b>Chapter 15 Continuously Improving Lean Performance Module .....</b>	<b>379</b>
Project Team Tasks .....	379
Defining and Initiating Lean Performance Measurements .....	379
Continuously Improving Lean Performance .....	385
Deploy Management Policy.....	387
Deploy Information Process Technology .....	388
Identify Processes and Teams .....	388
Complete the Lean Performance Analysis.....	388
Build New Information System Supports .....	389
Complete Updated Process Standards.....	389
Continuously Improve Lean Performance .....	389

<b>Index .....</b>	<b>391</b>
--------------------	------------

---

# Figures

---

Figure 3.1	Lean Business Processes: Strategic Level.....	51
Figure 3.2	Lean Business Processes: Organizational Level .....	54
Figure 3.3	Business Process Example: Organizational Level .....	59
Figure 3.4	Engineering Change Notice: Process MUDA .....	60
Figure 3.5	Supplier Selection Qualification 5 Ws-1H Checklist Result .....	61
Figure 3.6	Supplier Selection 4 Ms Checklist Result.....	62
Figure 3.7	Engineering Change Notice: Current Process .....	63
Figure 3.8	Engineering Change Notice: Future Process State .....	63
Figure 3.9	Engineering Change Notice: Lean Benefits.....	64
Figure 3.10	Lean Performance Foundation Blocks.....	67
Figure 3.11	Comparison of Reengineering, Lean and Lean Performance.....	68
Figure 3.12	General Methodology Comparison .....	72
Figure 3.13	Strategic Issues Comparison .....	73
Figure 3.14	Project Scope Comparison .....	74
Figure 3.15	Tactical Issues Comparison .....	75
Figure 3.16	Quality Issues Comparison .....	76
Figure 3.17	Results Comparison .....	77
Figure 3.18	Lean Progression .....	78
Figure 3.19	Future of Data Processing .....	79
Figure 4.1	Lean Commerce Model Overview .....	86
Figure 4.2	Lean Commerce Model—Customer Relationship Level.....	89
Figure 4.3	Available to Promise Inquiry .....	91
Figure 4.4	Lean Commerce Model—Sales and Operations Planner Level.....	92
Figure 4.5	SOP Planner Screen .....	93
Figure 4.6	Lean Commerce Mode—Lean ERP Level.....	97
Figure 4.7	Assembly Scheduling Screen .....	99
Figure 4.8	Lean Commerce Mode—Factory Flow Level .....	100
Figure 4.9	Final Assembly Screen.....	101
Figure 5.1	Lean Performance Analysis: Lean Business Policy Deployed.....	153
Figure 5.2	Business Process Areas .....	156
Figure 5.3	Current Process Activity Overview: International.....	157

Figure 5.4	Lean Performance Team: International.....	158
Figure 5.5	Lean Performance Analysis Process and Team Identified .....	159
Figure 5.6	Workflow Diagram Template.....	160
Figure 5.7	Work Instruction Template.....	160
Figure 7.1	Lean Business Policies .....	192
Figure 7.2	Lean Performance Analysis—Lean Business Policy Deployed.....	192
Figure 7.3	Lean Project Strategies .....	194
Figure 7.4	Lean Performance Analysis—Lean Project Strategy Deployed....	195
Figure 7.5	Project Mission Statement .....	197
Figure 7.6	Project Scope Statement .....	197
Figure 7.7	Lean Performance Analysis—Project Objective Deployed.....	204
Figure 7.8	Policy Deployment and Measurements Summary— Project Objective Deployed.....	206
Figure 8.1	Key Lean Software Features—General Requirements.....	222
Figure 8.2	Key Lean Software Features—Business Planning.....	223
Figure 8.3	Key Lean Software Features—Production and Operations.....	224
Figure 8.4	Key Lean Software Features—Customer Relationship .....	225
Figure 8.5	Key Lean Software Features—Product Engineering .....	225
Figure 8.6	Key Lean Software Features—Financial Management .....	226
Figure 8.7	Key Lean Software Features—Inventory Management and Logistics .....	226
Figure 8.8	Key Lean Software Features—Supply Chain.....	227
Figure 8.9	Key Lean Software Features—Performance Measurement.....	227
Figure 9.1	Lean Performance Methodology Project Summary Bar Chart ...	230
Figure 9.2	Project Work Plan .....	231
Figure 9.3	Open Issue Form.....	232
Figure 9.4	Open Issue Template.....	234
Figure 9.5	Business Process Areas Overview—Diagram for Corporate Site of a Manufacturer .....	235
Figure 9.6	Business Process Areas Overview—Diagram for Manufacturer of Products for the Aftermarket.....	236
Figure 9.7	Business Process Areas Overview—Diagram for an International Manufacturer .....	237
Figure 9.8	Project Organization Chart.....	238
Figure 10.1	Current Projects and Strategies Definition .....	242
Figure 10.2	Site Configuration.....	243
Figure 10.3	Information/Support Process Characteristics .....	245
Figure 10.4	Current Process Activity Overview Diagram (Corporate) .....	246
Figure 10.5	Current Process Activity Overview Diagram (Aftermarket) .....	247
Figure 10.6	Current Process Activity Overview Diagram (International) .....	248
Figure 10.7	Lean Performance Project Process Listing and Sequence.....	249
Figure 10.8	Lean Performance Team (Corporate) .....	254
Figure 10.9	Lean Performance Team (Aftermarket) .....	255

Figure 10.10	Lean Performance Team (International).....	256
Figure 10.11	Process Workflow Example.....	260
Figure 10.12	Work Instruction How-to Example.....	263
Figure 10.13	Project Control Spreadsheet .....	264
Figure 10.14	Process Workflow Diagram Status for All Process Areas for Aftermarket Site.....	266
Figure 10.15	Progress by Process Areas for Aftermarket Site .....	267
Figure 10.16	Progress by Primary Process Areas for Aftermarket Site .....	268
Figure 10.17	Progress by Secondary Process Areas for Aftermarket Site .....	269
Figure 11.1	Workflow Diagram Template .....	277
Figure 11.2	Work Instruction Template .....	278
Figure 11.3	Training Assignments Spreadsheet .....	279
Figure 11.4	Lean Performance Loyalty Analysis Template .....	281
Figure 11.5	Lean Performance Loyalty Analysis—Policy Deployed .....	282
Figure 11.6	Lean Performance Loyalty Analysis—Strategy Deployed.....	283
Figure 11.7	Lean Performance Loyalty Analysis—Objective Deployed.....	284
Figure 11.8	Lean Performance Loyalty Analysis—Technology Deployed.....	285
Figure 11.9	Overhead Cost Accumulation Model .....	288
Figure 11.10	General Ledger Accounts.....	289
Figure 11.11	Database Financial Entities.....	291
Figure 11.12	Material Information Flow Analysis Diagram .....	295
Figure 11.13	Material Information Flow Analysis Transactions .....	296
Figure 11.14	Lean Performance Analysis—Technology Deployed.....	299
Figure 11.15	Policy Deployment and Measurements Summary— Technology Deployed .....	300
Figure 11.16	Lean Performance Analysis—Process and Team Identified.....	304
Figure 11.17	Policy Deployment and Measurements Summary— Process and Team Identified .....	305
Figure 11.18	Process Requirements Definition—Interview and Status Listing .....	310
Figure 11.19	Process Requirements Definition—Order Entry .....	311
Figure 11.20	Fuel Pump Returns Process Workflow Standard .....	317
Figure 11.21	Lean Performance Analysis—GAP Solution and Benefit .....	328
Figure 11.22	Online Return Credit Work Instruction .....	330
Figure 11.23	Process Master Index.....	331
Figure 12.1	Process/System Overview Diagram.....	341
Figure 13.1	Pilot Prototype Test Roadmap .....	349
Figure 14.1	Implementation Readiness Assessment for International Site ....	377
Figure 15.1	Lean Performance Analysis—Process Measurement Identified..	380
Figure 15.2	Policy Deployment and Measurements Summary— Process Measurement Identified.....	382



---

# Foreword: A Message for Management

---

## Preamble: Leaving Kansas

“Toto, I’ve got a feeling we’re not in Kansas anymore.”

*The Wizard of Oz, 1939*

In the first stages of any lean engagement, Brian Carroll will always repeat that statement. So, in response, I say to you, Dorothy, or whatever your name is, something is different about the state of business today. But that’s not the problem for me: the problem is I can’t find a way to get back to Kansas. I fear that after living in that state of business since 1950, a comfortable one I know well, I cannot return there except in my imagination.

This book is different from all other previous business books. This is what makes it unique: it is the first book written that does not encourage me to wish I was back in Kansas. It does not provide me with a map, drawn by someone who has never left Kansas, to lure me back to a state that I, and you, should recognize doesn’t exist anymore.

This is the first book that provides a map to get to the new state, call it “lean.” Or, better, call it “the Virtual Lean Enterprise.” Brian Carroll is the first person to create the alchemy that Masaaki Imai spoke of when he wrote (in the preface to *Gemba Kaizen*), “When Western Management combines kaizen with its innovative ingenuity, it will greatly improve its competitive strength.” Carroll has done just that. When I say he has done just that, I mean he first accomplished transforming technological processes into a lean environment, and then, not content with that, he became evangelically passionate about what happened and was driven to write about how he linked lean and ERP. This book, *Lean Performance ERP Project*



*Management*, was and always will be the first in the world to create the synthesis of lean and ERP.

Carroll's approach is heretical to begin with in the academic world of business management, because the basis of the book—reality—is seldom seen in the kudzu-like growth of how-to management books and, lately, in a similar growth in sudden lean expertise in print (lean expertise that sounds like the right path but often leads back to Kansas).

Why has Carroll accomplished this unique task? Why did he even take it on, looking for the management touchstone that Imai prophesied? The answer is part nature and part nurture, as it is for all of us. To understand, I need to tell you a bit about Carroll's pedigree and about his formative business experience. Some of it seems like fiction. But again, and for the last time, this is likely the first book that I or you have read from the management jungle that was not written by people who never went there and back. There is irony in everything, even business management.

## **The Management Battlefield We Know**

In your training and long experience as a veteran manager, what has given you the best return on your time, money, but mostly your emotional investment? Or maybe I should ask, what has disappointed you the most? I think I know. Your confidence has been abused and you will not be fooled again. Was it technology then that first broke your heart? Was it other people, you know, that dry well that has been called "empowerment"? Does your black belt in Six Sigma still leave you feeling vulnerable? You know how that goes. It's OK. Or not.

What lessons have you learned as you endlessly strove to keep up with everything new to know in management? In my experience, working with strategy development in the rarified air of top management, there is always a new book, a new catchphrase, a new focus, each proclaiming that if we just do this one thing from now on and use it for all possible situations, decisions, and interactions...well, you know the pitch.

Much of our thinking as managers has been formulated by the tools and concepts, "best-sellers," and business training that emerged in the last half of the 20th century. It has become its own industry. Combined, the "pop management" and "pop psychology" cultures of the 1970s have formed who we are as managers and also much of who we are when we are not performing that role.

The cause may be we had too many choices as managers, and too many failures. Everyone—psychologists, sociologists, consultants, and especially CEOs, now the new rock stars—jumped in to proclaim a new management style and began turning out the how-to-lead-the-troops books like it was in their job description or part of their parachute package, even as they outsourced their manufacturing jobs for short-term gain and Wall Street.

Or maybe it was good old hubris, a shortsighted, stubborn conviction that management, like anything else, is best made in America. This was begun with the assumption that our long-standing military model would work in business as well as it worked in war.

Is it merely circumstantial evidence that current United States managers (us), the postwar baby boomers, were also the elementary school students who avoided the adoption of the metric system? This bold, symbolic, nationalistic resistance that has over the intervening decades resulted in our being the only country in the world with a unique and less exact measurement system! Does it really matter if it is less exact? After all, isn't 99.99 percent accuracy still good? Good enough?

We have a phenomenon in America in which we are comfortable with approximating the truth, a corruption that results in a near miss of reality, but allows us one that better satisfies our needs. In a culture of "close enough is good enough," who needs metric? Quality was an American invention, but it did not find a home on this soil, and it still fights to take root. It flourishes in a lean environment in much of the rest of the world.

As I write, Ford has announced a layoff of one out of four of its North American employees. General Motors has responded to the crisis by slowly going out of business, losing market share, closing plants, and spinning off its parts business. Said parts business is in bankruptcy today, and bankruptcy is speculated for GM as I write. An American automotive diaspora seems possible. It's OK?? Or not.

In the news recently was another example of how "mass production" cultural principles and the thinking behind them work against development of the lean cultural principles that underlie a truly lean enterprise. In the continuing sagas of GM and Ford, it is occasionally proposed that the "legacy" costs for pension and insurance benefits that load approximately \$1,000 in costs to each car produced be somehow removed from the cost equation. The most insidious of the proposals include the notions that the U.S. taxpayer should assume them—or even that these retired workers should be "cut loose," much like the Inuit Indians (Eskimos) practiced euthanasia by placing their elders on ice floes and pushing them away from shore. Is this OK?

In correspondence with James Womack, who alerted the U.S. Congress to fallacies of protectionism, and his colleague Daniel Jones, Carroll proposed that GM should follow Toyota's lead and create momentum toward a lean culture first, beginning with a "global refinancing" that sheds the unfunded legacy burdens by selling legacy investments such as the Asian operations of GM that were built with the profits of the mass production era, profits that might have been invested in funding those very same legacy costs that haunt GM today. With a clean cost slate, and perhaps a reinvigorated workforce, a new "social contract" between management and labor could be written. It would be much like the historical precedent found in the new social contract Toyota enacted in 1949, when its founder resigned over the mass layoffs he instituted, and lifetime employment relative to market was

promised to a workforce that agreed never to strike. What might happen should GM take this approach? Ominously, what will happen if GM doesn't?

## ***The Deming Code***

"Pay no attention to that man behind the curtain!"

*The Wizard of Oz, 1939*

The strategic management approach followed by the "military generation" of American business management in fact heralded the coming global economic conflict that W. Edwards Deming had prophesied following World War II. Deming was viewed by our victorious American military-trained managers then as just another "chicken little," a "sky is falling" prognosticator that no one paid any attention to under the eternally blue, halcyon skies our victories had delivered over fascism.

Deming's story is the stuff of management legend, now and always. We have already placed the blame for our recent manufacturing failures on a hopelessly conservative group of industrial managers from the stodgy 1950s who institutionalized the Taylor-Ford fallacies. We proclaim that the '50s managers mired all of us in ancient mass production practices, unaware of the "lean" storm approaching from one of the countries they had just decimated.

But the fact is, we managers—who are the sons and daughters of those '50s managers—are more likely to be the major reason for our late arrival into the global marketplace: the reluctance to change in the face of a new global economic model that arrived on our shift—and now we are no longer the stars on the team. In fact, we may not make the starting squad, because all the plays have changed. It is no longer "OK."

For the sake of discussion, let's focus on the near apocryphal figure of the aforementioned Mr. W. Edwards Deming. Deming is the figurative as well as the literal bridge between Eastern and Western management thought. To look at some of the areas where Western managers may have difficulty as we endeavor to incorporate lean thinking into our toolbox, let's take a survey of current Western management thinking through the lens of some of Deming's famous 14 points. (I am sure as a veteran manager you have them memorized so I could probably just refer to them by number, but they are listed below for the purpose of our discussion.)

1. Create constancy of purpose toward improvement of product and service, with the aim...to provide jobs. In the face of the wholesale flight of manufacturing, what is the focus of American leadership or management: are they stewards of jobs, or of profits, or is that a divide that was created years ago?
2. Adopt the new philosophy...Western management must awaken to the challenge...and take on leadership for change...blah, blah, blah. Leadership? Change? And philosophy? What—has Deming gone native?

3. Cease dependence on inspection to achieve quality...do we even get this now, 50 years later? Aren't we still an inspection-based, nonvalue-added, MUDA-producing mass industrial culture?
4. End the practice of awarding business on the basis of price tag...minimize total cost...single supplier...long-term relationship...loyalty and trust. Where do we start here? The different thinking and philosophy of long-term relationships built on trust and loyalty, the move to minimize cost, a strategy espoused by both Western management gurus (the Drucker low-cost provider strategy taken to a higher level by Wal-Mart) and Eastern lean thinking. Again, how well have we adopted this commandment, or, I mean, recommendation?
5. Improve constantly and forever the system of production and service...first, this is the basis of all management thinking that has quietly invaded us since the late (1970s) 1960s, again, with very little movement on our part, and second, Deming was speaking about the whole company, not just the factory floor processes. This is an approach to lean that has been reawakened by Brian Carroll, who, from experience, not from theory, knows that if everyone isn't involved in the lean transformation, then nothing changes, no transformation, just the veneer of lean...like a politician, wrapped in the flag and protesting his innocence. Maybe, like Delphi.
6. Institute training on the job. Well, we kind of did this, but pretty much in accord with our command and control approach, from the neck down, and in the process capturing workers in cementlike job descriptions that have kept them from ever enacting #5 or #3. Oh well, continuous improvement, quality, these were small losses to keep our management structure intact in the face of all that external pressure to change (which also means we didn't follow #1, 2, 4, and 6 as managers).

Points 7, 8, and 12 all kind of come together here, and I will paraphrase abundantly and without shame. Deming says to institute leadership; we have had enough of supervision of both management and production workers, and in order to be effective, we have to do what leaders do first, and managers never do because they use it as a means of control: drive out fear. And finally, Deming says as leaders we need "to remove the barriers...that rob people of their pride of workmanship."

And throughout the rest of his points, Deming appeals to us to "substitute leadership" by removing quotas, and management by objectives, adding education, and making it everyone's job to transform.

### ***The Deming Legacy and Brian J. Carroll***

Increasingly, we in the globalization era are forced to confront and analyze management processes in this new, non-Kansas lean globe. The model that Deming foretold is on us. We are compelled to compare East vs. West management thinking, really

Eastern All of Us Thinking (Lean) vs. Western Us and Them Thinking (Mass). The leadership processes, principles, and practices of both have been endlessly written about and analyzed.

So, why bother with “lean ERP”? Why should anyone think Carroll isn’t just another Western prognosticator, all vision and no application? Well, from my perspective, Carroll brings a decidedly “non-Western” vision to the problems of management, and a full system for applying it. He begins where Deming ended, and no other management thinker in the Western pantheon has begun: with principles, the cultural principles he observed in successful work environments, as well as the lean transformational principles from predecessors like Womack and Jones. He echoes and builds on Deming and applies the transformational principles of Womack and Jones, but like Dylan going electric, he adds technology to the mix.

Carroll exhorts us to follow the process to the customer, to enable it with the technology available (ERP), to train and educate and to lead the lean transformation, not simply to manage and supervise the workers. All that he writes about, all that he lays out methodically, step by step, to get there, like Deming, comes from what he has seen work, and like Dylan transforming folk into rock, what he loves forms the basis for his groundbreaking, yet achingly familiar, principles.

I do care that we have still come last in the world to adopt, let alone believe, those principles and practices, most invented here, utilized to win the global conflict that defined the latter half of the “American century.” The same elementary students who resisted the global shift to metric, now gray-haired and in charge, are still resisting change at an elemental level, and at such great cost to the economy and to our children’s legacy. But I have to briefly play historian and offer a bit of a timeline, picking out a few of the many important and, in my opinion, formative moments in Carroll’s life.

In preparation for this task, as I reviewed many of the people who came to be leaders in management revolutions, it was apparent that all were influenced early on by firsthand encounters with other figures in the management pantheon. Carroll first learned them from his father, who coincidentally didn’t just carry the influence of a father but was also involved in many of the important industrial and manufacturing events of the middle part of the 20th century. Carroll Sr. worked his way up from the production floor at Hughes Aircraft, tested planes with Howard Hughes himself, and then worked at the Ford Motor Company with Henry Ford and Charles Sorensen on the project that delivered the production system (a “lean flow,” by all measure) utilized to build the aircraft that dominated the skies of World War II. Carroll Sr. then helped build Motorola from a small company in Chicago into a global powerhouse.

Brian Carroll, though he balks at the comparison, is the closest thing we have to a Deming in the 21st century. He certainly wouldn’t put himself in that level of influence. He also has a Gump-like propensity to be at the right place at the right time when a paradigm shifts. He has been riding a wave of paradigm shift since the mid ’70s, when, after working his way up from machine operator to production manager,

he was lucky enough to be assigned to work with a customer who was an early adopter of “J-I-T,” having been forced to adopt this early lean practice by a customer, Hewlett-Packard. At a critical stage of career development, his mentor, a Professor of Operations, introduced him to Oliver Wight, widely credited as the “father of MRP.” At the meeting, Wight asked Carroll if he intended to pursue the MRP project management assignment that Carroll had been offered. Carroll was hesitant to abandon the safety of the shop floor, where things were actually made, for the uncertainty of the computer, where things didn’t always work so well. Wight asked Carroll if he thought he would make it to the end of his career without learning the computer and MRP. Could one safely hide in the shop for the following 35 years until retirement (Carroll was then just 28 years old) and avoid progress? Carroll took Wight’s advice and managed to be on the scene for early implementations of packaged MRP and then ERP software, eventually completing 25 successful implementations as a team member, project manager, or project director. Although given the benefit of many years of mentoring by the aforementioned Professor of Operations, Carroll somehow claims that one of his best advantages is that he lacks a formal American business school background. He does not possess an MBA, which he says is the degree in *mass* business administration and will be, according to Carroll, soon to be replaced by the LBA—the degree in *lean* business administration. Instead, he can lay claim to having had the benefit most especially of a “bottom to top” rise through the ranks—from machine operator to executive and then executive consultant, a tour of duty required of anyone desiring to rise to executive rank at Toyota, and a privilege given there to only a handful of incoming junior staff.

Carroll jumped from assignment to assignment, performing nearly 30 different line and staff assignments (in only four companies) before shifting to consulting, where he developed an international practice, and eventually his own methodology that realized Imai’s prediction. He states that when he realized that he could not pretend to be an expert in a process that someone else “owned” or “operated” it was time to shift from consulting to teaching and facilitating. Carroll says he is an expert in his process—lean ERP—and that he can teach and facilitate in that arena. You will have to work out your own lean processes, but Carroll and this book can enlighten and facilitate that journey.

## ***The Next Phase—Lean Dominates the American Marketplace***

“I’ll get you, my pretty, and your little dog, too!”

*The Wizard of Oz*, 1939

Of course I also hope that Carroll, unlike Deming, is not ignored for another 50 years in America, while the rest of the world adopts him to further the lean gap. Carroll and Deming are unique in being bridges that connect the Eastern and

Western schools of management. Deming, of course, through a forced exodus and an adoption of Eastern principles, developed a methodology that influenced the world—even eventually American managers (although even then only partially, sampling only what called for the least change in attitude and behavior). But to this experience in the later part of his life, Deming brought the foundation of his training (at Western Electric, under Shewart) as a manager in the first half of the 20th century, the mass production era of industrial age, creating his own contribution to quality that was to not only form a bridge for the management thinkers of the second half of the century, but also be the foundational glue for how work gets done around the world. Deming, like Carroll, goes largely unheeded, and though he points to the decline of Western mass manufacturing, which had already peaked by the mid-1950s, no one paid heed. Well, someone did on the other side of the world. You already know how that story turned out. Today, in hindsight looking at Deming, and in comparatively safe second sight, looking ahead to Carroll’s coming influence, Deming is the principal “bridge” management thinker of the 20th century, and Carroll is poised to be the same for the 21st. Carroll has fought not only to reconcile but also to marry the information machines to the lean processes throughout the company and across the virtual space that he calls “the Virtual Lean Enterprise.” Still, the DNA in the machines, and in the lean tools and practices, is our customer’s, and if we reject the tools it is because of this factor. The maddening thing about the customer is that just as you get the dose right and the process right, it needs to be adjusted again and will always need that as software is implanted into old processes. Nothing that is linked to the customer is stagnant. Innovation is driven by strategy, and strategy in Carroll’s Lean Performance methodology is deployed to the organizational process level. The best technology of the 21st century then enables lean processes at the activity level, allowing the customer to create the pull and flow of your business.

Like Deming, Carroll also has his own list of principles, and we are reminded painfully that principles are things we believe in and not just able to recite. Again, like Dylan building off of Guthrie, or the Stones off of Howling Wolf, he brings lean to the next level, one that incorporates technology that Deming heralded. Only Deming could have begun to conceive of a worldwide supply chain forged by a technology not yet conceived. Only Carroll could have created the formula for this to happen.

Finally, it may surprise many readers to learn that a code of action for ethical leadership by management was first formulated by Henry Ford, in his initial Dearborn Works Charter in 1914. Carroll refers to this “manufacturing magna carta” in the text that follows. The principles and practices espoused in this remarkable document were soon forgotten at Ford and indeed everywhere but in the defeated Japan, where this thinking elevated the industrial emergence more than a half century ago. But Carroll didn’t forget—it appears to be the only approach he knew.

## ***Signs of the Coming of the Lean Era***

Since the publication of the first edition of *Lean Performance ERP* in February 2002, events have converged to further support the substance of a book that has fallen short of being a business best-seller yet sits in every university engineering library from Saudi Arabia to Macedonia to China and Japan. If you had been one of the few reading the book five years ago, the events that happened afterward (e.g., the discovery of the manufacturing planet of China, the realization that lean could not coexist in some de facto basis with ERP, the understanding that supply chains would be redefined by new technologies, and the Wal-Martization of America) would have made you a leader with the prescience to get the place lean before everything fell apart.

In the period following the book's publication, and the tremendous lack of adoption of its lean principles in practice, the economy has morphed rapidly into the round earth global picture. In 2002, as the book hit the stands, the "advanced economies" (Western European) GDP grew at about 1.7 percent, while the Asian economies collectively grew at 5.9 percent. In the second year after its publication, 2003 saw the official end of the Iraq war (May 1), SARS was named, the Blaster worm virus attacked most of our computers, and *Forbes* magazine declared "white collar offshore outsourcing" the year's most significant trend. By 2004, three years later, we still hadn't picked up lean; we saw that the United States was holding about 20.9 percent of the world GDP so maybe we didn't need to do something as drastic as getting lean. But wait a minute, in 2004, the United States grew GDP by 4.3 percent, but China grew at 9 percent. Wait another minute, where did I put that book on lean?

Here we are in 2007 with the publication of the second edition, and India is the rising star of global business, and the analysts, those prognosticators of world economic doom, are wondering if it is just possible that GM may follow Delphi into bankruptcy. Wait a minute, wasn't Delphi lean? Is it no longer OK to stay in Kansas? Well, I am glad you asked that question.

## ***The Lean Path to Follow***

"Follow the yellow brick road; follow the yellow brick road."

*The Wizard of Oz*, 1939

It is never too late to correct a mistake. This is the greatest pearl of wisdom I have learned and lived by in 20 years of strategic management, and in nearly a quarter century of marriage (but that is another book). Since my early years as a recalcitrant, ethnocentric elementary school student rejecting the adoption of the metric system, I have learned it in order to do business throughout the world. I would



expect no less of you that you read on and follow the directions. Five years from now, where will you be then?

Don't worry about roads not taken, about wrong turns, don't fret that you have come this far for something that isn't there. Just keep reading, follow the directions, and you will get there much sooner than you realize. All you need is the ability to believe in some principles that won't make you successful until everyone else is in the process.

It is significant that two of the architects of significant change in the business models, and management practices necessary to build them, Deming and Carroll, are both detail-oriented, scientific thinkers. One is the midwife of statistical process control, and the other is the first to successfully incorporate Western technology, ERP, into a lean process enabler for the production of goods and services. Yet both begin a methodology with principles that speak to the least scientific of our understandings as human beings, that is, of other human beings. Both mandate with the maddening sureness of a scientist that you must change the culture from competitive, command and fear-driven control to one that is, well, you know where this is going.

Other issues still lie in wait for you, the nascent lean champion, before you begin the digging:

1. Make this transformation a project, not a process: define it and get it done. There is very little twilight land in which to linger safely between being in a place of mass production and thinking, and being in a place of Lean Production and thinking. There is very little room to equivocate between the two.
2. Don't linger. People will pull back, slip away at night, build coalitions, and talk behind your back. You know how that goes.
3. Finally, how will you incorporate your technology into your lean processes? If book sales are an indication, a lot of people have been listening to Carroll, but very few so far are in the United States.

Think of this as a second chance to learn the metric system. It's OK.

## Conclusion

"There's no place like home."

*The Wizard of Oz, 1939*

So there are a couple of things to agree on at this point. First, unlike the Hula Hoop, certain dolls and action figures, and the Pet Rock, computers are not a fad. Second, an enterprise must exist in a round world, a global economy, and a borderless, metric marketplace where lean is the clear winner on quality, cost, and delivery. Et tu, GM? Remember the hard-won lessons of the elementary tykes (Dorothy and the

gang) who resisted metric and now must buy two sets of wrenches and constantly quibble about tolerances with their outsourced suppliers, a clear supply-chain case of “you say potato” and I say, well, you know how that goes every day.

The chain from suppliers to customers will break continuously, let alone be lean, without the enabling power of technology. This is the ultimate tool to put in the hands of the process owners and operators, in every process in the factory and in the boardroom. Again, this is assuming, as Carroll did prematurely, five years ago, and as Deming before him, that everyone is thinking lean and ready to change.

The failure of Western management thinking was not total, but it was decisive as the century turned in positioning us to be playing a defensive position in a growing global marketplace. Leadership is necessary in the lean movement; you can’t manage your way to the state of lean. The fact is, war is won in the foxholes and trenches by the men and women who are willing to fight and die for their fellows, and for what they understand and believe. Squad by squad they have always won the wars—something the strategists cannot ignore. “Drive out fear,” indeed. “Loyalty to people enables continuous improvement.”

Our teams of workers work for themselves *and* each other. We would be wise to know and remember that before we “outsource,” “right-size,” “downsize,” or otherwise employ misconceived “strategies” that destroy the fabric of the team. The only remnant of military management, the sole principle I would encourage you to hang onto as you lead the exodus to lean, is that the first rule of leadership is to take care of your people.

I would exhort you to take a shortcut. It’s OK. No sin. Very secular. Leadership is born of the kind of suffering we share, the experience through which we have suffered. Managers are doomed to a life of leading recidivistic people: it’s human nature not to want to change. But rather than our old natural instinct or behavior, our new leadership challenge is to teach others to do it themselves by getting lean, like getting religion.

Finally, maybe it was just the time. Maybe we just declare victory with how we did it up until recently and move on. Don’t look back. It is not possible to return to the old, flat-earth, “Kansas” management thinking; we will never return to the good old days. And how long ago were they anyway? And good for whom?

The move to lean thinking then is an act of faith. Perhaps this has been the missing characteristic for all of us as managers. We got very professional with our business schools, best-sellers, and seminars. We got very experienced in a cynical way, irony alloyed our enthusiasm, and finally, we became sanguine in our style after always getting defeated in our approaches after the failure of every newly inspirational seminar or book.

But did we ever really possess the faith in those working alongside us that was necessary for success? Success stories are rare and usually culminate with someone selling the company, jobs going overseas, some contraindicator that all is now well forever.

Once we manufactured everything made in the world: every item and every innovation. Have we failed the U.S. worker? That's not OK.

Perhaps it is enough to admit we did and move on. The therapist yells "break-through!" We are cured, whole, no more us and them, officers and men, management and labor. I'm OK, and you're OK, and isn't that good enough? Fade to lean.

**Ed Allfrey**

*Center for Enterprise Development  
Institute for Entrepreneurial Studies  
University of Illinois at Chicago*

---

# Preface to the Second Edition

---

The first edition of *Lean Performance ERP Project Management* was written by a veteran of ERP implementations in manufacturing environments that were working to “get lean.” We hadn’t always called it “lean,” however. We had called it J-I-T, Zero Inventory, Synchronous Manufacturing and Continuous Flow, and several other names. MRP was often viewed as the enemy in these embryonic lean enterprises. Empowered by a lean management team and the beginnings of lean cultures in several of these implementations, I managed or directed projects that were successful in employing Lean Performance ERP in what were becoming very lean enterprises. I emerged from these experiences and wrote the first edition of this book. I thought that everyone in manufacturing would embrace Lean Performance ERP and that those same manufacturers as well as service industries would readily embrace “lean in the office.” I was wrong. American manufacturers who had been struggling with MRP transitioned into struggling with lean, and later with lean and ERP/MRP. The ERP/MRP proponents often reject lean as “simplistic—yesterday’s news” while lean advocates posit that ERP/MRP is the dinosaur. In this second edition of *Lean Performance ERP Project Management*, I am adding the “why do it” of Lean Performance ERP/MRP implementation to the first edition’s “go do it” perspective. I hope to convince the skeptics, on both sides of the issue, that lean and ERP/MRP are not only compatible but that they need each other. I would ask the reader to suspend his or her disbelief about the relative merits of lean and ERP/MRP and consider the case that this book puts forth.

It is apparent that many lean implementations fail for the same two primary reasons many ERP/MRP implementations fail—lack of education on how to accomplish the desired outcome and lack of directed commitment to change. As the global lean phenomenon accelerates, failure at lean is a doomsday scenario for American manufacturers. ERP/MRP systems form the backbone of global commerce, so failure at ERP/MRP implementation is likewise a doomsday scenario.

I hope this second edition helps to educate on the desired outcome: lean and ERP. It is up to the individual to accomplish the commitment to change.

I would like to explore for just a moment three additional themes that I believe make the publication of a second edition of this book desirable. The first theme is the title of the book itself. The title (actually subtitle) of this book has been returned to that which was originally submitted for publication in 2001. Readers of the first edition will notice that the original subtitle that has been reinstated is *Implementing the Virtual Lean Enterprise*. There are three key reasons for this change:

1. The subtitle for the book as originally submitted was *Implementing the Virtual Lean Enterprise*. The powers that be in the publisher's office decided that no one would buy a book with that subtitle. It was felt that that subtitle would not be understood by potential buyers. It was felt that "supply chain" was a term that had more currency at that time.
2. There are many good books on the market that are more suited to bear the subtitle *Implementing the Virtual Supply Chain*. The book you are reading presents only a portion of supply-chain implementation, that being the technical ERP/MRP foundation. There is plenty more to do to implement a supply chain, virtual or otherwise, and many books on the market do just that.
3. This book refers to the Virtual Lean Enterprise repeatedly, and is in fact about the Virtual Lean Enterprise. The Virtual Lean Enterprise is a real thing—it is the virtual connection and coexistence of linked producers in any lean enterprise: the automotive lean enterprise(s), the PC lean enterprise(s), etc. The Virtual Lean Enterprise is especially vibrant in the shared intersection of virtual space where the producers of products and services common to multiple lean enterprises collect, process, and share data about supply and demand.

The second theme that makes this second edition desirable has to do with the necessity of lean transformation and implementation of the Virtual Lean Enterprise that is imperative upon the West as the Eastern manufacturing base increasingly dominates global business through the emergence of lean global supply chains increasingly interconnected through channel Virtual Lean Enterprise technologies.

The third theme is the fact of the new challenges facing the ERP implementer, especially in a lean environment—or an environment attempting lean transformation. The typical project manager wants to be equipped with a current discussion of the latest events and theories on the topic and then see the "toolkit" with which to address them. It is my hope I have provided project managers with a relevant discussion on the latest theories and topics in the ERP/MRP project area. Here is a listing of the new evaluation and implementation tools included in the second edition that can provide implementation assistance:

1. “Foreword: A Message for Management” provides the project manager with an overview to give his or her lean sponsor and the other lean transformation steering committee members to read .....	xv
2. A case in support of the ERP project manager to be the lean champion and to lead the lean transformation .....	3
3. A refreshed discussion of history in the “Origin of Lean Production” .....	10
4. A discussion of why lean cultural principles are required to become lean .....	14
5. A discussion of lean accounting .....	27
6. A definition of the Virtual Lean Enterprise. ....	33
7. A discussion of the conflicts between lean and ERP titled “Lean and ERP: Why Can’t We All Just Get Along?” .....	35
8. A discussion of the failure of ERP implementations .....	42
9. A discussion of lean and Six Sigma .....	42
10. A refreshed discussion of current events in the transition to lean from mass in “Why Should Our Enterprise Be Lean?” .....	45
11. A discussion of the three levels of lean business process management .....	49
12. An update of the “lean commerce” section, including new developments such as e-kanban and Radio Frequency Identification (RFID). A discussion of customer TAKT and operational TAKT is also included, as is a discussion of the lean commerce system implemented by Toyota North America in the years since the publication of the first edition .....	81
13. A Lean Performance China strategy for ERP project managers dealing with China-based manufacturing .....	103
14. A discussion of the differences between lean principles, lean tools, and lean practices .....	110
15. An expanded discussion on the lean cultural principle “The Process Owners and Operators Are the Process Experts.” .....	113
16. An expanded discussion on the lean cultural principle “Loyalty to People Enables Continuous Improvement.” .....	119
17. A new lean enterprise future state assessment to introduce the Lean Performance Project Assessment .....	183
18. An evaluation and selecting software module that discusses a “process stream mapping” methodology to a lean ERP key features determination to select software .....	209
19. A human resource team and the tasks needed to address HR requirements in a lean transformation .....	278
20. A management policy deployment loyalty GAP analysis human resource team task .....	281

New figures:

- Figure 3.1: Lean Business Processes: Strategic Level
- Figure 3.2: Lean Business Processes: Organizational Level
- Figure 3.3: Business Process Example: Organizational Level
- Figure 3.4: Engineering Change Notice: Process MUDA
- Figure 3.5: Supplier Selection Qualification 5 Ws-1H Checklist Result
- Figure 3.6: Supplier Selection 4 Ms Checklist Result
- Figure 3.7: Engineering Change Notice: Current Process
- Figure 3.8: Engineering Change Notice: Future Process State
- Figure 3.9: Engineering Change Notice: Lean Benefits
- Figure 4.2: Lean Commerce Model—Customer Relationship Level
- Figure 4.3: Available to Promise Inquiry
- Figure 4.4: Lean Commerce Model—Sales and Operations Planner Level
- Figure 4.5: SOP Planner Screen
- Figure 4.6: Lean Commerce Model—Lean ERP Level
- Figure 4.7: Assembly Scheduling Screen
- Figure 4.8: Lean Commerce Model—Factory Flow Level
- Figure 4.9: Final Assembly Screen
- Figure 8.1: Key Lean Software Features—General Requirements
- Figure 8.2: Key Lean Software Features—Business Planning
- Figure 8.3: Key Lean Software Features—Production and Operations
- Figure 8.4: Key Lean Software Features—Customer Relationship
- Figure 8.5: Key Lean Software Features—Product Engineering
- Figure 8.6: Key Lean Software Features—Financial Management
- Figure 8.7: Key Lean Software Features—Inventory Management and Logistics
- Figure 8.8: Key Lean Software Features—Supply Chain
- Figure 8.9: Key Lean Software Features—Performance Measurement
- Figure 11.4: Lean Performance Loyalty Analysis Template
- Figure 11.5: Lean Performance Loyalty Analysis—Policy Deployed
- Figure 11.6: Lean Performance Loyalty Analysis—Strategy Deployed
- Figure 11.7: Lean Performance Loyalty Analysis—Objective Deployed
- Figure 11.8: Lean Performance Loyalty Analysis—Technology Deployed

New checklists:

A. Nine Forms of Office MUDA Checklist .....	215
B. 5S in the Computer Room Checklist .....	219
C. 5S in the Office Checklist .....	216
D. Lean Cultural Principles Checklist .....	122
E. Challenging Processes Checklist .....	320

---

# Preface to the First Edition

---

## What Is Lean Performance?

Lean Performance is a project management methodology for lean implementation that starts with existing processes and develops process performance improvements and measurements. By developing process workflow standards of *what* work must be completed, and then utilizing the process workflow standards to determine *how* to do the work, Lean Performance produces process work instructions for training to ensure continued process quality. Lean Performance also manages multisite projects by identifying common processes and prioritizing assignments. The methodology develops process performance measurements and Continuous Lean Performance where information technology has already been implemented, or as the implementation methodology for new projects.

Lean Production is the philosophy and practice of eliminating all waste in all production processes continuously. Manufacturing workers may apply lean principles, tools, and practices successfully to continuously improve production processes, but usually information technologies do not readily enable continuous improvements in management decision processes, information/support processes, and linkages to physical processes. Methodologies for information technology installation such as reengineering and process or system innovation do not facilitate the use of Lean Thinking to readily enable continuous improvements in management decision processes, information/support processes, and linkages to lean physical processes. Until now, lean thinking has narrowly focused on physical processes. This limited approach has several serious shortcomings:

- Process improvements driven by information technology are not always linked to management strategies and objectives.



- Management decision processes do not support lean physical processes.
- Physical process lean improvements are not supported by or linked to information systems.

The Lean Performance methodology presented in this book suggests a solution. Lean Performance uses lean principles, tools, and practices to improve and then *continuously improve* management decision processes, information/support processes, and their linkages to lean physical processes. The methodology trains and empowers the in-house experts, the process owners, operators, and customers, while employing the best of the process and system innovation and reengineering tools (from a lean perspective) to achieve system integration. Lean Performance develops or enhances a company culture of continuous improvement by recognizing the strength of the business (i.e., people and processes). Lean Performance integrates strategy, people, process, and information technology into a project management methodology that applies lean thinking to all processes by utilizing eight implementation and training modules.

## Why Is Lean Performance Important?

Today's manager is faced with the dilemma of managing emerging cross-functional and cross-enterprise business processes such as e-commerce and the new supply-chain management processes utilizing information technology in a business enterprise with an increasingly empowered team culture. All too often, traditional information system development based in methodologies such as reengineering and system or process innovation is woefully inadequate for use in an empowered team culture. Even in more traditional business environments, process analysis and system development projects run and performed by business or information technical "experts" often deliver miserable results, especially from a quality standpoint. Delivered systems either do not work technically or do not fit the process as the user performs it today or could best perform it tomorrow. In contrast, great results have been obtained by harnessing the power of all enterprise team members through methodologies that employ lean philosophy and thinking, such as Total Quality Management (TQM), *kaizen*, and continuous improvement. The Lean Performance project management methodology presented here incorporates lean philosophy and thinking in a task structure that, when executed, implements lean management decision processes, information/support processes and information linkages that support lean physical processes and provides the structure to improve physical processes. The methodology performs best in the empowered team business environment, utilizing vendor-supplied, unmodified software packages for manufacturing such as enterprise resource planning (ERP), supply-chain management (SCM), operations planning systems (OPS), advanced planning systems (APS), manufacturing execution systems (MES), and customer relationship management (CRM).

A successful business process improvement or redesign approach to implementation of these systems must consider input from the two hemispheres of management that are in conflict in a typical project:

1. Departmental, politically based management practices.
2. Emerging information-based management practices.

In many companies, established politically based management practices rely on an individual power-oriented management style that leverages power gained through controlling a “stovepipe” departmental structure and the flow of information (work) residing within that stovepipe. These structures depend on internal management alliances to manage the business through a process of negotiation, compromise, and accommodation. Emerging information-based management practices are fundamentally different in that the information that is held hostage in the stovepipes of the old style organization is open in the empowered team workplace. In fact, opening up this information flow and designing work around it (workflow) is the real (and perhaps only) reason to consider information technology-enabled process improvement or redesign. With open information, old alliances are not necessary, and team-based decision making can take place. Departmental structures are no longer efficient and are replaced by product and process stream structures.

Obviously, these structural changes can be very threatening to old-line (stovepipe) managers, and they resist them. When the information technology specialist (MIS manager/CIO/system analyst) is introduced into the mix, numerous complications occur. The lack of a common language between power-style managers (who translate their information requirements into newer and better stovepipes) and technically adept information technology/data processing experts (who do not have the business process expertise of the people already performing the existing processes) leads to enough confusion to sink many business process improvement efforts. When the process owners/operators are not the process designers, nonvalue-added tasks will dominate a new stovepipe at the end of the project. This collision of dysfunctional styles is a fundamental impediment to success in the information age, much as office-based manufacturing engineers of the mass industrial age were an impediment to success in the factory, leading to their removal by the originators and practitioners of Lean Production. Lean Performance defeats the nonvalue-added process constraints imposed on processes by well-intended, technologically adept but misguided individuals who presume they are “experts” in processes that they themselves do not perform.

Applying the Lean Performance methodology to a business process improvement or redesign project focuses the efforts on a common approach that uses common principles, tools, and practices. This approach promotes successful dialogue among the managers, information technology specialists, and emerging computer-literate knowledge workers and team members, who in many cases are already in the workplace but generally not (yet) in a position of management. Lean Performance leverages the expertise of existing internal process owners, operators, and customers

to design processes in terms of what needs to be done to produce value (product or service) for process customers immediately downstream. All methodology tasks are structured to “pull” process redesign/improvement activities from the point of view of the external customer so that optimum customer value is provided.

## **How Does Lean Performance Work?**

Lean Performance identifies and deploys lean management business policies and strategies during software implementation, process improvement, and lean transformation projects by integrating lean thinking and process-oriented management at the management decision, information/support, and physical process levels through the use of an integrative project and management practice: the Lean Performance Analysis. The methodology then utilizes Business Process Reengineering practices to design the process architecture. Lean Performance employs lean practices to develop Lean Performance teams of process owners and customers. These Lean Performance teams eliminate waste from existing management and information/support processes while developing value-added information linkages to support lean physical processes and improve physical processes. Additionally, Lean Performance employs system innovation practices from a lean perspective to provide a project management work plan and toolkit to integrate the information system (ERP, MES, ASP, SCM, OPS, CRM), and to provide an ongoing continuous improvement tool after implementation.

## **Who Is Lean Performance For?**

This book is geared toward the 21st-century business manager, a new manager who is developing in the lean workplace: one who manages *with* technology, not one who simply manages technology. I propose that there is a critical difference. These new managers will have used information technology for most of their careers and will readily agree that most information technology projects fail or deliver poor results and require extensive after-project rework. These managers may already be chief executives or chief operating officers, engineering or operations or materials managers, or continuous improvement or lean coordinators. They have probably served as project managers at some point or now employ project management approaches to team management. Project managers who have been exposed to Lean Production are a ready audience for this book. These managers are or have been successful employing lean methodologies in their current or previous assignments.

Information technology (IT) professionals, on the other hand, may not see the relevance of the methodology. Many IT professionals may be all too familiar with the failures of previous projects and methodologies; however, seasoned IT professionals who are ready to try this more comprehensive approach will immediately

hone in on the most obvious reason for IT management to support Lean Performance: Lean Performance puts the responsibility for a successful implementation or transformation squarely on the shoulders of the process owners, operators, and customers. The typically noninvolved system user of the past cannot function successfully in a Lean Performance environment.

## **Why Did I Write This Book?**

I wrote this book in part because it expresses my theoretical interest in business process and performance improvement methodologies, and it incorporates what I have learned about them by trial and error. In my career in manufacturing management and consulting, for a variety of domestic and international companies, I have had the opportunity to try out various approaches to business improvement and project management. Lean Performance is the result of my attempts to develop a methodology evolved from classical business consulting approaches but viewed through a lean thinking lens. Perhaps most important, I have had the experience of being a project manager subject to Murphy's first law of project management: about the time you know enough about what the project is about to write a comprehensive project plan, you don't have time to stop managing the project and write it. For this reason, I wanted to develop a project template for myself and other project managers to interpret and apply to our own projects, so we would have a comprehensive methodology to apply before their weight becomes all we can carry and there isn't time to write the plan.

As fond of information and other technologies as I am, I believe that the more complex and therefore more valuable (and costly) elements of business processes are tasks that are people based. When we de-emphasize technology, and introduce the concept of managing the office and linking the office to the factory with processes, in much the same way as we manage the factory, then introducing lean principles, tools, and practices to the management, information/support, and physical process linkages becomes possible. Although my preference is to emphasize manufacturing, the broader methodological concepts are appropriate to computer-based process management and to all business processes, regardless of service or industry. Also, the transition into the 21st century has revealed performance gaps in many new systems that will benefit greatly from applying Lean Performance.

In conclusion, management and information/support processes and information linkages to physical processes are not ineligible for continuous improvement. The Lean Performance methodology is a process-oriented approach that provides a project management structure for applying lean thinking to the entire enterprise, with an emphasis on the management decision, information/support, and physical processes.

Application of lean thinking in the factory has resulted in the elimination of some portion of direct labor while maintaining the same or greater productive

output from fewer workers. The application of lean thinking to the office results in a reduction of management layers, with a corresponding higher output flowing from the same or fewer knowledge workers. The real challenge to the enterprise in applying these lean principles, tools, and practices is to recognize that, above all, lean is a growth strategy. Management cannot expect workers to continuously improve their way to the unemployment line. New challenges must continuously be presented to today's Lean Performance teams by modern managers who manage with technology.

**Brian J. Carroll**

*August 2001*

---

# Acknowledgments for the Second Edition

---

In addition to the continuing support of many of those mentioned in the acknowledgments to the first edition, I would like to thank those managers and students who have contributed ideas and energy to the Lean Performance certificate classes I teach in conjunction with the University of Illinois at Chicago (UIC) Institute for Entrepreneurial Studies and the Center for Enterprise Development. I would especially like to thank the teams from Amurol Food Products, Emerson/Sealmaster, Medline Industries, Elite Engineering, Northrup-Grumman, Weathermakers, Texas Instruments, American Circuits, Midwest Folded Products, Peerless Mounts, and several teams at Kay Manufacturing as well as at Smith and Richardson. The success of these managers and students in the application of Lean Performance principles, tools, and practices sustains my vision of a lean transformation in the American lean economy.



---

# Acknowledgments for the First Edition

---

I owe thanks to many people who have helped me in the writing of this book, but I can only name some of them here. I would like to first thank my family, who gave me their consistent support. Roger Dykstra and Robert Montgomery of Manufacturing Management Associates gave me my first consulting experience and taught me much about the development and application of consulting methodology. John Toomey shared much of himself and, through the publication of his two fine texts, (*MRP II Planning for Manufacturing Excellence*, Chapman and Hall, and *Inventory Management Principles, Concepts and Techniques*, Kluwer Academic Publishers), has been an inspiration to me in demonstrating the persistence necessary to write a book. John A. “Jack” Kalina explored many of the ideas in this book with me early on in our project collaborations. Gary Saunders allowed me to pursue my ideas on several critical projects. Guenter Leibold and Ron Spiers gave me an opportunity to try my ideas in their projects and added their creativity to the effort. Kevin Pastel and Fred Gruber were instrumental in pursuing these ideas while we collaborated on the behalf of clients. Ed Holmes, Chuck Morin, and especially Bob O’Shea of Engineering Systems had the patience to support my vision. Ed Allfrey of the Center for Enterprise Development stuck by me through the seemingly endless “start-up.” Dick Marshall listened to my ideas with incredible patience and provided a wise and informed perspective on the use of lean principles, tools, and practices in the team setting. I especially want to thank John Condon for his close counsel and friendship. Finally, Goto–San, here is the book. Thank you for your inspiration.





---

# About the Author

---

**Brian J. Carroll** is president of Performance Improvement Consulting, Inc. (PIC), a management consulting and education firm specializing in Lean Performance services located in Downers Grove, Illinois. Mr. Carroll has 35 years of manufacturing management, management consulting, and education experience. His résumé includes positions in operations, logistics, warehousing, customer service, production and inventory control, project management, materials management, and general management, all in the automotive, integrated circuit, and metal fabrication industries. In a career transition to management consulting, he conducted over 50 engagements in manufacturing management and information technology for domestic and international clients. Mr. Carroll performed consulting engagements in industries producing healthcare equipment, flexible automation, packaging machinery, and fluid hydraulic pumps. He has extensive consulting experience with producers of automotive products, including engagements with manufacturers of automotive motors and fans, fuel control systems, electronic control units, fuel pumps, antilock braking systems, radios and CD players, plastic injected molding, alternators, starters, generators, and engine management systems. His completed projects include software evaluation and selection, operations reviews, information systems organization design and implementation, and process improvement. In addition, he was a team member, project manager, or consulting project director on over 25 successful MRP/ERP projects, many in lean environments. Now focusing on education, he has developed the Lean Performance certificate series offered by the Center for Enterprise Development in conjunction with the Institute for Entrepreneurial Studies at the University of Illinois at Chicago. Lean Performance classes have included teams from processors and manufacturers of food products, power transmission equipment, medical equipment and supplies, large capacity electrical regulators, electrical control panels and regulators, electronic testing services, defense goods and logistics services, automotive transmission and gear castings, HVAC services and equipment, electronic switching components, circuit board products and designs, school equipment, pharmaceutical processing machines, commercial and industrial TV mounts, and chaplets, chills, and perforated tubes. Lean Performance certificate program information and registration materials can

be found at: [www.ced-uic.com/leancertificate](http://www.ced-uic.com/leancertificate). Mr. Carroll can be contacted at [Author@leancommerce.org](mailto:Author@leancommerce.org) or visit his Web site at [www.leancommerce.org](http://www.leancommerce.org).

---

# **INTRODUCTION TO LEAN PERFORMANCE**

---

**I**



## *Chapter 1*

---

# Foundations of Lean Performance

---

### **When the ERP Project Manager Is the Lean Champion**

The Mass Production Era of the Industrial Age is now ending and the Lean Production Era is emerging to succeed it. The Lean Production Era is exemplified by processes based in systems of cultural cooperation, differing fundamentally from the Western systems of cultural competition. Outsourcing and offshoring are the latest stages of Western cultural competition and are fueling the expanding shift to Lean Production as great volumes of goods and services formerly produced in Western Mass Production facilities are now produced in Eastern Lean Production facilities.

Ages and Eras are recognized for their social attributes and cultural constructs, not just for their discoveries, machines, and science. The Industrial Age began in approximately 700–800 A.D., when people began to gather in groups (guilds) in the Craft Production Era and to manufacture goods and services. Elements of Mass Production, as well as elements of Lean Production, were visible in the “water-motor” factories that originated in the northeastern United States, beginning in the late 1700s, and were then built in various areas of the country throughout the 1800s. Perhaps the greatest practitioners of “water flow” were the Shakers, who built some of their furniture factories over streams in order to harness water power. The Shakers were a religious community, but they were also pioneers in the “flow” of work. Cultural cooperation and the common purpose of community enabled the Shakers to work in cooperative harmony. One of the last water-powered factories