

Putting it all together

How to integrate Six Sigma quality objectives with the SCOR model

by Peter Bolstorff

What is SCOR?

The **Supply Chain Operations Reference** model, developed by the *Supply-Chain Council*, provides a standard methodology for managing supply chain projects centered on Plan, Source, Make, Deliver and Return.

What is Six Sigma?

Six Sigma is a measure of quality that strives for near-perfection, which is defined as no more than 3.4 defects per million opportunities. In this article, the Six Sigma methodology for improvement is defined by the DMAIC process: Define, Measure, Analyze, Improve and Control

About SCOR

The Supply Chain Operations Reference (SCOR) model has been developed by the Supply-Chain Council and is **SCTN**'s recommended implementation model for SCM initiatives. While the author of this article is affiliated with the Supply-Chain Council, this article was prepared under the direction of **SCTN** and was not subject to prior review or approval by the Supply-Chain Council or any of its members/affiliates.

To learn more about the Supply-Chain Council, including a white paper guide to Level 1 metrics:

www.supply-chain.org

How does SCOR fit with **Six Sigma**? I've been asked this question at every educational event that I've spoken at this year; the only question I get asked more often is, "How does SCOR fit with **lean manufacturing**?" In fact, recently I was asked, "How does SCOR fit with lean Six Sigma?"

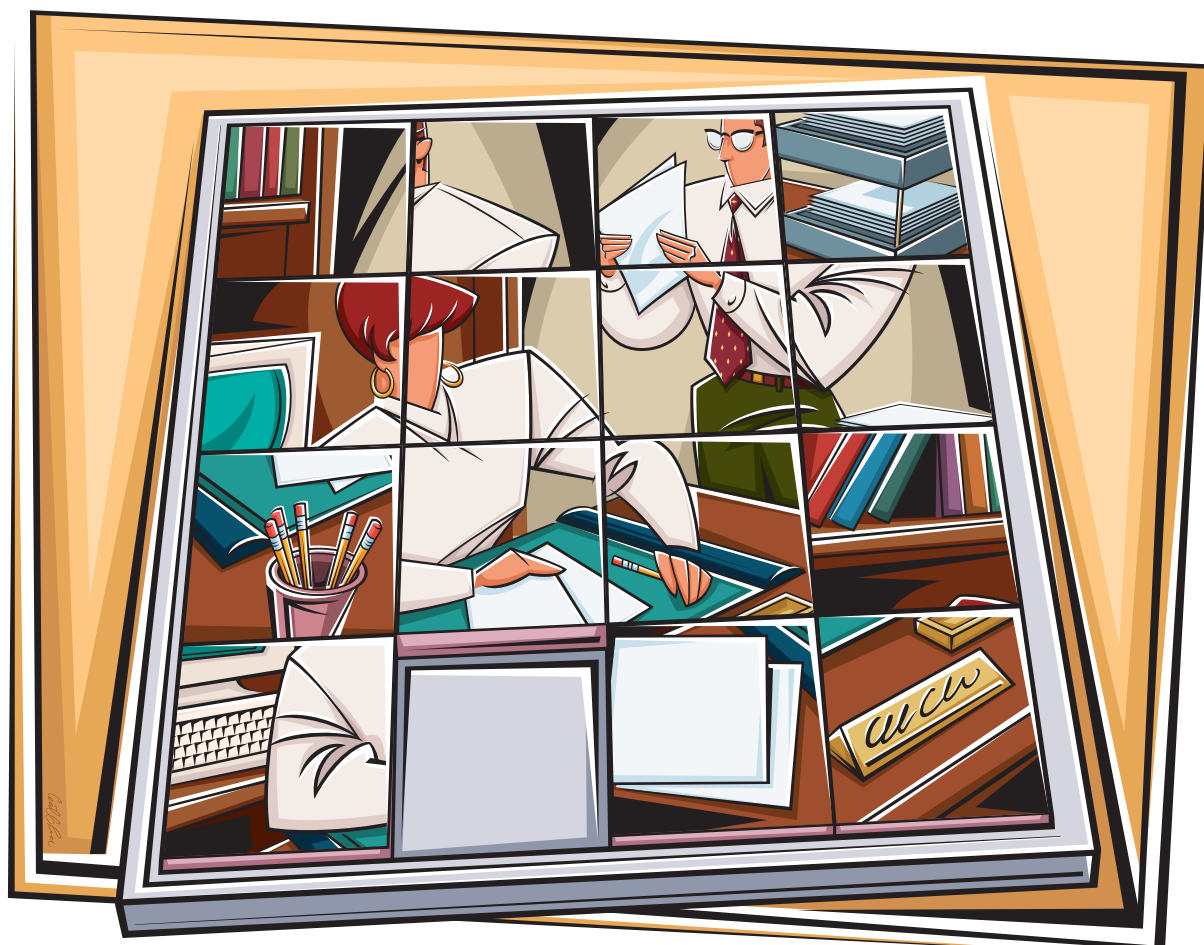
Fortunately, I picked up a great deal of Six Sigma training and experience in the early 1990s as part of my manufacturing assignments with *3M*. In addition, I have participated on several lean manufacturing-driven **Kaizen** teams, worked my way through the *Oliver Wight* education catalogue, and participated in most of the available **Theory of Constraints** seminars (I'm not a Jonah yet). You can also toss in some project management, change management and business process reengineering. This may resemble many of your backgrounds.

Six months ago I had to write a project plan to incorporate the SCOR Framework and Project Roadmap into an existing Six Sigma infrastructure. To be clear, the objective wasn't SCOR Six

Sigma; rather it was Six Sigma Supply Chain Process Improvement using SCOR.

In updating my research, I've found that the 21st century **Six Sigma training programs are like peanut butter** — they all have the same basic ingredients, but the texture can be somewhat different. This article highlights the key DMAIC integration points of the Six Sigma and SCOR project plan, which I'll abbreviate as **SCσR**. **Table 1** summarizes the highest-level integration of the two approaches.

DMAIC	SCOR
Define	Analyze Basis of Competition
Measure	
Analyze	Configure Supply Chain
Improve	Align Performance Levels, Practices and Systems
Control	Implement Supply Chain Changes



Resources

The SCOR plan leverages several Six Sigma resource roles to support the overall project:

- **The Leadership Group or Council** — comprised of senior management — is responsible for the planning and execution of the entire Six Sigma corporate program for all business processes. This group sets vision, identifies resources (including the Project Sponsor) and initiates projects.
- **The Project Sponsor-Champion** (potential future process owner) is a senior manager accountable to the Leadership Council for a particular project. In SCOR language, this is the active executive sponsor who develops an evangelist and establishes a core planning team, ultimately comprising the project steering team. The steering team in smaller organizations may also serve as the Leadership Group.
- **The Implementation Leader** (potential future process owner), a director-level executive, oversees the day-to-day rollout of the overall Six Sigma program. This role is most closely associated with the evangelist role in a SCOR project.
- **The Master Black Belt**, a Six Sigma expert, provides advice and counsel to multiple implementation leaders and their projects regarding analytical techniques, change management and process design strategies. This role could also be associated with the SCOR evangelist role.
- **The Black Belt-Project Leader** — a business leader who has completed the necessary training and experience requirements — has primary responsibility for the project. The SCOR equivalent also defines a project manager role to lead the project.
- **Green Belts-Team Members** (business experts) have completed necessary training and have primary responsibility for producing project deliverables.

Table 2	
DMAIC	SCOR
Define	Analyze Basis of Competition
DMAIC Project Charter	SCOR Project Charter Template Supply Chain Definition Matrix
Identify Customer Requirements: Kano Analysis; Voice of the Customer Analysis	Chip Exercise
Identify and Document the Process: SIPOC	Thread Diagram

Define

The SCOR project plan builds the DMAIC project charter using business objectives, project objectives, project scope, milestones, schedule, resources, roles and responsibilities, and associated benefits from a typical SCOR charter. The scope of supply chain costs to be placed under examination is **the most critical factor**; the Supply Chain Definition Matrix plays a significant role in helping to determine project scope and eventual scalability.

Lessons learned

While each approach can be used with great success, the value of SCOR focused on supply chain process improvement can be summarized in five key points:

- 1) SCOR greatly accelerates the Improve phase of DMAIC and provides for a more balanced solution between process and technology.
- 2) SCOR has standardized, process-based metrics for cost, delivery performance, responsiveness and asset management already defined, thereby simplifying the Measure phase of DMAIC.
- 3) The SCOR SCORcard and gap analysis minimizes the risk of working on complicated, functionally-based projects with little return.
- 4) SCOR leverages the project resource infrastructure of Six Sigma, and therefore —
- 5) Project team members learn more about overall supply chain impact.

Table 3	
DMAIC	SCOR
Measure	Analyze Basis of Competition
Appropriate Measures: CTQ; Stratification	SCOR Metrics Template SCORcard Baseline and Gap Analysis
Operational Definitions	
Data Sources, Data Collection and Sampling	SCOR Level 2 and 3 Measures for Material Flow Efficiency and Transactional Productivity
Sigma Calculation:	
Unit, Defect, Defect Opportunities	
Yield	
Cost of Poor Quality	

The SCOR project plan incorporates the SCOR “chip exercise” to help summarize supply chain performance priorities between delivery reliability, flexibility and responsiveness, supply chain cost, and asset management efficiency. **Kano analysis** — a Japanese diagramming method to measure customer satisfaction — is structured to collect data for input to supply chain competitive requirements.

The SCOR project uses the supply chain “thread diagram” technique to serve as the high-level SIPOC (suppliers; inputs; process; outputs; customer) process map. This **helps maintain metric integrity** from the level 1 SCORcard all the way down to the transaction productivity. The SCOR overview available at the *Supply-Chain Council's* website (www.supply-chain.org) has a sample thread diagram. **Table 2** presents how the terms and activities of the two approaches relate to one another in this context.

Measure

The SCOR project plan incorporates the metrics template and associated SCORcard to build the **Critical to Quality (CTQ)** metrics tree with appropriate stratification principles, establish an industry standard set of operational definitions, and suggest an initial query strategy to help determine typical data sources and data collection tactics.

Furthermore, after data collection, the SCORcard and gap analysis provides the business financial and service level link to sigma calculation, yield and overall **Cost of Poor Quality (COPQ)**; see **Table 3**.

Table 4	
DMAIC	SCOR
Analyze	Configure Supply Chain; Align Performance, Practices, and Systems
Data Analysis: Pareto Chart, Run Chart, Histogram, Scatter Plot, and Fishbone Analysis	AS IS Material Flow: Geographic Map; Transportation, Inventory, Warehouse and Returns Expense Summary; Delivery Performance and Order Fulfillment Lead Time Summary
Process Analysis: Detailed Process Maps, Cross Functional Process Maps, Process Value and Time	AS IS Work and Information Flow: Staple Yourself Analysis; Swim Diagram; Transactional productivity for purchase, work, replenishment and sales orders; forecasts; and return authorizations

Analyze

The biggest challenge to assembling the SCOR project plan is finessing the integration of two major SCOR deliverables into the data and process analysis steps of this phase of DMAIC. A typical SCOR project produces AS IS analyses for both material flow and work and information flow.

The material flow — while incorporating some process analysis — focuses mainly on numbers such as delivery performance, supply chain cost, order lead time and cost of goods sold. Conversely, work and information flow — while incorporating some data analysis — focuses mainly on the efficiency and effectiveness of the business processes of plan, source, make, deliver and return. **Table 4** compares each method's outputs.

Improve

Besides the metrics, the biggest value-add from SCOR to the SCOR project plan shows up in the “generate creative solution” and “cook the solution” steps. SCOR comes with a business blueprint — a cross-functional process map that illustrates how the plan, source, make, deliver and return processes *should* work together.

This avoids the inevitable silence at this point in the project when the project leader asks, “**How should we do this?**”; see **Table 5**.

Control

As indicated in **Table 6**, the SCOR project plan combines some of the tasks and templates from the Six Sigma project office with those of a typical SCOR project.

Table 5	
DMAIC	SCOR
Improve	Configure Supply Chain; Align Performance, Practices, and Systems; Implement Supply Chain Changes
Generate Creative Solutions "Cook the Solution"	TO BE Material Flow: SCOR Level 2 Configuration Strategy and Thread Diagram; Appropriate Leading Practices; TO BE Work and Information Flow: SCOR Business Blueprint; Application Architecture — Use Case; Organizational Design — Swim Lane Efficiency
Select and Solution: Impact - Effort Matrix; Decision Matrix; Force Field Analysis	TO BE Work and Information Flow: SCOR Business Blueprint; Application Architecture — Use Case; Organizational Design — Swim Lane Efficiency
Pilot the Solution Full Scale Roll Out	Implement Supply Chain Changes: Detailed Solution Design; Pilot and Evaluation; Roll Out Solution

Specific deliverables that benefit from integration include the setup of a supply chain program management office to initiate and staff improvements from the project portfolio;

documentation of the TO BE blueprint, thread diagram and supply chain definition matrix; the SCORcard as a means of dashboarding or keeping score of progress; and a supply chain

Table 6	
DMAIC	SCOR
Control	Implement Supply Chain Changes
Discipline	Supply Chain Program Management Office
Documenting the Improvement	TO BE Business Blueprint, associated Material Flow Thread Diagrams, Supply Chain Definition Matrix
Keeping Score	SCORcard
Process Management Plan	Organizational Responsibility Matrix

organization role/responsibility matrix to help efficiently and effectively organize centralized and decentralized supply chain process management plan. ◀



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For more detailed information on many of the SCOR concepts discussed in this article, the entire "Keeping SCOR" series is available in .pdf format at the **SCTN** website at www.totalsupplychain.com.