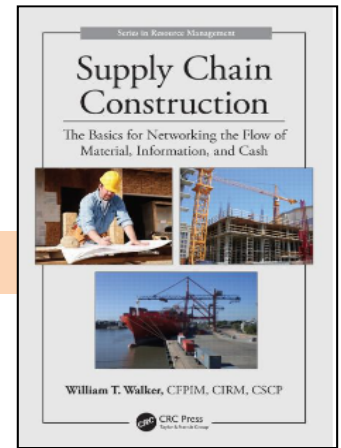


# Supply Chain Construction The Basics for Networking the Flow of Material, Information, and Cash

William T. Walker, CFPIM, CIRM, CSCP, CLTD

## A Reader's Guide

CRC Press ■ ISBN 978-1-4822-4046-7 ■ CRCPress.com ■ Amazon.com



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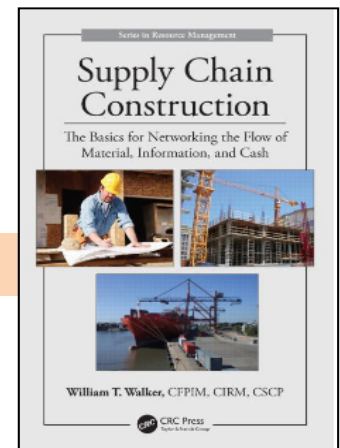
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## About the Book

*Supply Chain Construction* is a “how to” book written by a practitioner for new and experienced practitioners alike.

In just one example of the author’s experience...during his tenure as director of supply chain management at StarTrak Information Technologies, LLC...the author faced the practical challenges of constructing a new supply chain, then rebuilding this supply chain through multiple product generations. The 1<sup>st</sup> generation was new analog wireless electronic instrumentation targeted for a new market. How would the new product be delivered to the new market? Would the price to the end customer across this multi-echelon supply chain be competitive? The 2<sup>nd</sup> generation involved moving from a two piece enclosure with a seal and external antenna to an ultrasonically welded enclosure with an internal antenna. How were the new suppliers selected and qualified? How many times would the inventory turn? The 3<sup>rd</sup> generation converted the product from analog cellular communications to digital cellular communications due to a major shift in technology. How was old channel inventory depleted and new channel inventory forecast? How were old relationships terminated and new relationships embraced? And the 4<sup>th</sup> generation involved adding capability for remote microprocessor reprogramming. This was an overall operations cost reduction for the service portion of the business. How would this impact product returns and reverse logistics costs?

The answers to such questions in real-world, multi-echelon supply chains are complex and interrelated. *Supply Chain Construction* applies a Blueprint approach to break the problem into three basic tasks:

1. Build a network container to connect the information flows and cash flows end-to-end from suppliers through factories through distributors to customers.
2. Fill the network container with product contents connecting material flow from inventory location to inventory location while transforming raw materials into finished goods.
3. Match demand and supply through forecasting, inventory planning, product pricing, performance measures, and risk management. Validate actual to plan during startup.

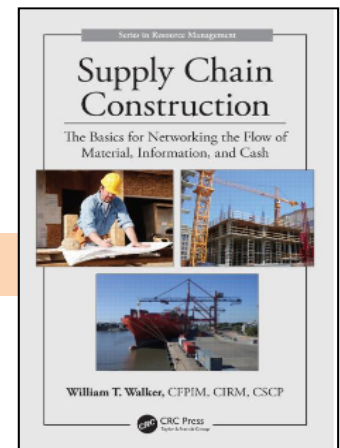
*Supply Chain Construction* approaches how to perform each task first in a storyline for the reader to understand supply chains from an interpersonal and intrapersonal perspective, and then in the chapter text. Each chapter with its detailed examples combines text, tables, simple equations, and figures for the reader to understand supply chains from linguistic, logical, and spatial perspectives. All this enables many different styles of adult learning.

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## About the Author

Bill Walker retired from industry after forty years as a supply chain practitioner. He is currently in his sixth year as an adjunct professor at New York University's Tandon School of Engineering in Brooklyn, NY. His course, based on this book, is the first supply chain course taken by over 215 industrial engineering graduate students. Another 120 undergraduate students at Rutgers in Newark, NJ have benefitted from his teaching demand planning and fulfillment. Through applying his personal supply chain learning with teams in industry, through understanding international cultures with his business travel, and through experiencing his student's difficulty in mastering learning in the classroom, Bill has driven his personal knowledge delivered in this book, his third supply chain book, from theoretical concepts into sound practices. In addition, his writing and teaching applies Howard Gardner's Theory of Multiple Intelligences to help adults learn by mastering each concept in their own way.

While working 30 years as product development engineer, project manager, production section manager, purchasing manager, materials manager, and supply chain architect for the 1,000 employee Power Products Division of Hewlett-Packard, Bill had to learn how to solve many supply chain related problems that he did not know how to solve. This situation continued while working as Asian transfer program manager for Agilent Technologies, director of supply chain management at Siemens Fire Products, and seven years as director of supply chain management for the 35 employee StarTrak Information Technologies, LLC. Bill began learning how to connect the dots in a practical way by writing short technical articles about what he did know, then swapping those articles with other practitioners having expertise in related areas. In this way he built up an international network of subject matter experts.

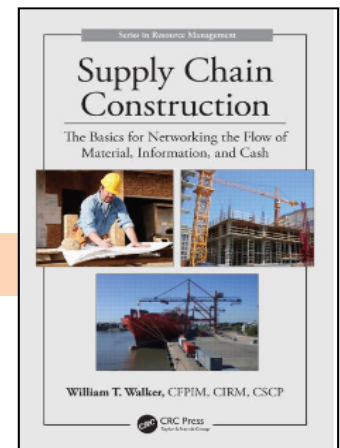
Bill has held continuous membership in APICS since 1980. He augmented his supply chain education with four APICS certifications from becoming a CFPIM (Certified Fellow in Production and Inventory Management CFPIM) in 1990 until becoming a CLTD (Certified in Logistics, Transportation, and Distribution) more recently in 2016. From 1985 through 1999 he served APICS in one volunteer capacity or another from Chapter President to elected APICS Society Vice President of Education to President of the APICS Education & Research Foundation. Throughout this time Bill advocated for the APICS body of knowledge to be expanded from operations management to include supply chain management and logistics topics. He shared his supply chain knowledge, learned from practical experience, and educated fellow practitioners through more than 20 presentations at APICS International Conferences. Bill was awarded the APICS Society level Voluntary Service Award in 1999 for his contributions. And in 2000 Bill was part of an eight member volunteer APICS committee that created the first APICS supply chain management courseware.

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## An Excerpt

From Chapter 3: Building Relationships in *Supply Chain Construction*...Understanding where there are many opportunities to apply the contents of this book...

### “Know When to Start and End a Supply Chain Construction Project

Supply chain construction projects are commissioned to improve, or to at least maintain, business performance measures. You may have built a new supply chain network and filled it with inventory, but how do you know you are getting its best performance? You may have successfully combined two supply chains when your company acquired another company; but how do you know this supply chain merger still delivers a competitive performance? A supply chain that is designed on paper and constructed by the project team needs to be validated in practice. The earlier this can be done, the lower is the business cost of having to rework the project to gain customer and management satisfaction.

### ***Supply Chain Lifecycle Event Triggers***

The start of a supply chain construction project is triggered by a lifecycle event. Lifecycle events occur all the time in supply chains. The most common lifecycle event triggers are listed in Table 3.1. Some triggers, such as adding a new product or adding a new market segment, drive short, lightly staffed projects. Other event triggers, such as starting a new business or outsourcing a product line, drive longer, more heavily staffed projects. All too often, multiple small events pass unnoticed, and they are not acted upon until there is some crisis. Each and every lifecycle event listed in Table 3.1 has the potential to trigger a new supply chain construction project.

### ***How to Get Started...Ask These Three Questions***

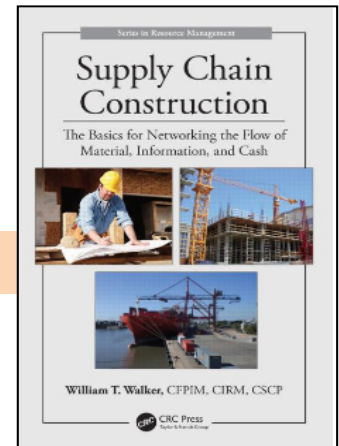
Once you have identified that a supply chain lifecycle event trigger is eminent, you need to quickly decide how to respond. Answers to the following three key questions will start you down the right path.

1. Will any product shifts occur that require adding/subtracting suppliers and adding/subtracting inventory items at inventory locations from the supplier echelon to the push/pull boundary echelon?

This is a small supply chain construction project starting from an existing operational supply chain. It can probably be handled by two persons working part-time for a few months. Compare the “as-is” composite bills of materials (BOM) with the “to-be” composite BOM and make the required network container and product content adjustments. Do not forget to adjust the forecast and demand information connections. Then use the Value Circle, described in Chapter 11, to validate that each performance measure is back on track, as the project is completed.

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2. Will any market segment shifts occur that require expanding/reducing a delivery channel and adjusting inventory from the push/pull boundary echelon to the end-customer echelon?

This is a small supply chain construction project starting from an existing operational supply chain. It can probably be handled by two persons working part-time for a few months. Compare delivery coverage to the “as-is” market segment with delivery coverage to the “to-be” market segment and make the required network container and product content adjustments. Do not forget to adjust the forecast and demand information connections. Then use the Value Circle, described in Chapter 11, to validate that each performance measure is back on track, as the project is completed.

**Table 3.1 Supply Chain Lifecycle Event Triggers**

Start to Growth	Mature	Decline to End
Begin a Supply Chain		End a Supply Chain
Enter a Market Segment	Switch Market Segments	Exit a Market Segment
Add a Product	Rollover a New Product Generation	Obsolete a Product
Add a Service	Rollover to a Different Service	End a Service
Acquire a Product Line	Due Diligence for an Acquisition	Divest a Product Line
Implementing an ERP Information System		
	Change a Pricing Strategy	
	New Competitor Enters the Market	
	Substitute a Trading Partner	
	Outsource/ Insource	
	Offshore/ Re-shore	

3. Are any more radical changes required to the network container or product contents?

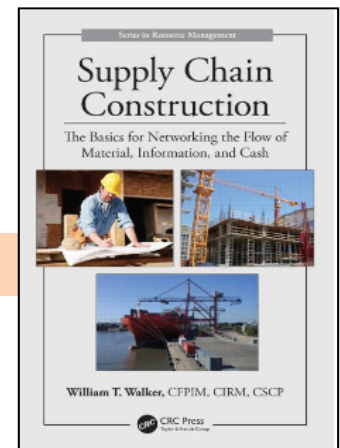
This is a large supply chain construction project. It will probably require a team with several people working full time for at least six months. This may be the startup of a brand new supply chain. Otherwise, start by documenting the “as-is” supply chain map and performance measures. Figure 3.1 is an example Supply Chain Echelon Map. Fill in the names of the suppliers, factories, distributors, and retail stores with the cities and countries where they are currently located. This is your baseline. Now draw a second Supply Chain Echelon Map of the “to-be” supply chain, for example, the supply chain for a company to be acquired. In some cases, the extent of the changes will make the project look like building a new supply chain from the ground up. Use the Value Circle, described in Chapter 11, to validate that each performance measure is back on track, as the project is completed.”

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## A Conversation with Bill Walker

### Q: How is this book different from other recent supply chain titles?

**A:** Supply chain books written by consultants delve into the strategies and best practices of well-known Fortune 500 companies. Supply chain books written by academicians offer either an introduction to a broad range of supply chain topics or a mathematically detailed explanation of a new theory. While such books are important contributions to the field, *Supply Chain Construction* is a book for the practitioner written by a practitioner. It applies a proven, in-depth blueprint for building real world, multi-echelon supply chains.

### Q: Why does the word “basic” appear in the title?

**A:** The word “basic” is intentional in the title. While some readers may feel that they are well beyond a basic understanding, the book provides breadth and depth to multi-echelon integration that is probably not completely understood. While other readers may feel that even the basics are just too complex to get started, this book develops a complete “how to” blueprint in logical, easy-to-understand chapters with detailed examples. A storyline connects the chapters.

### Q: How do you see other practitioners using this book?

**A:** My experience has shown that, for many adults, it is easier to take a detailed example and adapt it for a solution to their problem than it is to frame their problem and create a solution from scratch. I have known many people who have deep experience in one or two functional areas, but really miss the boat when working through the end-to-end integration of a global supply chain. *Supply Chain Construction* is tailored to connect with what readers already know and to advance their knowledge using methods that have been shown to improve adult learning.

### Q: What is so hard about building a supply chain?

**A:** There are many, many dots to connect when building a multi-echelon supply chain. *Supply Chain Construction* breaks the task into three overarching steps. First, build the network container. These are the relationships and processes that interconnect end-to-end. Second, fill the network with product contents. This is the structure of products and the end-to-end placement of inventory. Third, match demand and supply. This combines demand management, capacity control, dynamic pricing, performance measurement, and risk management.

### Q: Your background is electrical and industrial engineering. When do you get the construction of a supply chain network right?

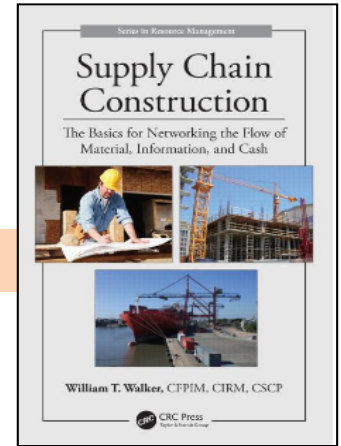
**A:** Engineering is about beginning with a specification of customer requirements, iterating through to an economic, efficient solution, and ending with a validation that the solution meets customer requirements. *Supply Chain Construction* embraces such a layered approach. The blueprint methodology enables a project team to quickly iterate a practical supply chain solution.

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## Reader's Comments

Chapter	Topic
1	Eight Steps
2	The Blueprint
3	Building Relationships
4	Cash Flow
5	MAKE
6	SOURCE
7	DELIVER
8	RETURN
9	Demand Planning
10	Inventory Management
11	Performance Measures
12	Risk Management

“Bill Walker's supply chain insights and knowledge are some of the best in the business.”

- Robert J. Trent, Ph.D., Co-Director Center for Value Chain Research, Lehigh University

“Bill Walker has delivered another outstanding manuscript on Supply Chain concepts. This work does an outstanding job of combining theory with practical application.”

- Russell J. Miller, CPIM, CIRM, CSCP  
Master Scheduler, Solvay S.A.

“Supply Chain Construction by William T. Walker is one of the best books of its kind.”

- Paul Humbert,  
President, The Humbert Group LLC

“It is a unique supply chain text book that begins each chapter with a near real life story that sets up the remaining chapter highlighting the importance of the concepts of supply chain.”

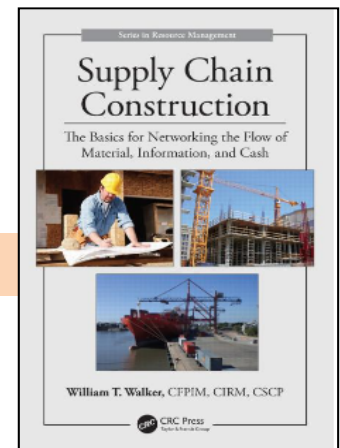
- Ben Lowe  
Associate Director, Verizon Wireless

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## Discussion Questions

1. In the Chapter 1 Storyline the management team has only a vague understanding of how their new product might add value in an unfamiliar market. Describe why your product or service adds value to your market?
2. The market need outlined on page 15 and as a first consideration in the Blueprint is the starting point for a viable business. What bounds your market (geography, demographics, industry, customer spending, social media, Internet access, or something else)?
3. Chapter 3 describes the need for trust within three kinds of relationships (among project team members, team to parent company, and team to external trading partners). How would your organization staff a supply chain construction project?
4. Table 5.2 Factory Selection Criteria, Table 6.8 Supplier Selection Criteria, and Table 7.3 Distributor Selection Criteria present the musts and wants to choose network relationships. How would you select suppliers, factories, and distributors to meet your requirements?
5. In Figure 4.5, the longer a supply chain is, the more expensive its product becomes for the end customer. How does the end-to-end landed cost of your proposed supply chain compare with the end-to-end landed cost of your current supply chain?
6. Your investment in inventory stays locked up until the inventory turns. Cycle stock, finished goods, and raw material inventories have inherently different turns described in Chapters 9 and 10. How do you determine inventory turns for each echelon of your supply chain?
7. Return, reuse, recycle, and environmental sustainability are byproducts of today's supply chains. Chapter 8 applies the Blueprint in detail to the construction of a reverse supply chain. How do you build a reverse supply chain?
8. When a business first starts, it needs cash to hire people, buy inventory, rent space, and extend customer credit. As the business grows, it forecasts the need for even more cash as shown in Tables 4.9 and 4.10. How much cash will you need to operate your supply chain?
9. Performance measures in Chapter 11 trace startup and operational performance for throughput, landed cost, delivery lead time, inventory turns, cash-to-cash velocity, and more. How well does your company measure the operational performance of its supply chain?
10. Chapter 12 describes environmental scanning and scenario planning with an example on page 433 as tools to manage supply chain risk. What are the primary risks you anticipate? How can they be mitigated? How often should you conduct a supply chain risk review?

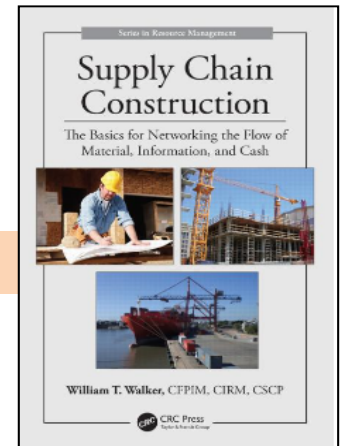


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## Share Your Story

Since the book was published, different readers – practitioners, entrepreneurs, CEO's, consultants, academicians, and undergraduate/graduate students – from different parts of the world have shared their thoughts about the book with the author. The author wants to hear from you too.

- Did this book change the way you think about supply chains?
- Did this book expand your basic supply chain knowledge?
- Did this book teach you how to apply basic supply chain techniques?
- Did this book help your project team build a new supply chain or modify an existing supply chain in the right sequence, on-time, and within-budget?

If you learned how to do new supply chain things, the author wants to know about it. Tell him your story. E-mail the author at: [wt\\_walker@verizon.net](mailto:wt_walker@verizon.net)