

# CENTER FOR QUALITY OF MANAGEMENT JOURNAL

## *Mastering Business Complexity Special Issue*

<b>About This Issue</b>	Page 2
<i>David Walden</i>	
<b>Mastering Business Complexity — CQM Skills for Getting Better at Getting Better</b>	Page 3
<i>Gary Burchill</i>	
<b>Making Organizational Changes that Work — The Enterprise Model</b>	Page 15
<i>Steve LaPierre</i>	
<b>Selecting the Right Opportunities — SCORE</b>	Page 27
<i>George Murray</i>	
<b>Managing Decision Risk — The ARMED Decision Process</b>	Page 53
<i>Barry Mallis</i>	
<b>Leading Without Authority — The Four Gears Process</b>	Page 65
<i>Linda Ridlon</i>	
<b>Dealing with Complexity Across Geography and Business Lines</b>	Page 77
<i>An Interview with Marci Sindell of Haemonetics Corporation</i>	
<b>Controlling the Complexity Inherent in New Product Line Development</b>	Page 85
<i>An Interview with Doug Rademacher of American Power Conversion</i>	
<b>Getting the Company from Where It Is to Where It Isn't</b>	Page 93
<i>An Interview with Sherwin Greenblatt and Joe Veranth of Bose</i>	
<b>Some Notes About MBC Skill Delivery</b>	Page 107
<i>Eric Bergemann</i>	
<b>Abbreviated Index of MBC Methods and Examples in This Issue</b>	Page 109

**Volume 11, Number 1**

**Spring 2002**

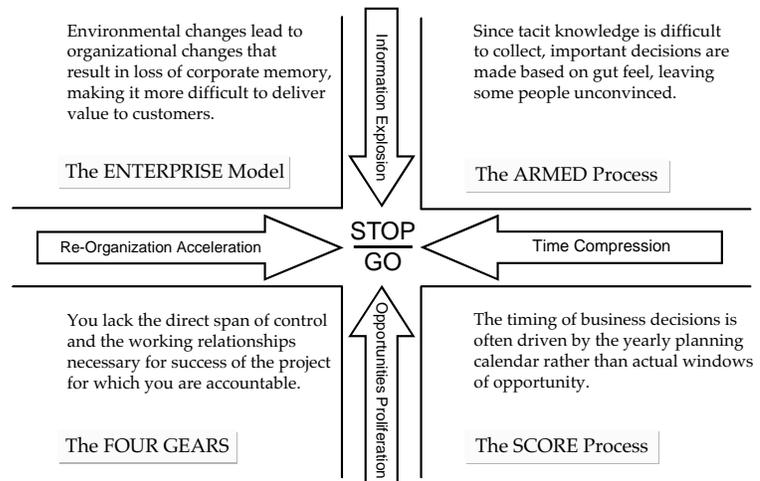
© Copyright 2002 The Center for Quality of Management, Inc. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post to servers, or to redistribute to lists requires prior specific permission and/or a fee. Copying is by permission of The Center for Quality of Management, Inc. • One Alewife Center, Suite 450 • Cambridge, Massachusetts 02140 USA Telephone: (617) 873-8950 • Email: [publications@cqm.org](mailto:publications@cqm.org) The Center for Quality of Management Authors retain rights for re-publication of their articles.  
ISSN: 1072-5296

# About This Issue

by David Walden  
Editor, CQM Journal

Over the past several years, people from Center for Quality of Management (CQM) member companies and the CQM staff realized that many businesses are becoming increasingly complex and thus more difficult to manage. The increased complexity comes from at least four sources: information explosion, time compression, proliferation of opportunities, and accelerating organizational change. The four arrows of the following figure indicate these four sources of business complexity; if not attended to, they *stop* business progress.

In 1999-2000, various CQM study committees and development teams undertook to develop new methods, or to adapt existing methods, to address these four sources of business complexity (and turn the *stop* in the figure into a *go*). Four overall methods were developed, involving a number of component methods. The four overall methods were called the Enterprise Model, the SCORE process, the ARMED process, and the Four Gears. Each of these methods addressed two of the arrows in the figure, and thus can be depicted as sitting in one of the four quadrants defined by the four arrows of the figure.



This issue of the *Center for Quality of Management Journal* is dedicated to this new set of methods, known collectively as Mastering Business Complexity (MBC). It contains four parts.

**Part 1 – Introduction and background.** The first paper of this special issue is by Gary Burchill, CQM president. It introduces the problem of increasing business complexity, describes how it became a focus of CQM’s attention, and documents how the development of the new methods was undertaken.

**Part 2 – The MBC methods.** Next follow four papers describing the four newly developed methods themselves. There is a paper on the Enterprise Model (by Steve LaPierre), on SCORE (by George Murray), on ARMED (by Barry Mallis), and on the Four Gears (by Linda Ridlon).

**Part 3 – Experiences using the MBC methods.** The next three papers of the issue are interviews of executives from three CQM member companies on their companies’ use of the MBC set of methods. The interviewees are: Marci Sindell of Haemonetics Corporation, Doug Rademacher of APC, and Sherwin Greenblatt and Joe Veranth of Bose.

**Part 4 – Metadata.** This special issue ends with some notes about the delivery of the MBC methods to CQM members and a mini-index providing useful cross-references between the descriptions of the methods and experiences using the methods.

More detailed information on the MBC set of methods and their use is available from the CQM and its chapter offices. See [www.cqm.org](http://www.cqm.org) for contact information. Please report any typos or other mistakes you see in this issue and any thoughts you have on the content by going to [www.cqm.org/mbc](http://www.cqm.org/mbc).

# Mastering Business Complexity — CQM Skills for Getting Better at Getting Better

By Gary Burchill

Gary Burchill has been President of the CQM since 1998 when he retired after serving twenty years in the U. S. Navy. In the Navy, Commander Burchill specialized in logistics support of both submarine and surface ships, serving in both shipboard and shore assignments, with responsibility for procuring and disseminating materials worth billions of dollars. He also has an appointment as a senior lecturer at the Harvard Business School, where he recently taught the Entrepreneurial Manager course required for an MBA.

Gary has published articles, lectured, and developed courses on product development and process improvement in industry and university settings; and he is co-author of the book *Voices into Choices: Acting on the Voice of the Customer*. This book broadens the voice of the customer and concept development methodology he developed as part of his Ph.D. research at MIT. He has also developed, designed, patented, and licensed products related to his outdoor hobbies.

*This special issue of the CQM Journal will present four papers that describe recently developed methods and tools for what we call Mastering Business Complexity (MBC) and three papers detailing real-case experiences of senior executives who have applied the MBC skill set to improve the performance of their businesses. In this essay Gary Burchill introduces MBC and describes how CQM came up with its MBC methods and tools.*

## 1. Introduction

For much of the late twentieth century, if a business could consistently meet or exceed the quality, cost, and delivery expectations of their customers, it could predictably deliver revenue growth. In some business segments, meeting these conditions was necessary and sufficient for success. Furthermore, if business leaders understood and were aligned with the dominant forces in their marketplace, then such leaders could create and capitalize on a sustainable competitive advantage.

Today, meeting or exceeding customers' requirements for quality, cost, and delivery remains necessary for predictable, profitable growth — but is no longer sufficient. Understanding, let alone aligning with, the dominant market forces has become a challenge of unprecedented complexity and one that requires companies to sense and respond quickly to continual changes in the marketplace (Haeckel, 1999). In this context, an organization's ability to detect, target, and capture the best opportunities from among a proliferation of diverse options is *the* critical success factor.

Unfortunately, the capacity to take timely thoughtful action in response to changes in the marketplace is being challenged by forces inside the organization, which in the extreme create a form of organizational gridlock.

Furthermore, for many companies, the proven methods they had used for getting better — that is, for adopting and perfecting the use of new methods for dealing with their rapidly changing environment — now have been deemed inadequate. They need a better approach to dealing with escalating complexity and a better approach for getting better.

Consequently, over the past several years, the Center for Quality of Management (CQM) has worked to address the expanded needs of its member companies (and companies more generally), as described in the rest of this paper and the other papers in this special issue of the CQM Journal.



## 2. Improvement through Intercompany Collaboration

Founded in 1989, the CQM is a consortium of more than 100 companies and other organizations. The mission of the CQM is to help member companies improve their business performance through mutual learning. This mutual learning includes both the sharing of experiences with existing methods and the active development of new methods (Walden, 2001).

New method development projects are initiated in response to input from member companies — primarily input from senior executives and their top management teams. Typically, the development of new methods is then carried forward by what we call “study groups,” consisting of individuals from member companies, senior members of the CQM central staff, and other individuals deeply familiar with the topic of study.

### 2.1 Initiation: Listening to “the market”

One of the core principles the CQM propounds to its member companies is the need to focus on what customers and the market want. In the case of the CQM itself, its direct customers and market are its current and future members. (The CQM also sees society at large as a customer — hence this public journal.) CQM practices what it preaches and tries to focus its development efforts on issues of importance to member companies. The method CQM often recommends to understanding the current and latent needs of customers and markets — and for articulating customer requirements and creating product concepts — is Concept Engineering (CE) (CQM, 1991).

When I became president of the CQM in 1998, I had the sense that some top managers in CQM member companies were feeling that their struggles were getting ever more difficult. Therefore, I initiated a CE effort to understand the next area in which CQM members might help one another. This effort was undertaken by the directors of the CQM chapters<sup>1</sup> and a few key people from the CQM central staff; I led the project. We applied CE to 18 CEOs in the United States and 11 in Europe. Our theme question was, “What are the challenges confronting chief executive officers today?” Our CE effort took nearly four months; it included the use of Kano’s methodology and self-stated preference questionnaires (CQM, 1991, pp. 48-58) mailed to all CQM CEOs as well as follow-up visits in which we presented the results of the study to the executive committees of five CQM chapters.

A key component of CE is an image LP. (For an explanation of language-processing, or LP, methods, see CQM, 1991, pp. 27-32.) An image LP is a way of digesting and organizing images of what people are actually doing. What people are doing is often more informative about what they need than what they are saying they need; at the very least, what they are doing provides a context for understanding what they are saying. Figure 1 shows our image LP capturing CEOs’ responses to the questionnaire item “What are the images of the chief executive officer?”

You can observe in the upper left part of Figure 1 (previous page) a set of images relating to the CEO keeping his or her eye on the ball. It’s about focus, focus, focus. The trouble is that it becomes more and more complex to keep your eye on the ball when there is more and more happening in your business environment; it’s easy to get distracted. Nonetheless, the idea of keeping the eye on the ball leads to a set of

<sup>1</sup> At the time, CQM had six chapters: CQM Cambridge (serving New England), CQM West (serving California and other west coast locations), CQM Louisville, CQM Cincinnati, CQM Germany (serving Germany and other central European locations), and CQM Finland (serving Finland and, to some extent, Sweden). Each chapter is coordinated by a director.

activities that CEOs engage in to ensure they are “ready for tomorrow”:

- “Taking aim before firing.”
- “Boldly going where no one has gone before.”
- “Being prepared for the unexpected.”

However, “being ready” is more difficult in today’s dynamic business environment. Your business model may have worked well over the course of a year or two; all of a sudden, however, there can be a new technology, a new competitor, or a new suitable substitute, and suddenly your business model doesn’t work anymore.

“Getting ready for tomorrow” leads to “building the future organization today.” That, in turn, is all about keeping your eye on the ball — which is what we all think CEOs do, right? But in this diagram, as in the real world, there is a group of images down on the lower left that depicts senior executives who are “stuck in the swamp.” In fact, one of these is called “Being treated like a mushroom when it comes to bad news.” For readers who may not have grown up in farm country, mushrooms are kept in the dark and covered with manure.

Most of the CEOs we interviewed in our CE effort were from quite successful companies — companies with prolonged above-average growth in revenues and profits. And yet these leaders still felt stuck in the swamp. This feeling, in turn, caused them to place a premium on their prior experience. But there’s the rub. In today’s business environment you can get into trouble if you make decisions by placing too much of a premium on your prior experience. The difficulty is that the mental model you have developed over the course of your career may not apply as well anymore, because there have been significant structural changes in the world in which most businesses operate today. These include, for example, changes in the relative balance of power between buyers and suppliers, the development of suitable substitutes, barriers to entry, and the nature of competitive rivalry (Porter, 1985). So although our past experience may be relevant to some problems, it may not be relevant to a lot of them. The problem we see today is that the more executives rely on their past experiences, the higher the likelihood that they’re going to make decisions that are not in the best long-term interest of their company’s success.

## 2.2 *What Do We Improve? The Complexity Challenge*

My original perspective on business complexity was, for the most part, framed by Art Schneiderman’s diagram of technological versus organizational complexity.<sup>2</sup> As shown in Figure 2, one way to map challenges facing organizations is along the two dimensions of problem complexity and organizational complexity. Challenges with relatively low problem and organizational complexities are primarily operational, often involving natural work teams and reactive problem-solving methods. Moving up the diagonal, situations with moderate problem and organizational complexities, such as new product development involving cross-functional teams, involve more tactical problems. Finally, the highly complex situations at the upper right of the graph involve strategic problems.

Historically, the CQM’s work on new skill development has more or less followed the Figure 2 diagonal from lower left to upper right. Many of our members began with an emphasis on Total Quality Management’s 7-step reactive problem-solving process, following the six-day course

<sup>2</sup> Art Schneiderman was involved in the formation of the CQM in the early 1990s, in the role of chief quality officer at Analog Devices.

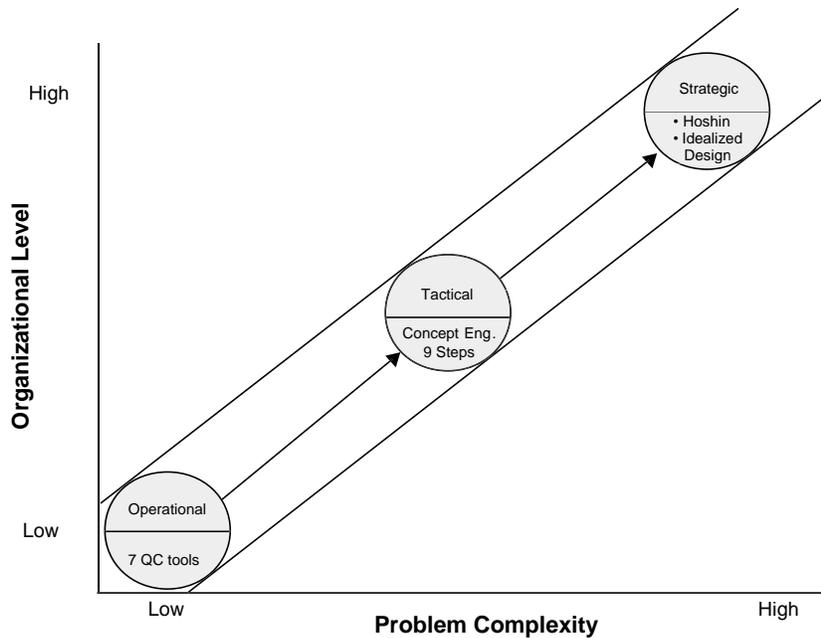


Figure 2. Historically Problem Complexity Rises with Organizational Level

on the four revolutions of management. The first skill developed and introduced into the CQM after Shoji Shiba’s groundbreaking effort was Concept Engineering. Coming quickly on the heels of CE was Hoshin management and the 9-step project planning method. Conceptually, CQM could provide complete decision support processes at the strategic level (Hoshin) on an annual basis for corporate-wide improvement work, build alignment through tactical decisions (Concept Engineering and 9-steps), and execute these plans using operational skills (7-steps) on the routine activities. (This evolution of CQM methods is described in more detail in Walden, 2001.) This was the way I saw the world before the CE study.

During the course of the CEO interviews in our CE effort, the topic of *decision complexity* was a constant theme. Ko Nishimura, CEO of Solectron, a two-time winner of the Baldrige award, had the most developed view of business complexity — a view influenced by his association with the Santa Fe Institute. During our interview he used linear algebra notation to define business complexity as  $\{N, n, s, t\}$ , where  $N$  represented the number of component parts,  $n$  the number of participants,  $s$  the geographic distance involved, and  $t$  time.

Through subsequent study of the activities of the Santa Fe Institute and particularly the work of John Holland, I came to embrace the concept of complex adaptive systems (Holland, 1998). In the light of this new framework of complexity, I came to appreciate that our traditional understanding of Art Schneiderman’s original complexity graph, did not adequately address the “white spaces” off the diagonal — the areas where you might have high problem complexity but low organizational complexity, or vice versa. Once I focused on these white spaces, I became more aware of the forces that could pull organizations out of alignment. The picture painted by our CEO study highlighted that organizational focus and alignment were becoming more and more difficult as organizations flattened out their management structures and decentralized decision making. A revised diagram (Figure 3) suggests our insight into the reasons for this situation.

### 2.3 Development: The MBC study groups

We initially created four study groups or teams to address the challenges discovered by the CE study: two at the CQM Cambridge chapter, one at the Cincinnati chapter, and one at the Louisville chapter. These were:

- Managing Organizational Complexity — in Cambridge
- Managing Problem Complexity — in Cambridge
- Making Change Commonplace — in Cincinnati
- Creating Organizational Integrity — in Louisville

The first two of these study groups directly addressed two of the needed areas shown (with cloud-like shapes) in Figure 3. The other two study groups directly addressed key aspects of the requirements chart we created as part of the CEO study; they also contributed to the other two cloud-like areas of Figure 3.

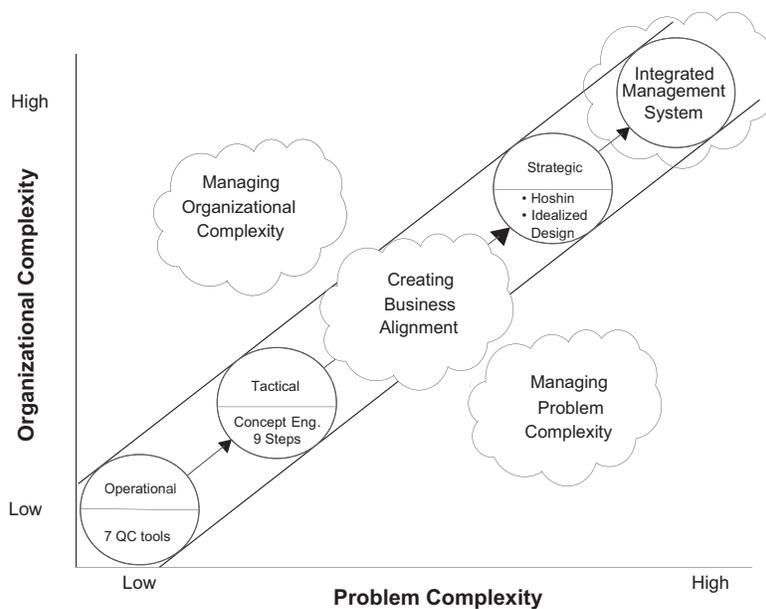


Figure 3. A New Framework Of Complexity.

For practical reasons, most CQM study groups are executive-centered, involving executives from one CQM chapter; they typically last for periods that range from nine months to a year. We generally try to involve someone (often a Ph.D. student) from a university affiliated with the chapter to improve the rigor of the study group effort.<sup>3</sup>

Study groups generally spend the first three months studying (reading, reviewing case studies, etc.) and then formulate their best response to the problem under investigation. Our goal is for the response to offer a complete decision support process, that is, to present an overarching conceptual model supported by appropriate step-by-step methodologies, with each step operationalized by tools, tips, or techniques. Study groups then spend six months improving the model and methodologies through the plan-do-check-act (PDCA) process, trying out what we *think* the solution is inside the member companies. In the last three months of the effort, groups take what they've learned and put it into an appropriate delivery format, for instance, a seminar, a course, an article, or some combination of the three.

CQM study groups work really hard at understanding existing methods proven to work in practice: if you're going to get results this quarter or this year, then you had better work with something that's been proven

<sup>3</sup> In this effort we had the good fortune to be joined by Dr. Ann Gray, then a professor in the Technology and Operations Management Group at the Harvard Business School, who worked broadly across all four study groups. Dr. Gray had been teaching people how to run companies and was now buying a company to run herself. Her company acquisition process overlapped almost exactly with our study efforts. Her invaluable contributions were recognized when she was awarded CQM's Ray Stata award for the most outstanding contribution for 2000.

In addition, the Cincinnati chapter was fortunate to have the participation of Dr. Matt Ford of Northern Kentucky University. His involvement in the Cincinnati study group and his unique contributions were closely related to his Ph.D. dissertation work. (See also Ford, 2001.)

to work. As the papers in this special issue demonstrate, CQM member companies take different ideas and blend them into an integrated problem-solving approach, as the CQM logo is intended to suggest. In every circumstance, CQM exists to improve the business performance of our member companies through mutual learning.



The Managing Problem Complexity study group developed a process called ARMED, and the Managing Organizational Complexity study group developed a process called the Four Gears.<sup>4</sup> The work of the Cincinnati and Louisville study groups was drawn on for the Four Gears. In addition, the efforts of the Cincinnati study group resulted in the CQM's *7 Infrastructures* manual.<sup>5</sup>

When the business alignment challenge (see Figure 3) became visible, we set up another study team consisting of Steve LaPierre, Linda Ridlon, and me. We started by investigating HP's 10-step planning process. However, it became clear that it would be a mistake to change a method which was already deployed in some member companies. Ann Gray introduced us to the Discovery Driven Planning method of Rita McGrath and Ian MacMillan. Subsequently, she and I visited Barry Isenstein at Mercury Computers to see this method in practice. This launched us on the path which led to the creation of the approach we call SCORE.<sup>6</sup>

<sup>4</sup> ARMED is described in detail on pages 53-63 of this issue. The Four Gears is described in detail on pages 65-75. The interviews at the end of this issue include discussion of both methods.

<sup>5</sup> And the paper by Ford et al. on pages 51-75 of Vol. 10, No. 2 of this journal.

<sup>6</sup> SCORE is described in detail on pages 27-51 of this issue and is discussed in the interviews at the end of the issue.

### 3. Four New Forces to Contend With

At this point in the evolution of CQM's work with new methods for addressing business complexity, our educational director, Steve LaPierre, and I were considering how to clearly describe the problems we were addressing. We looked back at the CEO study and focused on the sources of business complexity — its driving forces.

#### 3.1 Searching for an Improved Model

Our CE investigation led us to conclude that there were four pervasive forces (listed in Section 3.2) that, while not all-inclusive, contributed in significant ways to the challenges CEOs were facing in endeavoring to make organizations capable of predictable, sustainable, profitable growth. But as our understanding of these four forces began to grow, so did our awareness that our existing model for business complexity was not working. How could we come up with a productive model through which we could communicate our new perceptions? CQM operations

manager Eric Bergemann, recognizing a rising level of frustration, arranged for an informal session between Steve LaPierre (CQM’s education director), Jay Fitzgerald (then editor of the *Boston Business Journal*), and me. The idea of meeting with Fitzgerald was to have someone with no depth of knowledge about CQM, but with a wide-ranging perspective on current business challenges and a talent for getting to the heart of the matter quickly, to try to help us express what the CQM was trying to do. We would talk for a while; then Fitzgerald would summarize what he thought he had heard. We would disagree and try again. He repeatedly asked, “What picture is on page one to accompany this article?” He was making the point that to communicate our findings we needed, among other things, a memorable visual metaphor. By the end of several hours we had two working images: one was of a train derailling from the track, and the other was a congested road intersection. After several weeks of rumination, we concluded that gridlock was the best conceptual model of the four pervasive forces we were encountering in our CEO CE study. The following section explores these forces.

### 3.2 The Forces of Gridlock

In today’s business environment, the forces impacting decision-making inside the organization can be just as challenging as those in the marketplace. The four pervasive forces that consistently hampered the business performance of the companies we investigated were compression of time, explosion of information, acceleration of organizational changes, and proliferation of opportunities. Figure 4 emphasizes that these forces can create a gridlock configuration, as indicated by *Stop* in the figure.

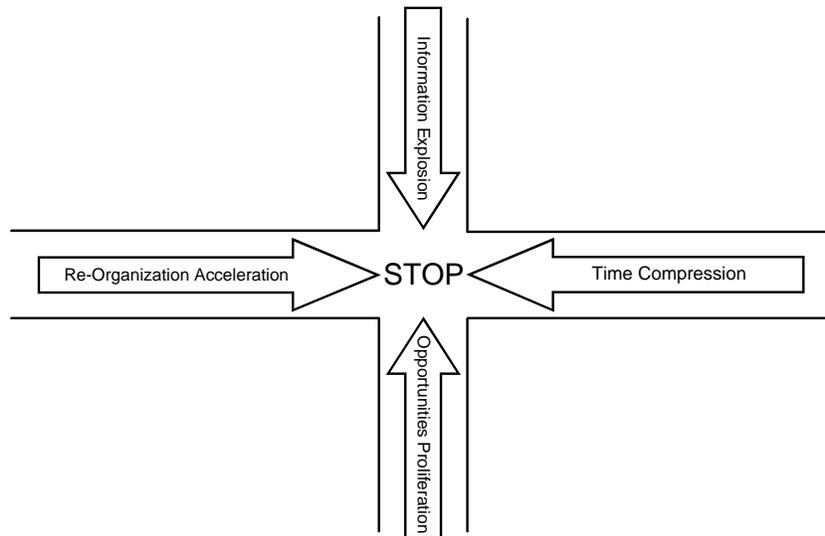


Figure 4. Uncontrolled Forces Can Produce Gridlock

Decision-making gridlock can occur when people in a position to take actions that drive the performance of the business do not make timely thoughtful decisions. Fundamentally, these individuals are often confronted with a choice between making an error of commission or an error of omission. In errors of commission, the decision is made to take action, but the action is a mistake. In errors of omission the decision (usually unarticulated) is made to take no action, but in fact an action should have been taken. The dilemma for executives is that although organizations can identify, account for, and assign responsibility for errors of commission, we generally do not have systems that hold individuals accountable and responsible for errors of omission. Such one-sided performance measurement and reward systems encourage

rational people to delay making decisions. CQM's challenge was to relieve the pressure from the four gridlock forces in order to enable the people who drive their organizations' performance to take timely thoughtful action'— and thus to master the escalating complexity of their business environment for competitive advantage.

Let's look more closely at the four gridlock forces.

### ***3.2.1 Compression of time***

We appear to have less time today than ever before. The problem is not just lack of time for work, it's lack of time for family, for recreation, and for community service. The compression of time has been accelerated by the pervasiveness of the Internet. The so-called Internet economy has made the concept of 24/7 a mantra for decision makers to act quickly in support of channel partners and customers before the competition can respond. This trend will accelerate with the explosion of wearable wireless devices and other technologies; today's pressure for promptness will become tomorrow's demand for immediate response.

Additionally, time zones have collapsed with the arrival of truly global business operations. The decisions that need to be made to drive the performance of businesses are being made around the world around the clock.

### ***3.2.2 Explosion of information***

The quantity of information available to decision-makers is exploding. Not only is the pipe that brings data to your desktop bigger; the flow rate is also faster. The cost of computing power has fallen so dramatically over the past decade that many of us carry more computing capacity in our briefcases today than existed in the organizations we worked in 25 years ago. As a result, more data about more things are literally at our fingertips. For instance, we often have the sense that we could convert the information proliferating on the Internet to competitive advantage if only we could identify and use the data that are accurate and valuable. As infrastructure evolves to optical and wireless networks, data are moving ever more quickly, literally under our feet and through the air around us.

### ***3.2.3 Acceleration of organizational changes***

Organizations are changing faster than ever before. People are more mobile inside of organizations. People are more mobile between organizations. And some organizations are applying the principle of cycle time reduction to their own efforts to reorganize, restructure, and reinvent themselves. Unfortunately, it's not just your company that is undergoing change — the entire value delivery chain supporting your product or service is one constantly changing complex adaptive system.

### ***3.2.4 Proliferation of opportunities***

There seem to be more and more attractive opportunities for businesses — more good ideas to pursue than there are time or money to do. The challenge many businesses face today is not just that opportunities are multiplying, but that those opportunities are more diverse. The products, markets, or technologies that look most attractive may be in realms

beyond what you've traditionally considered to be acceptable areas for your company. Furthermore, the timing of your existing business processes probably are driven by a yearly planning calendar rather than by external events.

## 4. Tools and Methods for Mastering the Gridlock Forces

Long ago, as a civil engineer working for the North Carolina Division of Highways, I designed parking lots for large traffic concentrations — shopping malls, hospitals, and the like. In planning for traffic flow, we had to consider gridlock potential in adjacent street systems. A basic principle was that relieving the pressure in one direction would not alleviate gridlock; rather, to ensure smooth traffic flow, it was important to relieve the pressure in all directions.

At CQM we have applied the same principle to our approach to mastering business complexity. It is insufficient to deal with only one of the four gridlock forces. There are well-known ways to deal with each of the four forces, for example, focusing on the vital few in the midst of an information explosion, reducing cycle times to deal with time compression, structuring decision and development processes to cull and address proliferating opportunities, and explicitly assigning roles and responsibilities with each new reorganization. These methods work well in relatively straightforward situations. However, anyone dealing with complexity of the sort I am discussing will have encountered instances in which, for example, assigning clear roles and responsibilities was not sufficient to get the job done.

Consequently, we looked for powerful but pragmatic ways to deal with combinations of the four forces, as shown in Figure 4 — ways to turn *Stop* to *Go*.

Ideally, it might be nice to deal with all four forces in parallel. However, trying to address four (or even three) forces in parallel seemed too hard. We decided to try to deal with pairs of the forces in parallel. There are six pairs of forces. Four of these pairs, as shown in the quadrants of Figure 4 (e.g., time compression and opportunities proliferation define the bottom right quadrant), seem more problematic gridlock combinations than the other two pairs.<sup>7</sup> Analysis of the four most problematic pairs of forces revealed many problems resulting from each pairwise combination, Table 1.

<sup>7</sup> We welcome readers' thoughts on problems caused by and solutions for the other two pairs: namely, (a) time compression and reorganization acceleration, and (b) information explosion and opportunities proliferation.

Table 1. Pairs of Forces and Examples of Resulting Problems

<ul style="list-style-type: none"> <li>• Information explosion + time compression → risks of unexpected consequences or analysis paralysis</li> </ul>
<ul style="list-style-type: none"> <li>• Time compression + opportunities proliferation → aren't fast enough in finding and responding to good opportunities or make investments in poor opportunities</li> </ul>
<ul style="list-style-type: none"> <li>• Opportunities proliferation + reorganization acceleration → can't mobilize sufficient resources to succeed or priorities shift before tasks are complete</li> </ul>
<ul style="list-style-type: none"> <li>• Reorganization acceleration + information explosion → loss of organizational memory or changes are made to processes without changing accountability for the outcomes</li> </ul>

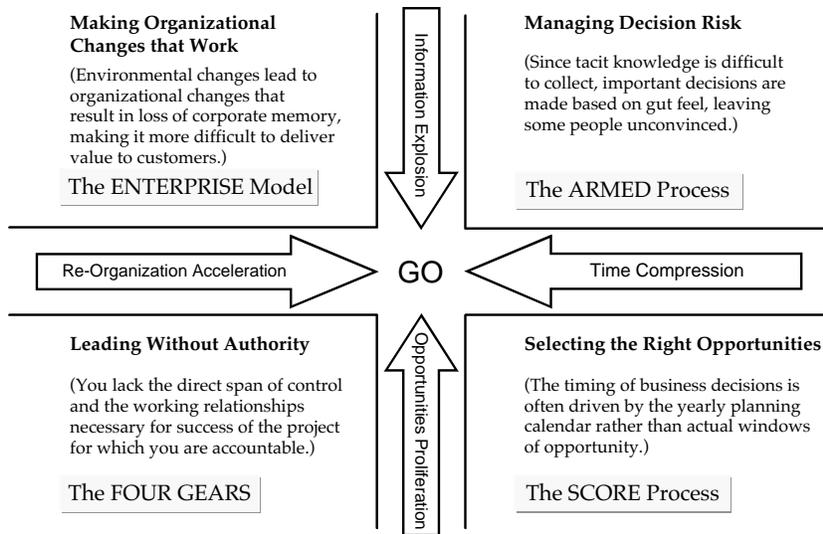


Figure 5. Methods for Mastering the Forces

To deal with the representative problems enumerated in Table 1, we identified the new MBC methods (and combinations of existing methods) named on slightly shaded backgrounds in the quadrants of Figure 5.

It was clear to us that we had three of the four quadrants covered by ARMED, the Four Gears, and SCORE (the creation of which were described in Section 2.3). However, the fourth (top left) quadrant was not covered. Therefore, we initiated another study team to adapt and expand the ideas of Hatten and Rosenthal regarding the Enterprise Model.<sup>8</sup>

Thus, we had the complete set of methods shown in Figure 5 to address the four forces. Taken together, we called these methods the Managing Business Complexity (MBC) skill set.

Each MBC method addresses two of the four gridlock forces; together, any two of the methods address three of the forces; and the four methods, if employed in concert, hit each force from two directions. This is important: skill in any one quadrant may be relevant to an immediate business concern, but for the people who drive the performance of the business, addressing the range of conditions is the most robust approach and helps build the capacity for timely thoughtful action that captures today's opportunities before they become tomorrow's crises. Taken in combination, the four methods developed at CQM (and improved through PDCA) are an extensive decision support process and broadly address the four forces and the business complexity issues raised by CQM CEOs.

<sup>8</sup> Our version of the Enterprise Model is described in detail on pages 15-25 of this issue and is discussed in the three interviews at the end of the issue.

## Sources

Christensen, C. M., *The Innovator's Dilemma* (Boston: Harvard Business School Press, 1997).

Center for Quality of Management (CQM), *Concept Engineering* (Cambridge, MA, 1991, rev. 1997).

Ford, M.W. et al., "Theoretical Foundations of the Seven Infrastructures Model," *Center for Quality of Management Journal*, Vol. 10, No. 2 (Winter 2001) 51-74.

Haeckel, S.H., *Adaptive Enterprise: Creating and Leading SENSE-AND-RESPOND Organizations* (Boston, MA: Harvard Business School Press, 1999).

Hatten, K.J. and Rosenthal, S.R., "Managing the Process-Centered Enterprise," *Long Range Planning* (Vol. 32, 1999) 293-310.

Hatten, K.J. and Rosenthal, S.R., *Reaching for the Knowledge Edge: How the Knowing Corporation Seeks, Shares and Uses Knowledge for Strategic Advantage* (New York, New York: AMACOM, 2001).

Holland, J.H., *Hidden Order: How Adaptation Builds Complexity* (Reading, MA: Perseus Books, 1995).

Holland, J.H., *Emergence, From Chaos to Order* (Reading, MA: Perseus Books, 1998).

McGrath, R.G. and MacMillian I., *Strategies for Continuously Creating Opportunity in an Age of Uncertainty* (Boston, MA: Harvard Business School Press, 2000).

Porter, M.E., *Competitive Strategy* (New York: The Free Press, 1980).

Porter, M.E., *Competitive Advantage* (New York: The Free Press, 1985).

Senge, Peter, et al., *The Fifth Discipline Fieldbook* (New York: Doubleday, 1994).

Walden, David, "Creating and Evolution of the CQM," *Center for Quality of Management Journal*, Vol. 10, No. 1 (Summer 2001) 17-26.



# Making Organizational Changes That Work — The Enterprise Model

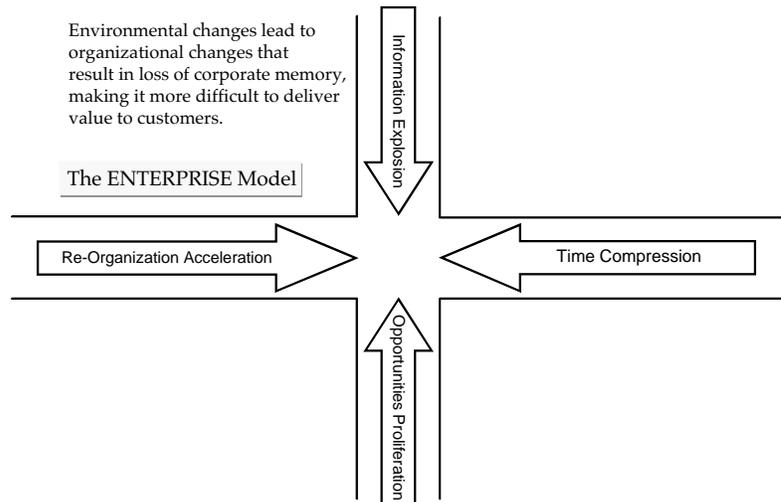
By Steve LaPierre

Since 1999, Steve LaPierre has been Director of Education and Advisory Services for CQM. Previously, he had 30 years of experience in a number of different business units of W. R. Grace that operated in a variety of industries including food and beverage packaging, specialty organic chemicals, medical devices, defense and commercial electronics, industrial ceramics, plastics fabrication, commercial printing, automotive acoustics, industrial and consumer adhesives, sealants and coatings, and industrial process equipment.

Steve’s specific areas of expertise include process engineering, manufacturing management, quality assurance, marketing, new product development, continuous improvement, and general management. He has degrees in chemical engineering and business administration and has been a licensed professional engineer in the states of Georgia and New Jersey.

As Gary Burchill describes in the introductory paper of this issue, increased management complexity results from at least four sources: information explosion, time compression, proliferation of opportunities, and accelerating organizational change. These are shown as the four arrows in Figure 1.

Figure 1. Four Forces That Increase Business Complexity



In particular, many companies are faced with the question of how to structure their organizations to achieve a desired result. This requirement is driven by many possible scenarios including issues such as acquisitions, layoffs, consolidations, supply chain partnerships, and loss or promotion of key employees. A critical issue associated with all of these drivers of change of organizational structure is concern over the need to preserve the critical information (i.e., the organizational memory) that is required to achieve the desired level of customer satisfaction and loyalty.

The Center for Quality of Management (CQM) recognized the existence of this problem and sought a new problem solving method for managers to use to improve their batting average when dealing with the kind of difficult problem mentioned above. In 1999, three individuals<sup>1</sup> associated with the Center for Quality of Management began work to discover an improved method for an organization to use when designing a structure to deal with the changing environment. This team drew heavily on a concept called the Enterprise Model developed by Professors Steve Rosenthal and Ken Hatten of Boston University.<sup>2</sup> The CQM team spent about six months (in-

<sup>1</sup> Gary Burchill (CQM), Steve LaPierre (CQM), and George Murray (consultant and frequent contributor to the CQM).

<sup>2</sup> Hatten, K.J. and Rosenthal, S.R. “Managing the Process-Centered Enterprise,” *Long Range Planning* (Vol. 32, 1999) 293-310; and Hatten, K.J. and Rosenthal, S.R. *Reaching for the Knowledge Edge: How the Knowing Corporation Seeks, Shares and Uses Knowledge for Strategic Advantage* (New York, New York: AMACOM, 2001).

cluding many field trials) adapting the Enterprise Model into a step-by-step process that made use of concepts and methods such as the value proposition, 5P frame, and accountability, all of which are described in this paper. The steps of the *CQM version* of the Enterprise Model are outlined in Table 1.

Table 1. *The Enterprise Model*

- Step 1: Identifying the Organization’s Customer Value Proposition
- Step 2: Identifying the Organization’s Critical Processes and Functions
- Step 3: Identifying the Organization’s Process Gaps
- Step 4: Identifying the Organizations Skill Gaps
- Step 5: Identifying Process and Skill Misalignments
- Step 6: Creating Gap Closing Action Plans
- Step 7: Reflection

The Enterprise Model provides skills required to address two of the axes bounding the top left quadrant of Figure 1 — accelerating organizational change and the information explosion.

In this paper, we describe how the Enterprise Model is applied — in particular, how it involves auditing an existing company that has recognized a performance problem which it believes is related to their organizational structure.

In order to describe how the Enterprise Model can be applied, we will use an example company called Acme Coatings. Acme is, in fact, a real company, but we have disguised its true identity for use in this article. Acme is a supplier to the metal can producing industry of corrosion protection coatings. Acme has been a leader in their market, and is especially well known for the reliability of their coatings application. However, over the past few years, the competition has caught up with Acme, particularly in the area of reliability. Acme has recently experienced some variation in the stability of their coatings viscosity, a critical factor in controlling the application process. With this problem in mind Acme decided to undertake an Enterprise Model analysis of their organizational structure to find opportunities for improvement.

## Step 1 — Identifying the Organization’s Customer Value Proposition

The first step in the enterprise modeling process is the identification of the organization’s customer value proposition. The definition of customer value is illustrated in Figure 2, where it is shown as a point on a cost/performance graph.<sup>3</sup> You identify a region on the graph that is favorable versus your competition — as the reason your customer buys from you and not your competition — indicated in the figure by the area labeled better customer value. The structure of your organization and its work processes are the mechanisms you use to deliver this value proposition and, thereby, insure the future success of your business.

<sup>3</sup> Bradley T. Gale, et al., *Managing Customer Value: Creating Quality and Service That Customers Can See* (New York: Simon & Shuster Trade, 1994).

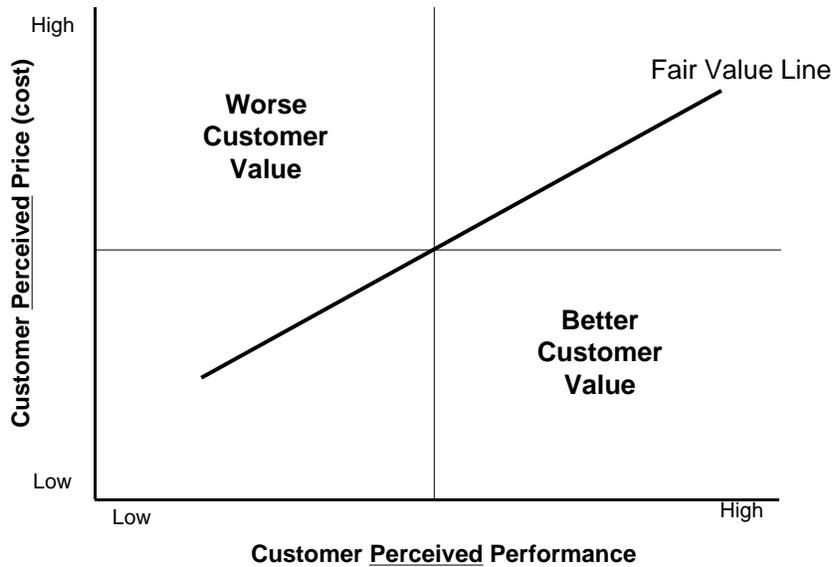


Figure 2. Definition of Customer Value

In order to successfully locate yourself on such a graph you need to develop a basic understanding of your cost performance position. You can do this simply by completing an assessment of your marketing strategy using a tool called the 5P frame, an example of which is shown in Figure 3. Gary Burchill and I derived this simple model from the classic 4Ps of marketing strategy (Place, Product Price and Promotion) with a P added for value Proposition.<sup>4</sup>

<sup>4</sup> The tool may seem simple but, perhaps because of its simplicity, it has been exceptionally well received by users. I like to think of it as providing “a business plan on a page.”

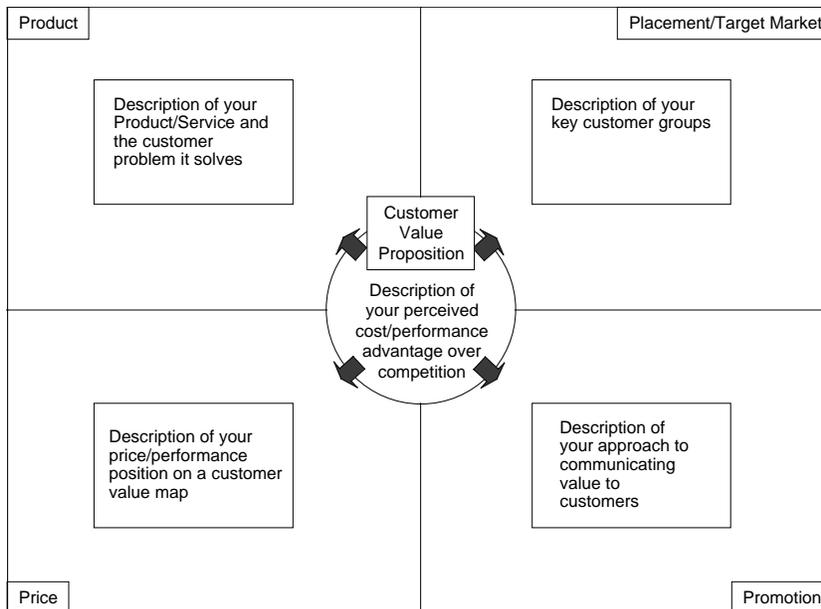


Figure 3. 5P Frame to Identify a Company's Customer Value Proposition

The 5P analysis requires you to identify the customer segments in your market and to describe the products you supply and how you promote their sales.

To complete the 5P analysis, you also must be able to compare the price and performance of your product to those of your competitors.

This can be done using a cost performance matrix as shown in Figure 4. On completion of this matrix you will be able to finalize the 5P frame (Figure 3) and write your organizations customer value proposition (Figure 2). An example of the 5P frame for Acme is shown in Figure 5.

Key Performance Elements	Your Company	Competitor A	Competitor B	Competitor C	Competitor D
	Rate yourself versus the competition				
Identify key performance elements					
<b>Key Cost Elements</b>					
Identify key cost elements					

Figure 4. Customer Perceived Cost/Performance Comparison Matrix

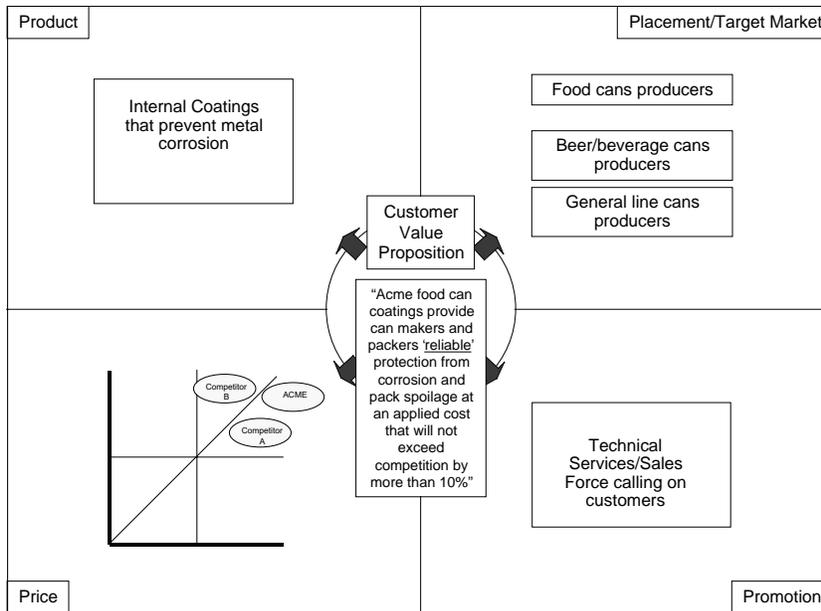


Figure 5. 5P Frame Example

## Step 2: Identifying the Organization's Critical Processes and Functions

Once you understand your value proposition, you must deliver to your customers, you can begin to model how your organization manages to do this. This modeling involves the concepts of capability and competency. We define capability and competency as follows:

- Capability = Process
- Competency = Skills

Thus, an important aspect of step 2 is to identify the critical processes to be used in this analysis. This identification is accomplished using a tool known as a *top down flowchart*, as shown in Figure 6. Using this chart, you map the top level process of your organization and the first sub-level process of each top level process.

Top Level Processes	Process 1	Process 2	Process 3	Process 4	Process 5	Process 6	Process 7	Process 8
Sub level Processes	Sub level process 1							
	Sub level Process 2							
	Sub level Process 3							
	Sub level Process 4							
	Sub level Process 5							
	Sub level Process 6							
	Sub level Process7							

Figure 6. Top Down Flowchart with First Sub-level Processes

The senior management team develops the top down flowchart, identifying the company’s work flow using process names that are easily understood by everyone. An example from Acme Coatings is shown in Figure 7.

Top Level Processes	Market Assessment	Product Formulation	Selling	Material Purchasing	Production	Application Service
First sub level processes	Customer need analysis	Pack selection	Can test data presentation	Material specification	Establish process standard	Process standard
		Pack processing conditions	Application testing	Supplier selection	Establish material test methods	Process start-up
		Can selection	Application standard	Supplier qualification	Material acceptance testing	Process audit
		Material selection	Compound order placement	Material order placement	Pilot production	
		Formula development			Full scale production	
		Application testing				
		Can testing				

Figure 7. Top Level and First Sub-level Processes Example

The next step in the analysis is to decide which sub-level processes are critical to the company’s ability to successfully deliver its customer value proposition. An example from Acme is shown in Figure 8, where the critical string of processes that contain the key elements of Acme’s competitive advantage is identified.

Top Level Processes	Market Assessment	Product Formulation	Selling	Material Purchasing	Production	Application Service
First sub level processes	Customer need analysis	Pack selection	Can test data presentation	Material specification	Establish process standard	Process standard
		Pack processing conditions	Application testing	Supplier selection	Establish material test methods	Process start-up
		Can selection	Application standard	Supplier qualification	Material acceptance testing	Process audit
		Material selection	Compound order placement	Material order placement	Pilot production	
		Formula development			Full scale production	
		Application testing				
		Can testing				

Figure 8. Critical Processes Example

Now we get to model the enterprise. The Enterprise Model worksheet used in this analysis is a matrix constructed from the identified critical processes and the organizational functions that operate them. Identifying operating functions (or departments) requires an understanding of how the company has structured itself to manage work flow. Typically this is accomplished by focusing on the skill sets (alternatively known as competencies) of the people who do the work. Organizing the structure around these skill-sets enables creating the critical mass that in turn enables development and improvement of the skills in question. Typical examples of functions are sales, engineering, accounting, and so forth.

An example Enterprise Model worksheet for Acme is shown in Figure 9. By collecting the information for this worksheet, as is described in this and following steps, you end up with an integrated model of your enterprise.

Figure 9. Enterprise Model Worksheet Example

Function Process	Market	R&D	Can Test	Purchasing	Engineering	Manufacturing	Sales	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Gap Rating
Customer Need Analysis												
Formula Development												
Can Testing												
Application Standard												
Material Specification												
Production Standard												
Production Start-up												
Application Startup												
Existing Competency												
Required Competency												
Competency Gap Description												
Gap Rating												

First, the customer value proposition is positioned at the top right of the worksheet to maintain focus on it through the rest of the steps (this is illustrated in Figure 10). The critical processes and operating functions are the row and column headings.

## Step 3: Identifying the Organization's Process Gaps

Step 3 begins with definition of process outcomes and capabilities. We define a process outcome as being equivalent to its output. An output must be described with words that can be easily understood to represent a result of operating the process. Examples from Acme are shown in Figure 10.

A process capability is a description of how a process works to give the required outcome. This analysis describes the existing capability of the process as well as its desired capability. Identifying both allows for the assessment of a capability gap which could become the cause of a failure to deliver the customer value proposition. Identifying all possible capability gaps leads to an action plan to close them. Examples of existing / desired capabilities for Acme are shown in Figure 10.

*Customer Value Proposition:*

*Acme food can coatings provides can makers and packers 'reliable' protection from corrosion and pack spoilage at an applied cost that will not exceed competition by more than 10%.*

Figure 10. Listing the Capabilities Gaps

Function Process	Market	R&D	Can Test	Purchasing	Engineering	Manu- facturing	Sales	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Gap Rating
Customer Need Analysis								Target coating requirement specification	Ability to conduct an informal interview	Ability to conduct formal interview program	Use of structured VOC method	M
Formula Development								A stable coating formula that meets customer requirements and application specification	The ability to formulate coatings based on selecting commercial resins	The ability to formulate coatings based on in house design of resins	Ability to design coating resins	H
Can Testing								A statistical analysis that demonstrates coating reliability	The ability to predict final coating performance results	The ability to predict final coating performance results	-	-
Application Standard								An application process specification that works in a customer facility	The ability to scale-up application process	The ability to scale-up application process	-	-
Material Specification								Raw material acceptance spec's that allow coating to meet performance requirements	The ability to select appropriate raw material specifications	The ability to develop appropriate raw material specifications	Resin formulation skill	H
Production Standard								A production process standard and specification that works in an Acme facility	The ability to scale-up coating production process	The ability to scale-up coating production process	-	-
Production Start-up								The production of acceptable quality coating in an Acme facility	Ability to start up and control a coating production process	Ability to start up and operate a capable coating production process	Resin production process skill	M
Application Startup								The production of acceptable quality coated cans in a customer facility	Ability to scale-up a can coating process	Ability to scale-up a can coating process	-	-
Existing Competency												
Required Competency												
Competency Gap Description												
Gap Rating												

The rating system used in the analysis involves four choices: High, Medium, Low, or none (indicated by a dash). The rating of gaps is a necessary step in using the Enterprise Model to insure focus of improvement work on the vital few important gaps. Process gaps can have a number of causes including items such as “there is no formal process,” “the organization does not have the people skills required to run the

process in question,” or “the process is capacity-limited in some way.”

Organizations that implement the kind of process management described by the Enterprise Model recognize the need to integrate each process with the people who operate it. The first step required to accomplish this integration is to identify the organizational function that is going to be held accountable for delivering the required outcome from each process. (We define accountable to mean responsibility plus results, that is, the person or persons are committed to their assignment and accept responsibility for successfully carrying out the assignment.<sup>5</sup>) The Enterprise Model is used to identify important relationship by placing an “A” for accountable at the intersection that is formed from of the process row and the appropriate function column. In addition to this accountability assignment, other functions that must contribute to the process outcome are identified and labeled with a “C.” It is clear that this exercise is particularly useful for demonstrating the cross-functional nature of many critical processes. In fact, this technique for modeling cross-functional work in an organization is another result that can be achieved through use of the Enterprise Model. See Figure 11 for an example.

<sup>5</sup> For a related discussion, see Shoji Shiba and David Walden, *Four Practical Revolutions in Management* (Productivity Press: Portland, Oregon, 2001) 401.

Figure 11. Outcome of Accountability Assignments *Customer Value Proposition: Acme food can coatings provides can makers and packers ‘reliable’ protection from corrosion and pack spoilage at an applied cost that will not exceed competition by more than 10%.*

Function Process	Market	R&D	Can Test	Purchasing	Engineering	Manu- facturing	Sales	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Gap Rating
Customer Need Analysis	A						C	Target coating requirement specification	Ability to conduct an informal interview	Ability to conduct formal interview program	Use of structured VOC method	M
Formula Development		A						A stable coating formula that meets customer requirements and application specification	The ability to formulate coatings based on selecting commercial resins	The ability to formulate coatings based on in house design of resins	Ability to design coating resins	H
Can Testing			A					A statistical analysis that demonstrates coating reliability	The ability to predict final coating performance results	The ability to predict final coating performance results	-	-
Application Standard			A					An application process specification that works in a customer facility	The ability to scale-up application process	The ability to scale-up application process	-	-
Material Specification		C		A				Raw material acceptance spec's that allow coating to meet performance requirements	The ability to select appropriate raw material specifications	The ability to develop appropriate raw material specifications	Resin formulation skill	H
Production Standard		C			A			A production process standard and specification that works in an Acme facility	The ability to scale-up coating production process	The ability to scale-up coating production process	-	-
Production Start-up					C	A		The production of acceptable quality coating in an Acme facility	Ability to start up and control a coating production process	Ability to start up and operate a capable coating production process	Resin production process skill	M
Application Startup			C				A	The production of acceptable quality coated cans in a customer facility	Ability to scale-up a can coating process	Ability to scale-up a can coating process	-	-
Existing Competency												
Required Competency												
Competency Gap Description												
Gap Rating												

## Step 4: Identifying The Organization’s Competency Gaps

Step 4 continues to build the model of the enterprise by adding to the matrix the competencies (skills) required to operate the processes. First, you identify the skills required by accountable functions and then you do the same analysis for contributing functions. Identifying functional skills at both the existing and required levels allows you to identify, de-

scribe, and rate any skill gaps that might exist in the organization. The use of a high, medium, low, none gap rating scheme allows you to focus on the vital few.

One significant set of connections that must be made is the relationship between the identified skill gaps and the process gaps revealed in the previous analysis step. The existence of skill gaps is one of the possible causes of a process gap. Closing a skills gap also closes a process gap. Figure 12 shows an example of completion of step 4.

*Customer Value Proposition:*

*Acme food can coatings provides can makers and packers 'reliable' protection from corrosion and pack spoilage at an applied cost that will not exceed competition by more than 10%.*

Figure 12. Competency Gaps

Function Process	Market	R&D	Can Test	Purchasing	Engineering	Manu- facturing	Sales	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Gap Rating
Customer Need Analysis	A						C	Target coating requirement specification	Ability to conduct an informal interview	Ability to conduct formal interview program	Use of structured VOC method	M
Formula Development		A						A stable coating formula that meets customer requirements and application specification	The ability to formulate coatings based on selecting commercial resins	The ability to formulate coatings based on in house design of resins	Ability to design coating resins	H
Can Testing			A					A statistical analysis that demonstrates coating reliability	The ability to predict final coating performance results	The ability to predict final coating performance results	??	-
Application Standard			A					An application process specification that works in a customer facility	The ability to scale-up application process	The ability to scale-up application process	??	-
Material Specification		C		A				Raw material acceptance specs that allow coating to meet performance requirements	The ability to select appropriate raw material specifications	The ability to develop appropriate raw material specifications	Resin formulation skill	H
Production Standard		C			A			A production process standard and specification that works in an Acme facility	The ability to scale-up coating production process	The ability to scale-up coating production process	-	-
Production Start-up					C	A		The production of acceptable quality coating in an Acme facility	Ability to start up and control a coating production process	Ability to start up and operate a capable coating production process	Resin production process skill	M
Application Startup			C				A	The production of acceptable quality coated cans in a customer facility	Ability to scale-up a can coating process	Ability to scale-up a can coating process	-	-
Existing Competency	Customer interview skills	Resin specification selection skill	Skill required to apply statistical methods to can testing	Skill required to buy coating resins using supplier specs	Coating production process scale-up skill	Production process control skill	Coating application process scale-up skill					
Required Competency	Customer requirement development skill	Resin specification development skill	Skill required to apply statistical methods to can testing	Skill required to develop suppliers who produce Acme specified resins	Coating production process scale-up skill	Production process improvement skill	Coating application process scale-up skill					
Competency Gap Description	VOC Translation Skill	Coating resin design chemistry	-	Supplier Process Knowledge	-	Production Process Problem Solving	-					
Gap Rating	M	H	-	H	-	L	-					

## Step 5: Identifying Process and Skill Misalignments

Sometimes an organization’s process gaps can be caused by a mismatch in alignment of skills and process. An example of this situation in Acme is seen in Figure 13.

Look at the material specification process for Acme and note that the purchasing function has been accountable for the outcome of raw material acceptance specs that meet product performance requirements. In a changed environment where coatings companies produce their own raw materials, purchasing no longer has the skills required to achieve the desired outcome. However, the R&D function already has such skills, so a realignment of accountability can result in significant performance improvement with little or no incremental cost. Step 5 is based on identifying the opportunities to improve performance by completing the above mentioned sort of realignments (as shown by the Δ symbol). Acme concluded the cause of their viscosity stability problem was mis-alignment between R&D and purchasing.

Customer Value Proposition:

Acme food can coatings provides can makers and packers 'reliable' protection from corrosion and pack spoilage at an applied cost that will not exceed competition by more than 10%.

Figure 13. Process and Skill Mismatches

Function Process	Market	R&D	Can Test	Purchasing	Engineering	Manu- facturing	Sales	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Gap Rating
Customer Need Analysis	A						C	Target coating requirement specification	Ability to conduct an informal interview	Ability to conduct formal interview program	Use of structured VOC method	M
Formula Development		A						A stable coating formula that meets customer requirements and application specification	The ability to formulate coatings based on selecting commercial resins	The ability to formulate coatings based on in house design of resins	Ability to design coating resins	H
Can Testing			A					A statistical analysis that demonstrates coating reliability	The ability to predict final coating performance results	The ability to predict final coating performance results	-	-
Application Standard			A					An application process specification that works in a customer facility	The ability to scale-up application process	The ability to scale-up application process	-	-
Material Specification		ΔC		ΔA				Raw material acceptance spec's that allow coating to meet performance requirements	The ability to select appropriate raw material specifications	The ability to develop appropriate raw material specifications	Resin formulation skill	H
Production Standard		C			A			A production process standard and specification that works in an Acme facility	The ability to scale-up coating production process	The ability to scale-up coating production process	-	-
Production Start-up					C	A		The production of acceptable quality coating in an Acme facility	Ability to start up and control a coating production process	Ability to start up and operate a capable coating production process	Resin production process skill	M
Application Startup			C				A	The production of acceptable quality coated cans in a customer facility	Ability to scale-up a can coating process	Ability to scale-up a can coating process	-	-
Existing Competency	Customer interview skills	Resin specification selection skill	Skill required to apply statistical methods to can testing	Skill required to buy coating resins using supplier specs	Coating production process scale-up skill	Production process control skill	Coating application process scale-up skill					
Required Competency	Customer requirement development skill	Resin specification development skill	Skill required to apply statistical methods to can testing	Skill required to develop suppliers who produce Acme specified resins	Coating production process scale-up skill	Production process improvement skill	Coating application process scale-up skill					
Competency Gap Description	VOC Translation Skill	Coating resin design chemistry	-	Supplier Process Knowledge	-	Production Process Problem Solving	-					
Gap Rating	M	H	-	H	-	L	-					

## Step 6: Creating Gap Closing Action Plans

Step 6 identifies the gaps requiring incremental action to close and then planning the necessary actions. The grid shown in Figure 14 is used to prioritize all recognized gap closing actions. The keys are to recognize the benefit of closing the gap, described as the “impact on the business success if the gap is closed” and “the likelihood that the gap will close without focused additional attention.” The gaps that are rated high on impact and low on likelihood become the top priorities for new action plans.

Impact on Business Success if Gap is closed	High	Gap 1	Gap 2
	Low	Gap 3	Gap 4
		High	Low

Likelihood Gap will close without focused additional attention

Figure 14. Closing the Gap

Planning gap-closing actions can be accomplished with a 4W, H & C table as shown in Figure 15. Start off by asking, “why do we have the gap in question?” The answer to this why-question then becomes the entry in the “what” column of the table. The remaining planning sub-steps can then be completed as required. In the Acme example, the answer to the why-question was that purchasing did not have the skill to develop specifications for raw materials produced in-house. The final conclusion was to reassign accountability for this process to R&D, which solved the stability problem, and thus maintained Acme’s customer value proposition relating to reliability.

What (will be done)	Where (will it be done)	Who (will do it)	When (will it be done)	How (will it be done)	Check (to ensure it's completed)

Figure 15. 4W, H & C Action Planning Table

## Step 7: Reflection

Of course, every step-by-step process such as the Enterprise Model tool described in this paper should end with reflection on the results of the process (if they are available), but at least with reflection on the use of the tool and what can be learned from the just finished use about how to use the tool more effectively next time.

## Conclusion

The Enterprise Model presented in this paper is designed to allow a company to plan organizational changes that result in improved performance. This desirable result is accomplished by creating a value proposition that is attractive to customers and then structuring a process that is capable of delivering it. The process that gets designed with this method is a complete model of the required organizational solution. The concept of a complete solution here means all of the necessary work activities and the appropriate levels of skilled people required to get them done.

**Editor’s Note:** Two of the interviews at the end of this issue describe experiences using the Enterprise Model. See pages 78-80 and page 89.





*This page left blank intentionally for duplex printing.*

# Selecting the Right Opportunities — SCORE

By George Murray

## Introduction

George Murray is the founder and principal of GEM Consulting of Westford, Massachusetts. He frequently serves as the leader of CQM training courses and as an advisor to CQM member companies.

George has forty years experience in the engineering and quality fields, twenty-five of them at Polaroid, a CQM founding member.

He is a senior member of the American Society for Quality and served for three years on the Malcolm Baldrige National Quality Award examiner board, two of them as a senior examiner.

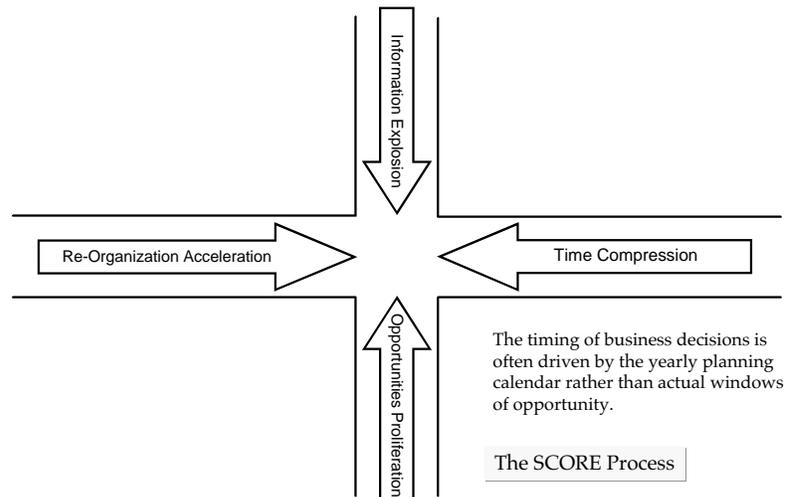
There is nothing quite as clear as a rear-view mirror. Reviewing past investments in promising opportunities often reveals examples of errors of omission — opportunities which we wish we had invested in but didn't. Likewise, we can identify errors of commission — investments that we should have avoided, but didn't.

The study group that developed the SCORE process found that most major business processes are executed on a repeatable, predictable calendar cycle. Financial planning, earnings reports, tax filings, and budgets are executed on a quarterly or annual cycle. Opportunities, in contrast, occur randomly throughout the calendar year. Because business cycles have set schedules, traditional planning rarely coincides with the occurrence of a new opportunity, leading to both errors of commission and errors of omission. Organizations need an explicit process for recognizing and reacting to opportunities, independent of the calendar or cycle of other business processes.

## Decision to Develop SCORE

As described in the introductory paper by Gary Burchill in this issue, increased management complexity results from at least four sources: the information explosion, time compression, proliferation of opportunities, and accelerating organizational change. These are shown as the four arrows in Figure 1.

Figure 1. Four Forces That Increase Business Complexity



The intersection of two of these issues, time compression and opportunity proliferation, led a project in 1999-2000 to develop a methodology for "selecting the right opportunity," the bottom right

quadrant of Figure 1. This development activity was undertaken by Gary Burchill, Ann Gray, and Steve LaPierre.<sup>1</sup> Their ultimate approach was to focus on the methods of McGrath and MacMillan and Haeckel<sup>2</sup> and, as Gary has said, "to develop straightforward templates and tables to allow users to step through the concepts in the books." To this they added concepts from other MBC and CQM processes, for example, the Enterprise Model. This "operationalization" and integration of methods, in a very real sense, created a new problem-solving method, which they called SCORE, standing for:

- S – Sense opportunities
- C – Check alignment
- O – Operationalize the opportunity
- R – Resource commitment
- E – Execute

<sup>1</sup>Burchill and LaPierre are members of the CQM central staff, and Gray (then of Harvard Business School) worked under contract to the CQM.

<sup>2</sup>See Rita Gunther McGrath and Ian MacMillan, *The Entrepreneurial Mindset* (Cambridge, Massachusetts: Harvard Business School Press, 2000); and Stephan H. Haeckel, *Adaptive Enterprise: Creating and Leading Sense-and-Respond Organizations* (Boston: Harvard Business School Press, 1999).

## Managing Assumptions

One of the greatest difficulties in considering new opportunities, is managing what we know versus what we assume to be true. A couple of vocabulary words help us think about assumptions:

- *Statements of fact* are statements for which we are presumably able to provide verification. For instance, if a person stated that it rained last Monday, other reasonable people will accede to the validity of the statement, presuming the first person could provide evidence for the statement if asked, for instance, a newspaper weather report.
- An *assumption* is a statement of fact for which it is not possible to provide verification, because the data is not available.

A key aspect of opportunity evaluation and selection is managing the ratio of knowledge (factual statements, supported by data) to assumptions (statements that need to be proven true or false).

$$\frac{K}{A} = \frac{\text{Knowledge}}{\text{Assumptions}} = \frac{\text{Facts supported by data}}{\text{Opinions that need to be proven true or false}}$$

In the development of products or services to capitalize on a recognized opportunity, the ratio of knowledge to assumptions is very low in the early stages of concept development. As the project progresses, we learn more and more, and the ratio of knowledge to assumptions increases. This is shown by the lower right curve in Figure 2.

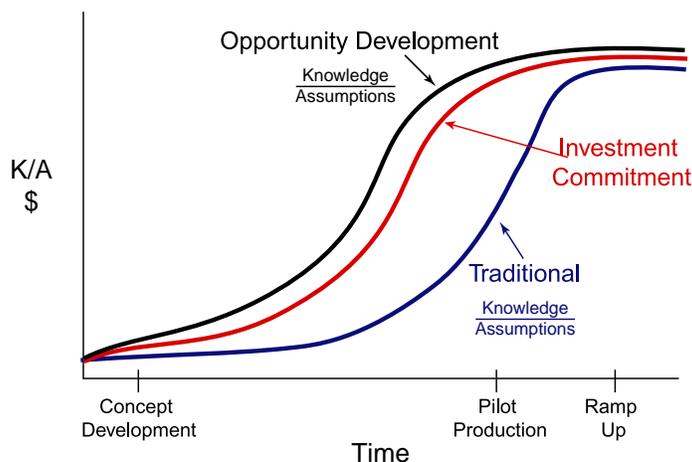


Figure 2. Ratios of Knowledge to Assumptions; Investment Commitment

Unfortunately, in many projects, the *investment commitment* curve for the opportunity (middle curve in the figure) leads the knowledge-to-assumptions ratio curve. As a result, we find ourselves having to commit to investment decisions based on assumptions, rather than upon verified facts. The SCORE process enables identification of what statements are assumptions rather than facts and planning for the conversion of assumptions into knowledge *before* significant investments need to be made, thus creating a knowledge-to-assumptions curve that leads the investment commitment curve, as shown by the upper left curve in the figure.

The importance of identifying assumptions is critical. In many situations where we find ourselves unhappy with the result of investing (or not) in a new opportunity, the roots of the unhappiness are unverified assumptions, sometimes without us being aware that an assumption had been made.

### The SCORE Funnel

Figure 3 illustrates the flow of activities in the SCORE process.

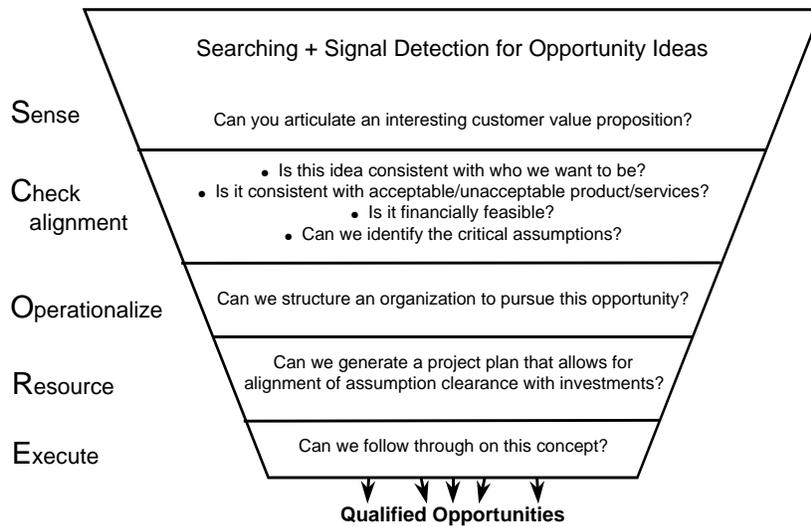


Figure 3. The SCORE Funnel

This diagram is intended to illustrate the funnel principle in SCORE. The few opportunities that pass through all stages of SCORE are ready to become actual development projects for products or services. Most opportunities will fall out early in the process, having failed to pass through the criteria screen set up at each stage.

Thus, the benefits of the SCORE process include:

1. It screens out opportunities inconsistent with the purpose and direction of your business.
2. It quickly determines if you can efficiently respond to a selected opportunity.
3. It avoids you being blindsided by hidden or untested assumptions by capturing them during planning, and managing them during execution.
4. SCORE unambiguously assigns accountability for results to the responsible party.

The process can be utilized by all employees to propose opportunities for development (idea screening). In the product development process, it is positioned at the front end; ideas that survive the SCORE evaluation enter into the concept development phase of product development.

### *The rest of this paper and the Kao example*

The rest of this paper is divided into five major sections, one for each of the major stages of the SCORE process. Of course, actual application of the SCORE process ends with a fifth stage in which the team reflects on their use of the process and any available results, i.e., seeks “lessons learned” that can improve future use of the process. The outline of this process is shown in Table 1.

Table 1. Outline of the SCORE Process.

<b>Stage I</b>	<b>Sense Opportunities</b>
	Step 1 – Search patterns
	Step 2 – Separate signal from noise
	Step 3 – Describe the problem/opportunity from the customer’s perspective
<b>Stage II</b>	<b>Check Alignment</b>
	Step 1 – Reason for being statement
	Step 2 – Check for consistency
	Step 3 – Evaluate financial potential and model outcomes
	Step 4 – Evaluate business model assumptions, using lenses and frames
<b>Stage III</b>	<b>Operationalize the Opportunity</b>
	Step 1 – Check organization’s capabilities and competencies against the opportunity
	Step 2 – Cascade the Enterprise Model
	Step 3 – Evaluate assumptions behind the Enterprise Model
<b>Stage IV</b>	<b>Resource Commitment Decision</b>
	Step 1 – Develop project plan
	Step 2 – Create alignment
	Step 3 – Make a decision
<b>Stage V</b>	<b>Execute</b>
	Reflect

Throughout this paper, we illustrate SCORE by *hypothetically* applying it to a case study from the Kao Corporation, a centuries old Japanese manufacturer of soaps and toiletries.<sup>3</sup> Kao had successfully made itself a supplier of surfactants to the magnetic media (floppy disk) industry in the late 1970’s. The opportunity which Kao identified was to enter the 40B¥ (\$320M) magnetic media industry directly. The data available to Kao at the start of their evaluation is shown in Figure 4.

As you read the remainder of this paper, refer back to Table 1 to keep track of the context of the individual stages and steps within the overall process.

<sup>3</sup> We want to emphasize: applying SCORE to the Kao situation is an entirely hypothetical application of SCORE by the CQM to what we read about Kao in Rita Gunther McGrath and Ian C. MacMillan, “Discovery-Driven Planning” *Harvard Business Review* (Cambridge, Massachusetts: July-August 1995), and the McGrath and MacMillan book listed in footnote 2. CQM has not talked with anyone from Kao and knows nothing first hand about Kao. It is simply an example of how SCORE might have been used, not an actual case study. All the data in this figure and the other figures relating to Kao comes from CQM’s interpretation of what was read in the writings of McGrath and MacMillan.

Data Available:

1986 Sales of 3.5" disks

US = 500M	} With +40% Compounded Annual Growth
Europe = 100M	
Japan = 50M	

1993 Estimated Global Demand 3B disks

	<u>% of Market</u>	<u>Price</u>	<u>Key Requirements</u>
OEM	1/3	180¥ (\$1.44)	Quality & Reliability
Consumer	1/3		Brand Image
Business	1/3		Price & Reliability

Figure 4. Kao Example Data

## Stage I — Sensing Opportunities

The objective of stage 1 is to establish a robust process that systematically eliminates the organization's blind spots to recognizing significant opportunities by identifying:

1. Ideas that will have the greatest impact
2. Ideas that might have been missed by the traditional planning process
3. Signals that indicate a change in the business environment

	Internal to business boundaries	External to business boundaries
Passive	<ul style="list-style-type: none"> <li>● Multi-client market studies</li> <li>● Trade shows</li> <li>● Customer Requests</li> <li>● Industry Periodicals</li> </ul>	<ul style="list-style-type: none"> <li>● Social networks</li> <li>● Travel/tours</li> <li>● General Periodicals</li> </ul>
Active	<ul style="list-style-type: none"> <li>● Market research projects using Concept Engineering</li> <li>● Consultants</li> <li>● Trade Shows</li> </ul>	<ul style="list-style-type: none"> <li>● Executive Education</li> <li>● Networking Organizations</li> <li>● Trade Shows</li> </ul>

Figure 5. Example Search Pattern

## Designing a Search Pattern

Often a simple diagram or grid can facilitate thinking about a multi-dimensional situation. The 2 by 2 matrix illustrated in Figure 5 includes some possible avenues for discovery of new ideas.

Ideas come to us as a result of deliberate searching, or by simply keeping our eyes and ears open. Ideas can come from within the boundaries of "our business" or from totally unrelated sources.

As Pasteur said, "Chance favors only those minds which are prepared." The grid in the figure should be viewed as a starting point to evaluate the methods your organization uses to detect signals for potential opportunities. Questions that should be considered in evaluating your current search pattern are:

1. Are our current detection efforts limited to one or two of the quadrants on the grid?
2. How do we incorporate the suggestions for opportunities from throughout the organization, not just the Marketing and/or Engineering functions?
3. How do we integrate the opportunities identified throughout the organization?
4. What action plan should be launched to improve the search pattern we use to detect opportunities?

## Detecting Relevant Signals — Impact versus Rate of Change

Another simple 2 by 2 grid can be used to flag the need for the SCORE process to evaluate opportunities (see Figure 6).

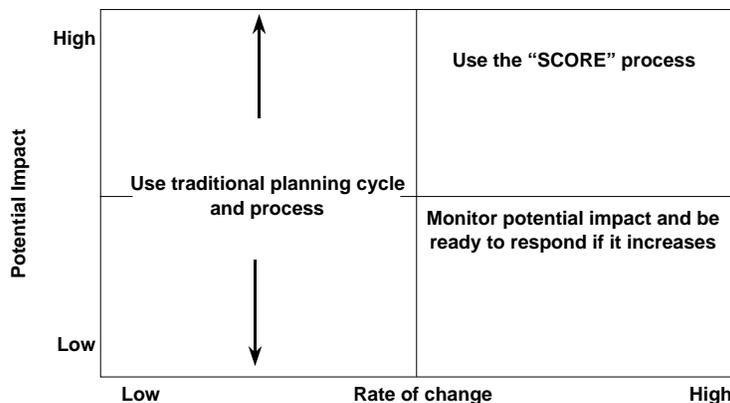


Figure 6. Separating Signal from Noise: Impact versus Rate of Change

If the rate of change in the environment being evaluated is slow, the organization's traditional planning cycle is probably sufficient for evaluating opportunities. Conversely, if the potential impact of an opportunity is low, you may decide to simply monitor it and respond later if its potential impact increases. However, when the rate of change relevant to the opportunity being considered is high, and the potential impact on the organization is also high, the SCORE process can be used to quickly assess the opportunity. Rate of change, possible trends in either impact or rate of change, and patterns of individually insignificant but collectively important changes should all be monitored.

## The 5P Frame

The 5P framework is described in some detail in the accompanying article on the Enterprise Model.<sup>4</sup> Its usefulness in applying the SCORE process to evaluation of new opportunities involves creating a clear statement of the opportunity, i.e., "Describe the problem or opportunity from the potential customers' perspective."

In the Kao example, an initial statement of the problem from the customers' perspective is:

*The reputation of software developers is adversely impacted by defects on a floppy disk." It was modified to state, "The perceived quality of a computer program is seriously degraded by a defect on a floppy disk."*

<sup>4</sup> Steve LaPierre, "Making Organizational Changes That Work — The Enterprise Model," *Center for Quality of Management Journal*, Vol. 11, No. 1, Mastering Business Complexity Special Issue, 15-25.

The five Ps of the 5P framework are:

1. Product — A description of the product/service concept and how it solves the customers' problem
2. Placement/target market — A description of the target customer group and estimated market unit volume
3. Promotion — A description of your plan for communicating the value proposition for this idea to customers
4. Price — a description of your price/performance position on a customer value map
5. Proposition of value — i.e., value proposition

These are illustrated in Figure 7.

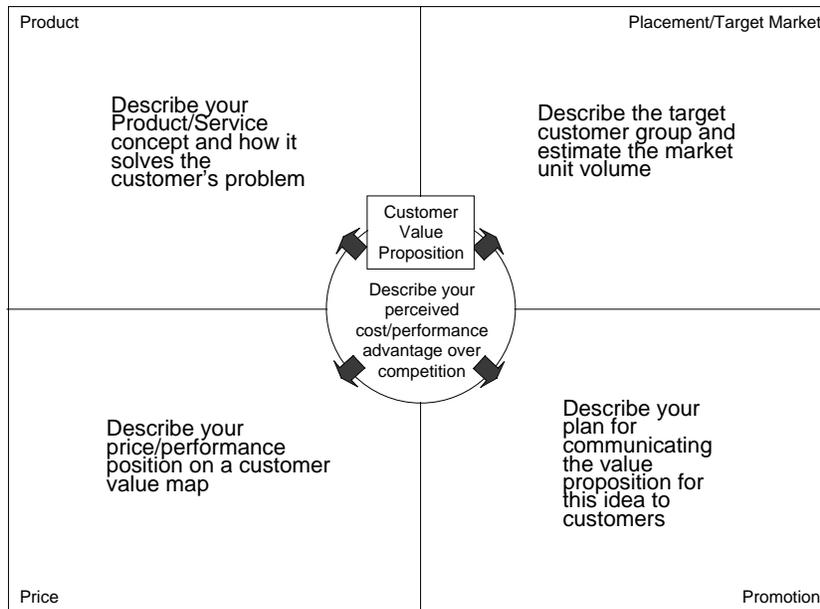


Figure 7. Frame the Product/Service Concept-Articulate the Customer Value Proposition

In the center of the 5P framework, the customer value proposition is written describing the perceived cost/performance advantage over competition, that is, why the customer would want to buy this product/service.

Customer value, the lower-left quadrant of the 5P framework, can be illustrated as a graph of customer perceived price (cost) vs. perceived performance, as shown in Figure 8.<sup>5</sup>

<sup>5</sup> Bradley T. Gale, et al., *Managing Customer Value: Creating Quality and Service That Customers Can See* (New York: Simon & Shuster Trade, 1994).

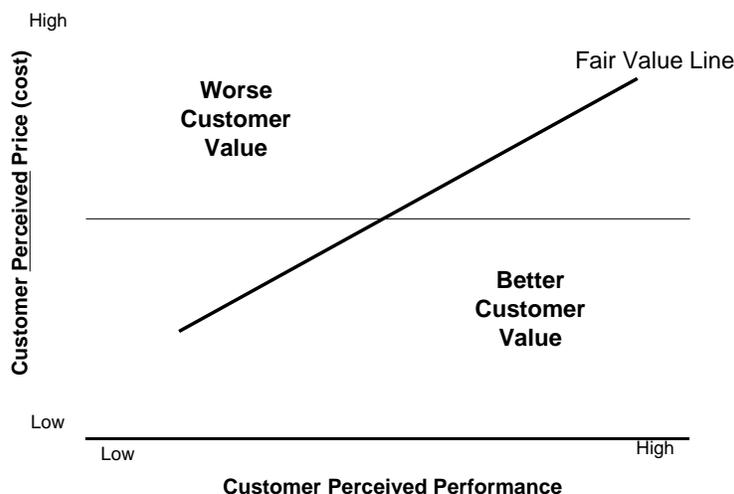


Figure 8. Definition of Customer Value

The diagonal line represents "fair value." Although it may be difficult to precisely quantify the perception of cost and performance, you can assume that some current offering is on the fair value line, and then plot where your opportunity falls relative to that.

The 5P framework for the Kao example is shown in Figure 9.

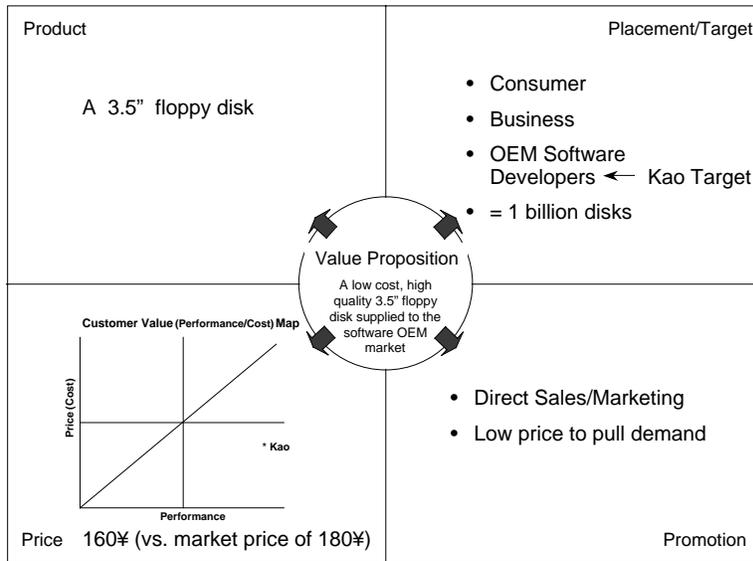


Figure 9. 5P Concept Frame Example

## Stage II — Check Alignment

In order to proceed to Stage II, your customer value proposition must state convincingly how this proposition will deliver value to your customer and therefore be attractive to them. If this can be done, Stage II then screens the idea/opportunity further by determining:

1. Is the value proposition consistent with who we want to be?
2. Is the product/service concept consistent with offers the organization would consider?
3. Is the financial opportunity attractive?
4. Can we identify critical assumptions?

### *The "Reason for Being Statement" — checking the consistency of the value proposition with who we want to be*

Ideas that survive Stage I are tested for consistency with a reason for being statement. Articulation of the reason for being statement is not pursued for each opportunity but might be reviewed annually, along with the list of acceptable and unacceptable offers (see below.) The reason for being statement should make the following clear:

1. The fundamental *purpose* of the organization
2. The organization's primary *constituency*
3. The organization's *binding constraint*

These three elements of the reason for being statement are illustrated by an example from General Motors Corp. in Figure 10.<sup>6</sup>

General Motors exists...

- a. to make money by making motor cars
- b. to make motor cars profitably

Fundamental Purpose	Primary Constituency	Binding Constraint
a. Make \$	Shareholders	Through making motor cars
b. Make cars	Management & employees	Be profitable

What appear to be small differences in wording can have a big impact on what the company does.

The reason for being statement is developed using a chart such as is shown in Figure 11, where the rows are labeled Statement, Fundamental Purpose, Primary Constituent, and Binding Constraint. The particular example in Figure 11 is derived from the Kao case study.

Statements	...to be a world leader in personal and household care products	...to make people feel good about themselves	...to generate long term profits by applying our technology expertise to manufactured products which improve how people live	Summary: To be a world leader in markets where our technology can be applied to products which improve people's lives.
Fundamental Purpose	World Leader	Make people feel good	Long term profit	World Leader
Primary Constituent	Company employees	Consumers	Shareholders	Consumers
Binding Constraint	Personal & household care products	Products for individual uses	Build on existing technology	Build on existing technology

The second, third and fourth columns in the shaded (first) row represent candidate reasons for being proposed by members of the management team. An appropriate fundamental purpose, primary constituent, and binding constraint are derived from each draft statement. Then consensus is sought on the most important expression of each of these elements, which is written in the last column. Finally, a new consensus summary reason for being is then entered in the upper right cell.

The customer value proposition for the opportunity must be consistent with the reason for being. If not, the idea is dropped and not carried further through the process. In this example from the Kao case study, the reason for being and value proposition are judged to be consistent, as shown in Figure 12.

<sup>6</sup> As with the examples we have been showing from Kao, this example for General Motors really only comes from CQM making up an example using data from chapter 7, page 114 of Haeckel's book cited in footnote 1.

Figure 10. Reason for Being Statement Example

Figure 11. Reason for Being Development Example



## First Level Financial Screen

The objective of the first level financial screen is to conduct a simple analysis to quickly determine if the potential benefit is attractive enough to warrant further consideration. For a given opportunity, the first step should be the identification of what actually generates revenue. An example is shown in Figure 14.

Identify the product or service offering that actually triggers revenue...

- Insurance = Policy
- Consulting = Unit of time or project
- Manufacturing = Product
- Web site = Number of eyeballs that will see an ad

Often, new business model = change in revenue generating unit

Examples

**Cars**  
sale of car → sale of a lease on a car

**Music business**  
physical collection of songs → electronic file of one song

**IBM**  
Computer hardware & software → computer hardware & software solutions & services provider of outsourced information systems services

Figure 14. Identify What Generates Revenue

Rather than a conventional return on investment (ROI) analysis, the *reverse income statement*<sup>8</sup> used in SCORE begins with target minimums for contribution to revenue and profit, and then calculates allowable costs, assets and other financial parameters.

<sup>8</sup> This comes from McGrath and MacMillan's paper cited in footnote 3 and their book cited in footnote 2.

It is critical to identify the assumptions being made, to express them explicitly, and to establish a tracking mechanism and accountability for *clearing* them. Clearing an assumption means generating factual data to turn the assumption into knowledge before significant investment is made.

The financial benchmarks in the reverse income statement need to be consistent with those in the 5P Frame developed earlier. Begin by identifying current revenues, profits, return on sales (ROS), and return on assets (ROA). Then consider those factors, such as risk, that might lead you to modify those values for your opportunity being evaluated. Assert *opportunity target values* based on the factors considered. This can all be done on a worksheet such as is shown in Figure 15,<sup>9</sup> which is also an example of derived from the Kao case study. Note that the opportunity target value *revenue* is not assumed: it will be calculated from the reverse income statement later.

<sup>9</sup> Ibid.

	Current	Considerations	Opportunity Target Value
Revenues	400B ¥		<calculated in reverse I/S>
Profits (income before taxes)	37B ¥	Must contribute +10% to income	4B ¥ at steady state
ROS	9.5%	Risk premium: +0.5%	10%
ROA	8%	Risk premium: +2%	10%

Figure 15. Specify Target Outcomes

## 1st Level Reverse Income Statement

Target values are then entered into a first level reverse income statement, together with the price and market size assumptions from the 5P frame, to calculate revenues, total allowable costs, unit volume, market share, and allowable assets. In the Kao example, this is shown in Figure 16.

	Value	How Determined
Profits (income before taxes)	4B ¥ (\$32M)	From Target Outcomes
Return on Sales	10%	From Target Outcomes
Return on Assets	10%	From Target Outcomes
Revenues	40B ¥ (\$320M)	Required Revenue = Required Profits / Required Return on Sales = 4B ¥ / 10%
Total Cost	36B ¥	Allowable cost = Revenue - Profits = 40B ¥ - 4B ¥
Price	160 ¥	Product / Service Concept (from 5 P Frame)
Unit Volume	250M	Unit Volume= Required Revenue / Allowable Price = 40B ¥ / 160 ¥
Market Share	25%	250M Units / 1B units (from 5 P Frame)
Assets	40B ¥	Allowable assets = Required Profits / Required Return on Investment = 4B ¥ / .10

Figure 16. 1st Level Reverse Income Statement Example

## Key Economic Success Factors

The next step is to identify the performance required against key economic drivers, including:

1. Standard business economic drivers
2. The key drivers of the economics of your particular industry
3. Unique drivers related to the specific opportunity.

Identify sources for this information. (Throughout the analysis, you and your team need to pay scrupulous attention to documenting the assumptions made.) Figure 17 shows examples of key economic success factors for a manufacturing/distribution business.

Standard Business Drivers	Industry Drivers: Industrial Distribution Business	Specific Opportunity Drivers: Manufacturing Business
Annual Sales Growth	Days receivables	Life of equipment before technological obsolescence
Margins	% on time deliveries	Raw material cost as % COGs
Inventory Turns	Error rates	Minimum economic scale
Fixed asset investment/sales	# lines/order	Scrap rate
Debt to equity ratio	Fixed cost/order	Order to delivery
Price per revenue generating unit		Time
% SG&A		% indirect workers
Revenue/Employee		

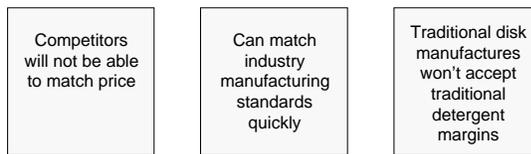
Figure 17. Key Economic Success Factors Example

Another example of key economic factors, this time derived from the Kao case study, is shown in Figure 18. This figure shows values for the magnetic media industry and targets for Kao's opportunity. It also shows some of the assumptions identified during this analysis.

Key Economic Factor	Industry	Kao Target
Fixed asset investment/sales	0.8:1	0.8:1
Effective production capacity per line (after allowing for scrap rework, maintenance, and setup)	25 disks per minute	25 disks per minute
Effective life of equipment before technological obsolescence	3 years	3 years
Sales margins	12% on sales	10% on sales
Surfactant material cost/sales	27 ¥ per unit	20 ¥ per unit
Expected selling price per disk to OEMs	180 ¥	160 ¥

Figure 18. Key Economic Factor Comparison for the Floppy-Disk Business Example

Assumptions:



Kao Corp. did not assume any difference between their capability and the industry average for asset investment, production capacity (25 disks/min), or equipment life. They were willing to accept a lower sales margin, having assumed that they would have lower surfactant costs based on their expertise and having assumed a lower selling price than competition.

### Second Level Reverse Income Statement

Review what you learned in the first level reverse income statement. If the initial calculation indicates that you would need to generate a 90% market share, for example, you might stop at that point. If the first level reverse income statement continues to indicate that the opportunity is attractive, it may be advisable to conduct a second level reverse income statement.

In the first level reverse income statement of the Kao example (review Figure 16), allowable costs are calculated to be 36B ¥. Manufacturing/Packaging costs, and Sales costs are key elements of the allowable cost total. Factors affecting manufacturing and packaging costs include:

1. Production line capacity of 25 disks/minute
2. Number of people to support one manufacturing line
3. Number of lines needed
4. Raw material costs
5. Package costs
6. Manufacturing salaries
7. Manufacturing cost parameters

These are shown in Figure 19.

Specifications	Estimate	Source of Estimate
Effective Production line capacity of 25 per minute = 12.5 million disks per 350-day year	12.5 million disks per line	Calculation
Number of production lines needed (250 million disks/12.5 million disks per line)	20 production lines	Calculation
Number of people to support one manufacturing line (including all functions): Assume 10 per line for 3 shifts per line = 30 per line	600 manufacturing staff	Assumption based on current industry experience
Manufacturing salaries = 5 million yen per manufacturing person annually (600 x 5 million yen)	3 billion yen	Calculation
Raw materials costs: Assume 20 ¥ per disk	5 billion yen	Assumption based on analyzing competitors' costs
Packaging: 40 ¥ per package of 10 disks	1 billion yen	Assumption

Figure 19. Estimate the Values of Each Parameter — Manufacturing Costs Example

Sales expenses are a function of:

1. Required disk sales
2. Average OEM order size
3. Sales orders required
4. Number of calls to make a sale
5. Annual number of sales calls needed
6. OEM sales calls per day per salesperson
7. Annual salesperson-days needed
8. Number of salespeople needed
9. Annual salary per salesperson
10. Total sales salaries

The estimates for these factors, and their sources, are shown in Figure 20.

Specifications	Estimate	Source of Estimate
Average OEM order size	10,000 disks	Calls to IBM and Hewlett-Packard
Required disk sales (from above)	250 million	Calculation
Sales orders required (250,000,000/10,000)	25,000 orders	Calculation
Number of calls to make a sale	4	New hire's previous experience
Annual number of sales calls needed	100,000	Calculation
OEM sales calls per day per salesperson	2	Calculation
Annual salesperson-days needed (100,000/2)	50,000	Calculation
Salespeople needed: 250 selling days per year = 50,000/250 selling days	200 sales staff	Calculation
Annual salary per salesperson	10 million yen	Assumption
Total sales salaries (200 x 10 million yen)	2 billion yen	Calculation

Figure 20. Estimate the Values of Each Parameter – Sales Expenses Example

The level of reverse income analysis required depends on the results of earlier levels. At any point at which the opportunity becomes unfeasible, the analysis (and work on the opportunity) should stop. For some elements of the reverse income statement you may feel more comfortable identifying a range of values rather than a single point estimate. You can then perform sensitivity (what-if) analyses to establish scenarios for a go/no-go evaluation, and to test the robustness of the outcome.

An example of a second level reversion income statement, derived from the Kao case study, is shown in Figure 21.

Reverse Income Statement	Billion Yen
Required profit	4.0
Required revenues at required margin of 10%	40.0
<b>Allowable Costs (90% of sales)</b>	<b>36.0</b>
Sales	2.0
Manufacturing Salaries	3.0
Variable Manufacturing	5.0
Packaging	1.0
Shipping	2.5
Depreciation	10.1
<b>Total Estimated Costs</b>	<b>23.6</b>
<b>Maximum allowable administrative and overhead costs</b>	<b>12.4</b>

Figure 21. Summary Second Level Reverse Income Statement Example

Next, check the financial feasibility of your opportunity: are the required outcomes in the financial model realistic?

1. Is the required market share achievable?
2. Is it feasible to produce the product/ service in the required volumes given resources available to the firm, and technologies available in the market?
3. What is the evidence that required prices are attainable?
4. Can the cost targets be met?

*If the required outcomes are clearly not feasible, do not pursue the opportunity further.*

### ***Evaluation of Business Model Assumptions behind the financial model requirements***

Throughout the SCORE process, you should continue to recognize assumptions you’re making and to articulate them clearly. SCORE uses the analogy of lenses and frames to organize the assumptions made throughout the evaluation of an opportunity.<sup>10</sup> A lens is a point of view from which a person views a problem or opportunity. A lawyer will typically focus on legal issues while sales people see customer issues. Frames are sets of lenses, which group the lens perspectives into major categories, such as business environment, strategies/goals, internal capacity, etc. As shown in Figure 22, SCORE organizes about 36 lenses into six frames, or categories. This listing is not prescriptive, and your organization may use other lenses or groupings.

Each assumption is placed into the lens outcome/ assumption grid. Organizing assumptions this way helps identify other assumptions that were missed. For each entry, the required result (for that assumption to be valid) is identified, as well as the financial driver impacted by the assumption. Then, each assumption is assessed against: (a) the impact on the opportunity if it is false; (b) the likelihood of it being false. A high-medium -low scale can be used to assess the assumptions.

<sup>10</sup> CQM learned about the concept of *lenses and frames* from Steve Kerr of GE Crotonville, who presented it at a CQM seminar in the spring of 1999.

Frame	Lenses	Underlying Assumptions	Required Results	Financial Driver Impacted	Impact if False H/M/L	Likelihood of False H/M/L	Clearance Responsibility	
<i>Business Environment</i>	Competition	1						
	Supply chain	2						
	Marketplace	3						
	Technology	4						
	Regulation	5						
			6					
<i>Strategies and Goals</i>	Execution time horizon	7						
	Consistency with core values	8						
	Consistency with long term objectives	9						
<i>Internal Capacity</i> Capabilities = sum of processes	Development capabilities	11						
	Production/service capabilities	12						
	Sales/marketing capabilities	13						
	Distribution capabilities	14						
			15					
			16					
Competencies = sum of skills	Functional task skills	16						
	Process management skills	17						
	Project management skills	18						
	Change management skills	19						
	Customer Relationship Mngt. skills	20						
			21					

Frame	Lenses	Underlying Assumptions	Required Results	Financial Driver Impacted	Impact if False H/M/L	Likelihood of False H/M/L	Clearance Responsibility
<i>Stakeholders</i>	Employees	22					
	Customers	23					
	Suppliers	24					
	Shareholders	25					
	Community	26					
	Partners	27					
			28				
			29				
<i>Finance</i>	Capital requirements	29					
	Time to positive cash flow	30					
	ROI	31					
			32				
<i>Organizational Bias</i>	History of similar decisions	33					
	Risk tolerance	34					
	Damage control desires	35					
	Business model assumptions	36					
			37				
			38				
		39					

Figure 22. Lens Outcome/Assumption Grid

Impact-if-false can be evaluated through sensitivity analysis (what-if exercises), assessment of unintended possible consequences around the assumption, or scenario planning<sup>11</sup> can be used to think through various possible outcomes.

The likelihood of being false can be evaluated by getting additional information, expert opinion, breadboard mockups, simulations, market tests, etc. The objective is to view the assumption with clear-eyed objectivity, rather than just hoping it's true.

Each assumption is assigned to a specific individual who has what is called "clearance responsibility."<sup>12</sup> He or she has the assignment to track that assumption, develop a plan to convert it to knowledge, and inform the team if the impact or validity of the assumption changes.

Figure 23 shows one frame (Business Environment) in the Kao example and five different lenses within that frame.

<sup>11</sup> The typical introduction to scenario planning is Peter Schwartz, *The Art of the Long View: Planning for the Future in an Uncertain World* (New York: Doubleday, paperback edition 1996); a more detailed text is Kees Van Der Heijden, *Scenarios: The Art of Strategic Conversation* (New York: John Wiley & Sons, 1996).

<sup>12</sup> See chapter 10 of McGrath and MacMillan's book cited in footnote 1.

Frame	Lenses	Underlying Assumptions	Required Outcome	Financial Driver Impacted	Impact if False H/M/L	Likelihood of False H/M/L	Clearance Responsibility
<i>Business Environment</i>	Competition	1	Maintain significant cost advantage	No price drop	Margin	H	L
	Supply chain	2					
	Marketplace	3	Will buy on cost	OEM Sales	Revenue	H	M
	Technology	4	Stable technology	No shift from disks	Revenue	H	L
	Regulation	5					
			6				

Figure 23. Lens Outcome/Assumption Grid Example

## Risk Assessment Grid

A 2 by 2 grid can be used to perform risk-assessment on assumptions (see Figure 24).



Figure 24. Assumption Risk Assessment Grid

The vertical axis is "Likelihood of Assumption Being False," and the horizontal axis is "Impact on Business Opportunity if Assumption Proves False." All of the assumptions are plotted on this grid and the team evaluates:

1. The overall opportunity risk as it now appears
2. The aspects of the opportunity which present the greatest risk, and
3. Contingency or monitoring plans needed to manage key risks

Those assumptions that fall in the upper right quadrant of this grid (high likelihood of being false and high impact on the business opportunity if the assumption proves false) are subjected to a go/no-go evaluation, using another 2 by 2 grid (see Figure 25).

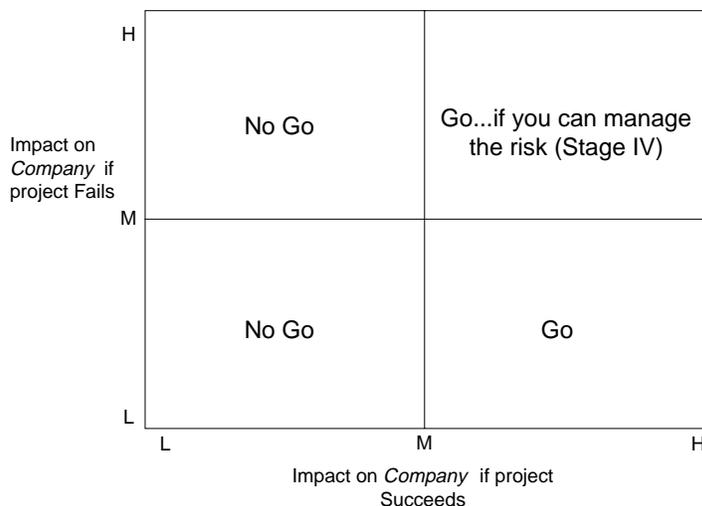


Figure 25. Go/No-Go Evaluation Grid

Opportunities having low impact on the company even if successful, should not be pursued. If there is little impact on the company if the project fails, and highly beneficial impact if it succeeds, the opportunity continues to be attractive and it's evaluation should continue. Riskier opportunities are those judged to have a high impact on the company whether they succeed or not (the upper right quadrant of the go/no-go evaluation grid).

The remaining stages of the SCORE process will help your team decide whether risks associated with this opportunity are manageable.

## Stage III — Operationalize the Opportunity

The CQM version of the Enterprise Model, derived from work by Hatten and Rosenthal<sup>13</sup> and described in the previous paper in this issue, is used in Stage III of SCORE to develop the appropriate organization to execute this opportunity. In that previous paper, the Enterprise Model is presented as a method for assessing performance of the organization, addressing gaps in its capabilities or competencies to successfully deliver its value proposition. In SCORE, the Enterprise Model highlights changes required for the organization to operationalize the new opportunity.

### *Top-Down Flowchart*

In SCORE, the top-down flowchart described in the Enterprise Model, is generated with a specific focus on identifying new processes at the top and sub-levels required to move forward the opportunity being evaluated using SCORE.

### *The Enterprise Model*

Starting with the top-down flowchart, complete the top level Enterprise Model Worksheet for your opportunity idea, including:

1. Critical processes and critical competencies
2. Required process outcomes
3. Existing and new capabilities required by the opportunity
4. Existing and new competencies
5. Gap ratings and gap descriptions

*It is critical that your team identify and articulate new assumptions underlying the ability to achieve the required outcomes.*

Figure 26 (next page) shows the top-level enterprise model resulting from application of SCORE to the Kao case study.

Notice that the development and manufacturing processes have significantly different capability requirements for manufacturing floppy disks than for cosmetics, and that the competencies required of engineering, operations, and sales/marketing are significantly different from the existing business.

The Kao team identified additional assumptions they made while completing the Enterprise Model:

1. Easier to find non-tech direct sales people
2. Simple order fulfillment compared to cosmetics

### *Cascading the Enterprise Model*

For those processes that show a high gap in existing vs. required capabilities, cascade the Enterprise Model to another level. The Kao example for the cascaded manufacturing process (Figure 27, next page) should

<sup>13</sup> Hatten, K.J. and Rosenthal, S.R. "Managing the Process-Centered Enterprise," *Long Range Planning* (Vol. 32, 1999) 293-310; and Hatten, K.J. and Rosenthal, S.R. *Reaching for the Knowledge Edge: How the Knowing Corporation Seeks, Shares and Uses Knowledge for Strategic Advantage* (New York, New York: AMACOM, 2001).

Figure 26. Top-Level Enterprise Model: Assess Competency Gaps – Example

Function Process	Engineering	Operations	Sales and Marketing	Logistics	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Capability Gap
Development	A				Prototype mfg parts at quality standard	Develop tight spec chemical (liquid) products	Develop manufacturing/ assembly process		H
Manufacturing	C	A			250 million disks per year at quality and cost standard	Process control (chemical) manufacturing	Discrete part mfg		H
Sales			A		25K orders of 10K disks/order or greater	Sell surfactant to OEM manufactures	Sell finished products direct to OEMs		M
Logistics		C		A	25K on-time deliveries per year	Ship 1+ M orders per year of various sizes	On-time delivery		—
Existing Competency	Develop chemical products an mfg process	Manage continuous flow operations	Technical sales with field support to OEM suppliers	Large volume mixed order shipments					
Required Competency	Design for pieces part assembly and discrete part mfg	High volume assembled products	Non-tech OEM direct sales	Low volume limited configuration shipments					
Competency Gap Description									
Competency Gap	H	H	H	—					

Assumptions:

Easier to find non-tech direct sales people	Simple order fulfillment compared to cosmetics		
---	--	--	--

Figure 27. Cascaded Enterprise Model for Manufacturing Process – Example

Function Process	Engineering	Operations	Logistics	H/R	Finance	Required Outcome	Existing Capability	Required Capability	Capability Gap Description	Capability Gap
Subcontracted Production		A			C	7.5M disks/yr	Subcontract bottling	Subcontract assembly		M
Production Process Development	A	C				Capable (Cpk) Process	Develop flow processes with very tight specs	Develop assembly processes with very tight specs		H
Pilot Plant Construction					A	Operational Pilot Plant	Build two plants/year	Build one pilot plant		L
Pilot Plant Staffing				A		200 Trained employees	Hire and train 1,000/yr	Hire and train 1,200/yr		L
Inventory Management			A			Raw mtrl for 6x turns	Manage 80B# Inventory	Manage 80.5B # Inventory		L
Pilot Production		A				80M disks/yr	0	Disk Assembly		H
Main Plant Construction					A	Operational Plan	Build two plants/yr	Build one plant		L
Main Plant Staffing				A		600 trained employees	Hire and train 1,000/yr	Hire and train 1,600/yr		M
Inventory Management			A			Raw mtrl for 6x turns	Manage 80B# Inventory	Manage 86B# Inventory		L
Main Production		A				250M disks/yr	0	24/7 disk assembly		H
Existing Competency	Continuous flow process design	Mfg tight tolerance flow product	Worldwide supply chain mgmt	Worldwide recruitment and training	Worldwide plant acquisition construction					
Required Competency	Assembled plant process design	Mfg tight tolerance assembled products	Worldwide supply chain mgmt	Worldwide recruitment and training	Worldwide plant acquisition construction					
Competency Gap Description										
Competency Gap	H	H	L	L	L					

Assumptions:

Can develop assembly expertise on the subcontracted plant	Negligible inventory management concerns	Can hire 600 mfg workers in one local region
---	--	--

help you understand the detailed application of the Enterprise Model:

As can be seen from the example in the figure, operations must develop the competency to manufacture tight tolerance assembled products, to supplement its competency to manufacture tight tolerance flow products. The pilot plant must be able to go from zero to 80M disks per year; the Kao team identified this as a high capability gap.

### Revisiting Assumptions

All of the additional assumptions identified during development of the Enterprise Model are arrayed against the lens/outcome grid, the risk assessment grid, and the go/no-go grid. Additional assumptions generated during this review are also plotted. If the opportunity under evaluation passes this screen, the team is ready to develop a plan to move forward with the opportunity.

## Stage IV — Resource Commitment Decision

The objective of Stage IV is to create a single document with an overview of the timing of activities, critical assumption clearances, and investment commitments.

### Creating a Project Plan

The project plan is developed at an overall level, concentrating on the most important outcomes and critical assumptions. The plan should be consistent with the reverse income statement and the Enterprise Model, and it should create alignment between the schedule for clearing assumptions and the schedule for project investments.

Beginning with the processes required to execute against this opportunity (from the Enterprise Model), a timeline schedule and project outcome for each activity listed is created. An example chart of the time schedule and project outcomes is shown in Figure 28.

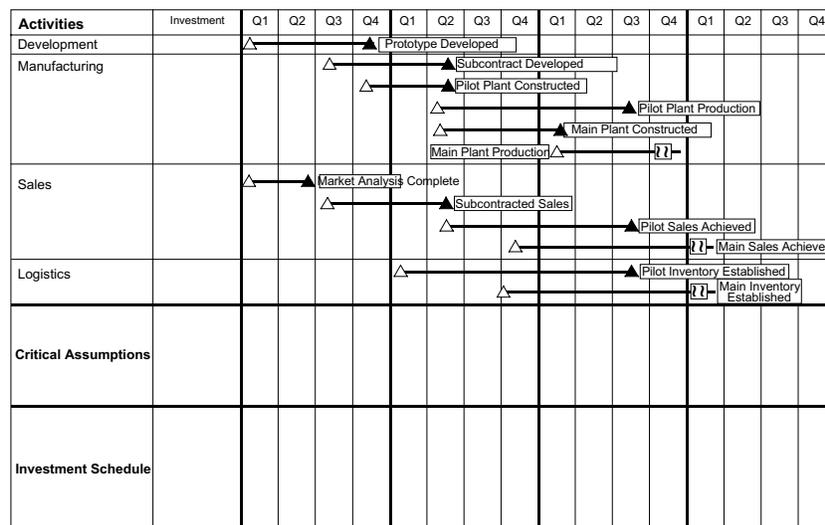


Figure 28. Project Plan — Activities and Outcomes Example

## Determining Investment Profile

Next you estimate the total investment for each of the processes in the activity section of the project plan and determine the cash flow in each period of the activity schedule. You enter these amounts in the investment schedule row as shown in Figure 29.

Activities	Investment	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Development	200M	△															
Manufacturing	200M																
	1B																
	1B																
	3.75																
	2B																
Sales	50M	△															
	60M																
	400M																
	2B																
Logistics	500M																
	6B																
<b>Critical Assumptions</b>																	
<b>Investment Schedule</b>	Development	50	50	50	50												
	Manufacturing			37.5	25	25	25	250	250	250	250	250					
					1B	3.75	3.75										
	Sales	25		22.5	15	15	15	100	100	100	100	100					
								600	400	400	400						
	Logistics					500		6000									
	<b>Totals</b>	75	50	90	1090	540	4140	6350	1250	1250	1250						

Figure 29. Project Plan: Activities, Outcomes, Investments – Example

You then continue to identify assumptions made during the investment scheduling. For example, three assumptions can be identified in the Kao case:

1. Plant and inventory investments are single point investments
2. Labor is equally allocated each quarter
3. .5 salary premium in the first quarter for recruitment and training

## Critical Assumption Clearance

The objective of critical assumption clearance is to increase the knowledge/assumption ratio prior to making significant investments in the project. You identify the assumptions that must be cleared to avoid high risk investments, and you identify the point in the timeline when these assumptions need to be cleared. An example from the Kao case study is shown in Figure 30.

Activities	Investment	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Development	200M	△															
Manufacturing	200M																
	1B																
	1B																
	3.75																
	2B																
Sales	50M	△															
	60M																
	400M																
	2B																
Logistics	500M																
	6B																
<b>Critical Assumptions</b>			1 2		6 7		3	5	4								
<b>Investment Schedule</b>	Development	50	50	50	50												
	Manufacturing			37.5	25	25	25										
	Sales	25															
	Logistics																
	<b>Totals</b>	75	50														

1. OEMs will conduct quality tests on prototype disks  
 2. Locate plant capacity  
 3. Hire/train sales employees  
 4. Hire/train manufacturing employees  
 5. Part variability < OEM specification  
 6. Qualified OEM supplier  
 7. Funding available

Figure 30. Project Plan: Assumptions – Example

Six critical assumptions were identified for the Kao example. The critical assumptions row of the timeline indicates when those assumptions need to be cleared. For instance, the assumption that funding will be available needs to be converted to knowledge (certainty) before building begins on the pilot plant and the main plant.

### Creating Alignment

A series of activities may be required to align investment decisions with conversion of assumptions into knowledge. For instance, in quarter 4 of year 1, a major activity of "pilot plant construction" is scheduled. This activity requires a one billion yen investment. Also in quarter 4 of year 1, a major assumption of "Kao is qualified as an OEM supplier" is scheduled to clear. To create alignment, the Kao team must: 1) accelerate the OEM supplier qualification process, or 2) delay the commitment to start the pilot plant.

A 4W, H & C table can be used to plan clearance of assumptions:

1. What assumption is to be cleared?
2. Where will it be done?
3. Who is accountable? (This should be a person's name, not an organizational function or unit.)
4. When will it be done?
5. How will the assumption be cleared?
6. Check – what will ensure that the assumption has been cleared?

An example of the 4W, H & C table for a few of the critical assumptions from the Kao case study are shown in Figure 31.

What (will be done)	Where (will it be done)	Who (will do it)	When (will it be done)	How (will it be done)	Check (to ensure it's completed)
OEMs will qualify Kao as supplier based on prototype disks	At OEM's facility	Account representative	Q2	OEM will be asked for a memorandum of understanding upon accepting prototype disks that they are sufficient for qualification purposes	MOU received
We can develop a mfg/assembly capability for making floppy disks at high volume		VP Mfg	Pilot capab.: 18 mos. Volume capability: 2+ yrs.	Pilot production facility operational High volume production facility operational	
\$20M will be available for a new plant			Preliminary assessment 2 months Firm source 18 months	Talk to VCs, company sponsors	

Figure 31. 4W, H & C Table for Clearing Assumptions – Example

The key assumption of "OEMs will qualify Kao as a supplier based on prototype disks" is moved from Q4 to Q2 to align it with the investment decision needed. How it will be accomplished is through a memorandum of understanding from the OEM, and the Check is that the memorandum of understanding was received.

### Decision

At this point, you must determine the feasibility of proceeding with this project. Do not go forward if you were unable to create alignment between assumption clearance and investment timing, i.e., if:

1. You were unable to clear a critical assumption
2. You will be unable to get required resources in time
3. You'll miss a key market window for this opportunity, or
4. The investment is too risky i.e., you have to invest too much before you know enough

Now you must consider the balance of scope, schedule, and resources for this opportunity. This can be done using a table such as is shown in Figure 32.<sup>14</sup>

<sup>14</sup> This table is a variation on a concept CQM learned about from Edith Wilson or Mark Halloran (most probably Wilson) of HP at the CQM New Product Development Symposium held in Cambridge, Massachusetts on October 21, 1992.

If Go...	Fixed	Set	Accept
Scope			
Schedule			
Resources			

Figure 32. Scope, Schedule and Resources Table

Determine which of scope, schedule or resources is most important and, therefore, least desirable to have slip. Declare it *fixed* (the first column of the figure) *if*:

1. A powerful customer has provided very clear requirements; you may need to fix the *scope*.
2. The market window is clearly established by a trade show; you may need to fix the *schedule*.
3. The opportunity requires a new invention; you may want to fix the *resources*, but definitely not the schedule.

For instance, suppose it is more important not to slip scope than schedule or resources. Then there will be an entry in the table in the figure at the intersection of the fixed column and the scope row, that is, the target scope.

Of the two remaining elements (for example, schedule and resources), identify which has lesser flexibility or greater impact on value proposition realization. You declare this lesser flexibility or greater impact element to be *set*. For example, *if*:

1. A powerful customer's requirements have fixed the scope; you may need to set the *schedule*.
2. You fix resources for a new invention; you may want to set the *scope* if you have flexibility on schedule.
3. You fix the schedule to meet trade show timing; you may want to set the *scope* if you have flexibility with resources.

The target for the element that is set is entered in the table in the figure at the intersection of the set column and the row for the element, for instance, at the intersection of set and schedule you would enter the schedule target

The target for the remaining element (e.g., resources) is the consequence of the previous two. *You cannot make independent decisions on all*

three elements. Thus; the remaining element has its target inserted at the intersection of the row for that element and the accept column.

An example of the scope, schedule and resources table for the Kao case study is shown in Figure 33.

	Fixed	Set	Accept
Scope	3.5" floppy disk for OEM market		
Schedule		In-house production within 6 quarters	
Resources			Up to 7B¥ and 350 employees

Figure 33. Make a Decision — Example

## Stage V — Execution

The objective of Stage V is to utilize the understanding developed throughout the SCORE evaluation process to manage the project if a go decision is made.

1. Develop contingency and monitoring plans based on the likelihood / impact assessment of key assumptions.
2. Schedule go/no-go evaluation points with unambiguous criteria attached to assumption clearing points in the project plan.
3. Execute on contingency and termination plans as required.

## Reflection

Of course, every step-by-step process, such as SCORE described in this paper, should end with reflection on the results of the process (if they are available), but at least with reflection on the use of the tool and what can be learned from the just finished use about how to use the tool more effectively next time.

Some results for the Kao case study are shown in Figure 34.

Successful foray into the magnetic media market

- Top US producer of floppy disks in 1990
- 1992 US sales = 30B¥ (\$240M)
- 1992 Cost = 100¥/disk (\$0.80)
- 1994 led world in market share in floppy disks. By far the largest supplier to OEM market
- 1997 400M floppy disks/yr and CD-Rom, other media

Intense competition

- Mainland Chinese firms
- Price collapse = Jan 1992: \$0.75/disk  
Dec 1992: \$0.25/disk

Sold its information technology operations in 1998 for \$37.5M (closed high volume disk plan in southeastern Massachusetts)

Still admired as one of the most successful and entrepreneurial Japanese companies

Figure 34. Kao Epilog

While use of SCORE is only beginning to become widespread, its use is proving to provide significant leverage and strategic (and tactical) insight in several ways. Of course, a basic purpose of SCORE is new investment opportunities to find the truly great opportunities and to encourage employees to bring forward their ideas by providing powerful a way to evaluate the ideas.

In addition, use of SCORE in some cases has resulted in projects being killed in the middle of their execution — it's clearly an advantage of stop as quickly as possible a project which is not going to be a success. In other cases, SCORE has been used to reframe and redirect existing projects — obviously also something that should be done as early as possible.

The three interviews at the end of this special issue report specific experiences using SCORE, including situations in which millions of dollars were at stake.

**Editor's Note:** The interviews at the end of this issue describe experiences using SCORE. See pages 82-83, 86, 91-92, and 94-102.





*This page left blank intentionally for duplex printing.*

# Managing Decision Risk — The ARMED Decision Process

By Barry Mallis

Barry Mallis consults as a business adviser in organizational development and is a frequent leader of CQM courses and workshops. He has conducted courses and workshops in Singapore, Mexico, Germany and across the U.S., and he is fluent in Spanish, French and Russian.

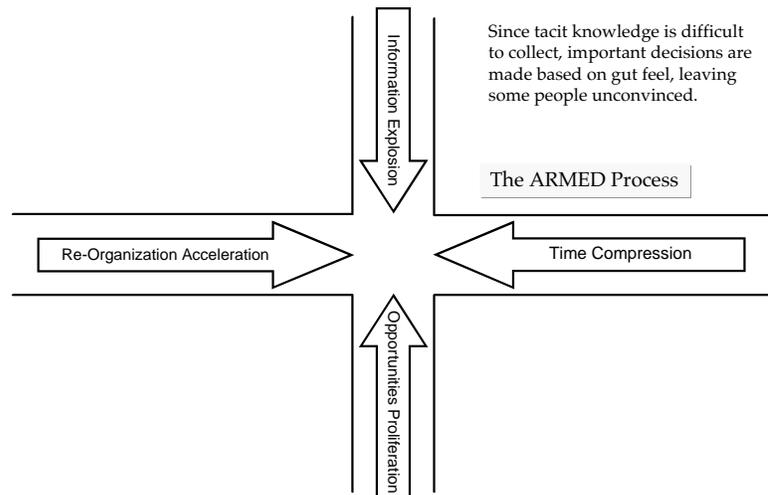
Barry's background includes fifteen years of classroom teaching and an equal time in sales and manufacturing. He first came in contact with CQM while with MARKEM Corporation, where he directed their TQM effort as Manager of Training and Development.

Barry is based in Keene, New Hampshire.

As described in the introductory paper by Gary Burchill in this issue, an increase in management complexity results from at least four sources: information explosion, time compression, proliferation of opportunities, and accelerating organizational change. These are shown as the four arrows in Figure 1. This paper focuses on making complex decisions, the skill required to address two of the axes bounding the top right quadrant of the figure:

- Time compression — the speed at which critical choices must be made in order to effectively solve and resolve internal and external opportunities and challenges.
- Information explosion — how does one separate significant signals from the noise?

Figure 1. Four Forces That Increase Business Complexity



In 1999, the Center for Quality of Management (CQM) formed four study groups and conducted design activities to address the issue of managing business complexity. One of those activities, a study group of individuals associated with the CQM Cambridge chapter,<sup>1</sup> addressed the issue of decision-making complexity (and thus the pair of issues represented by the arrows describing the top right quadrant of Figure 1). This team spent about 18 months developing an approach to address the issues of decision-making complexity (the top right quadrant of the figure). The result of this work is called ARMED, standing for Accelerated Rational Method for Effective Decision-making.

In the acronym, *accelerated* refers to an increased rate of synthesis for identified information. *Rational* has to do with rationalizing

<sup>1</sup> Study group members, in alphabetical order, were Gary Burchill (CQM), Stephen Downes-Martin (then a consultant and now employed by the U.S. Navy), Christine Duvivier (CQM), Ann Gray (Harvard Business School), Steve LaPierre (CQM), Barry Mallis (Markem), Tammi McVay (employed by the U.S. Navy), Marci Sindell (Haemonetics Corporation), Ash Rao (Babson College), Anita Tucker (Harvard Business School PhD candidate).

the decision-making process, so it relies not only on traditional emphasis on facts, but also makes explicit:

- Which facts are or are not to be considered.
- How can a decision-making team ensure it maximizes its consideration of the breadth and depth of information required.
- Understanding how team members know what they don't know.

Efficacy (*effective*) will be determined by generating activities which contribute to the desired outcome.

The ARMED process supports decisions to irrevocably commit resources at a point where they contribute to competitive advantage, because accelerating the decision point has been made possible by increased understanding, as shown in Figure 2.

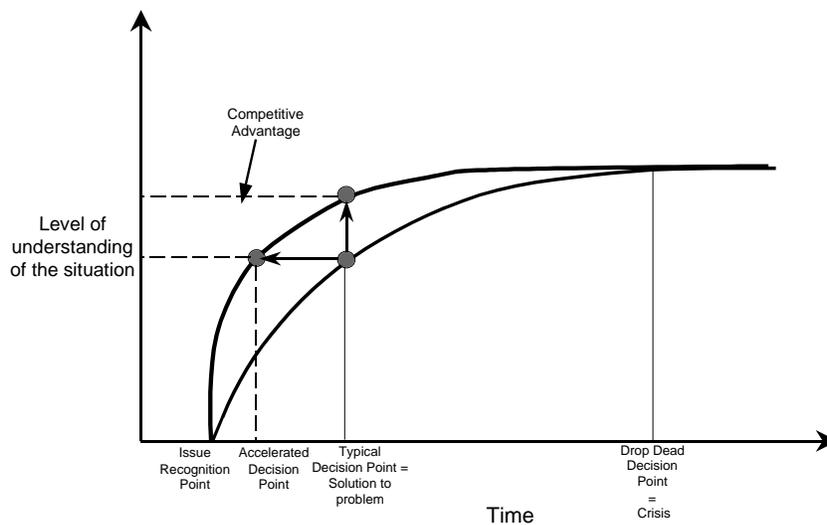


Figure 2. Benefit of Accelerated Decision Making

In training situations, the ARMED process is conveyed in one of two ways: as a two-day workshop using a Harvard Business School case study<sup>2</sup> to show application of the step-by-step ARMED method; or as a just-in-time application to a company's specific problem. In the latter case, a company team leaves with a clear understanding about how to proceed with their specific problem or opportunity.

The ARMED decision-making process that resulted from the CQM study group has seven stages. Some of these stages have more than one substep and use specific tools, as shown in Table 1 (next page).

From the second stage on, as shown in Figure 3 (next page), the process alternates between stages that expand the team's knowledge and stages that focus or clarify what the team is learning, what it will recommend, and how recommended actions should be undertaken.

In what follows, we look at each of the ARMED process stages in turn, using the hypothetical application of ARMED to the Sears auto repair case to reinforce the concepts and methods of ARMED. The Sears example is based on a real-life situation in which the Sears auto repair business suffered from declining revenue and profit. The management of that business was challenged to solve the problem and turn the situation around.<sup>3</sup>

While reading the following detailed descriptions of the stages, you may want to refer back to Table 1 and Figure 3 as necessary to clarify where you are in the overall process and for an outline of the stage you are reading about.

<sup>2</sup> Lynn Sharp Paine and Michael A. Santoro, *The Sears Auto Centers Case* (Boston, Massachusetts: Harvard Business School Press, May 31, 1996), product number 394009.

<sup>3</sup> Regarding the CQM courses using the Sears case study and in this paper: Sears did not use the ARMED process. For pedagogical purposes, CQM applied the ARMED process to what we read about in the Sears case study. Thus, in all of the examples in this paper where we show ARMED analysis of Sears data, the analysis is hypothetical.

Table 1: ARMED Stages, Sub-steps, and Tools

I. Decision statement and scope
1. Formulate an initial statement of the decision to be made
2. Create a decision scope tree diagram
3. Assess decision complexity (decision complexity assessment matrix)
II. Build a broad perspective (identify relevant lenses)
III. Create an in depth perception
1. Analyze root causes (5 Whys diagram)
2. Assess impact (impact assessment bar chart)
IV. Understand the interactions
1. Root cause factor naming
2. Create causal loop diagrams
3. Use causal loop diagram to increase understanding of each lens
4. Combining causal loop diagrams for lens with more than one diagram
5. Create integrated causal loop diagrams
6. Use causal integrated diagrams to understand system dynamics
V. Make the decision
1. Create a (Pugh) decision selection matrix
2. Compare alternatives
3. Select best alternative
4. Iteratively redo decision selection matrix with new datum, improving the alternatives through iteration
5. Evaluate risks (causal loop diagrams; risk factor characterization grid)
VI. Plan the implementation
1. Select appropriate project planning tool (four gears method and goal deployment, 7 infrastructures and goal deployment, four gears method and 9 steps, or 7 infrastructures and 9 steps)
2. Plan the implementation
VII. Reflect (improve use of the ARMED process)

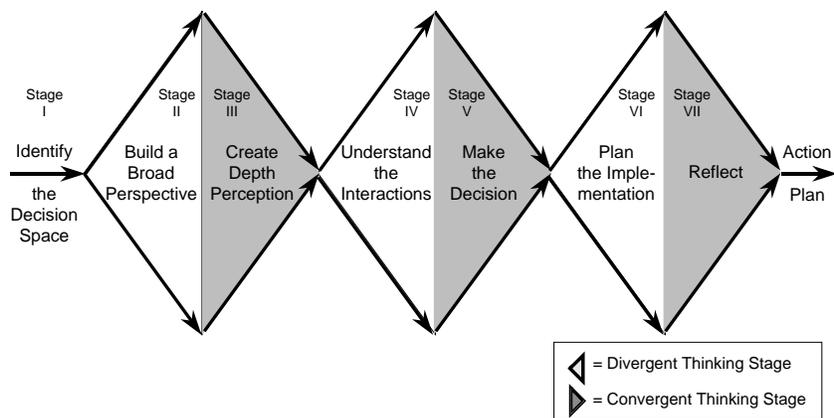


Figure 3. Stages of the ARMED Decision Making Process

## Stage 1 — Decision statement and scope

The hardest part of solving a problem is figuring out what problem to solve. Stage I requires utmost care and consideration. Thus, prior to embarking on stage I, the company forms a team of individuals who are likely to have important perspectives on the problem at hand. At the outset, everyone involved in this process comes in with one or more solutions in pocket. All ideas are legitimate in this awareness phase, where participants consider if the decision space has enough breadth. Concept awareness, trust and psychological acceptance each play a key role.

Using a decision scope tree diagram, participants determine the decision-making direction. By considering time pressure and level of complexity factors, they determine whether to use the full ARMED approach or a subset of tools within ARMED.

In the example, we formulated the initial statement of the decision into one-sentence: “Decide on what actions should be taken in order to rapidly increase automotive sales profitability.” With this statement in hand, one can then scope out tentative solutions for consideration, creating a decision scope tree diagram such as is shown in Figure 4.

Determine what actions to take to rapidly increase automotive group profitability.

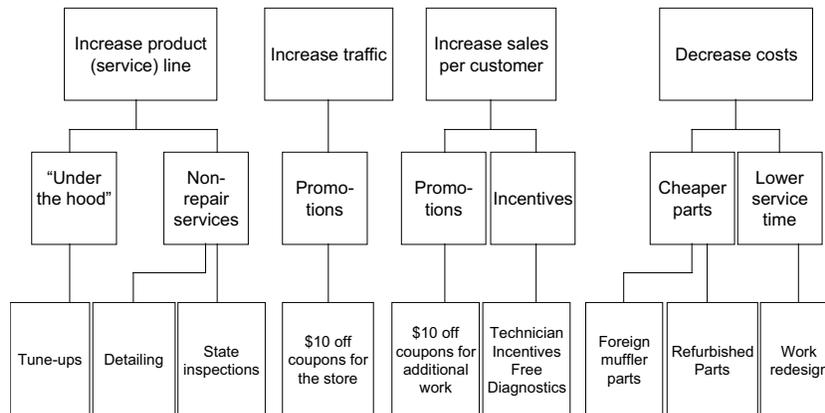


Figure 4. Decision Scope Tree Diagram Example

From this, one can see that competitor response, effects on future business, and career jeopardy — combined with negative impact of slow decision-making (tight time constraint) — could doom the automotive service business entirely. When the Sears dilemma was analyzed using a decision complexity assessment matrix, the clear result was a go-ahead for deploying the full ARMED process.

## Stage II — Build a broad perspective

This stage develops frames of reference for better understanding the problem space. These frames are:

- business environment
- strategies and goals
- internal capacity (capabilities and competencies)
- stakeholders
- finance
- organizational bias

Just as eyeglass frames can hold myriad lenses, so, too, can our ARMED frames. The CQM study group identified thirty lenses and provided space on the lens selection grid for additional lenses a team may deem appropriate in their business context. An example of five lenses for one frame is shown in Figure 5.<sup>4</sup>

<sup>4</sup>The concept of the frame and lens comes from Steve Kerr of GE Crotonville, who presented the concept at a CQM seminar in the spring of 1999.

Frame	Lens	In the context of this decision, consider the impact of:
<b>Business Environment</b>	Competition	<ul style="list-style-type: none"> <li>● The response from existing and potential competitors</li> <li>● Participants upstream and downstream from you in the value delivery chain</li> <li>● Changes in the marketplace from your customer's perspective</li> <li>● Your ability to use existing or future technology in this problem space</li> <li>● Any constraints, risks, costs, or opportunities posed by the regulatory environment</li> </ul>
	Supply Chain	
	Marketplace	
	Technology	
	Regulation	

Figure 5. Business Environment Lens Example

Frame	Lenses	High Potential Impact	Explanation	
<i>Business Environment</i>	Competition	1	✓	Unexpected sources of new competition
	Supply chain	2		
	Marketplace	3		
	Technology	4		
	Regulation	5		
			6	
<i>Strategies and Goals</i>	Execution time horizon	7	✓	Need to have fast impact on the bottom line
	Consistency with core values	8		
	Consistency with long term objectives	9		
			10	
<i>Internal Capacity Capabilities = sum of processes</i>	Development capabilities	11	✓	Consider developing under the hood capabilities
	Production/service capabilities	12	✓	Complexity of repair tasks
	Sales/marketing capabilities	13	✓	Need for using promotional blitzkrieg
	Distribution capabilities	14		
			15	
Competencies = sum of skills	Functional task skills	16	✓	Under the hood skills do not exist now
	Process management skills	17		
	Project management skills	18		
	Change management skills	19		
	Relationship management skills	20		
			21	

Figure 6. Lens Selection Grid Example

Frame	Lenses	High Potential Impact	Explanation	
<i>Stakeholders</i>	Employees	22	✓	New skills will require new employees
	Customers	23	✓	Maintaining brand image with customers
	Suppliers	24		
	Shareholders	25	✓	
	Community	26		
	Partners	27		
			28	
<i>Finance</i>	Capital requirements	29		
	Time to positive cash flow	30	✓	Need for improved profitability
	ROI	31	✓	Need for improved profitability
			32	
<i>Organizational Bias</i>	History of similar decisions	33		
	Risk tolerance	34		
	Damage control desires	35	✓	Turnaround situation
	Business model assumptions	36	✓	"Cross-selling" of auto and retail store
			37	
		38		
		39		

The team generates a broad perspective for consideration from which to attack the issue at hand by using the lens selection grid and agreeing on which frames and which of their lenses have a high impact on the decision to be made. As part of this, the decision team reviews its membership: are all significant lenses represented by a member with expertise in that area. If not, who should be added to the team?

Sears used the lens selection grid as shown in Figure 6 (previous page) to identify high potential impact lenses and to communicate succinctly and graphically their relationship to the critical decision under investigation. Notice, for example, how lens #23, Customers (in the Stakeholders frame) illustrates Sears’ underscoring the importance of the company’s renowned image.

### Stage III — Create an in depth perspective

With diversity of views accounted for, and perhaps new team members added as a result of the consideration of frames and lenses in Stage II, the decision team must dive deep into the issue in order to clarify perceptions. The root cause of the factors of concern related to the decision is made explicit for use in further analysis in Stage III.

1. Why is (Lens) Customers a concern?

	Why	Key Idea	Factor Name
2.	Sears brand recognition for value		
3.	Expect high quality/low cost effective repairs		
4.	No rip-offs		
5.	Collateral damage to Sears brand		
6.			
7.			

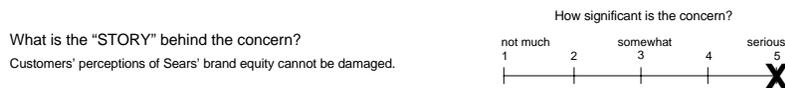


Figure 7. Root Cause Factor Analysis Example

Using root cause factor analysis tables<sup>5</sup> (see the example in Figure 7), the team selects high-potential-impact lenses and asks, “Why?” five times in order to complete the table. Then, the team writes the one sentence “story” that best describes the concern relevant to the selected lens. Finally, as a result of the insight gained from this analysis, the team rates the significance of the concern.

Figure 7 shows a completed root cause factor analysis table for customers. In this case, brainstorming five levels of *Why?* led to the conclusion that the customers’ perception of Sears brand equity must not be damaged — a serious concern.

Because a root cause factor analysis table is developed for each lens, the meeting room walls will be covered with the root cause factor pages generated by the team.

<sup>5</sup> The approach of asking *Why* five times to find the root cause of a problem came to CQM in 1990 via Shoji Shiba. Gary Burchill of CQM developed the root cause factor analysis table format.

## Stage IV — Understand the interactions.

Although by this stage in the ARMED process, the team has some breadth and some depth of understanding, the inter-lens connections typically will not be clear. Thus, perhaps the most striking tool in the ARMED process, the causal loop diagram, comes into play.

Systems thinking provides us with the causal loop diagram to understand the complexity created by the interaction among the identified factors of concern. Causal loop diagrams also provide a view of the impact of feedback on decision results and help identify unintended, unfavorable consequences.<sup>6</sup>

At its simplest, a causal loop diagram graphically displays dynamic cause-and-effect action in a network of loops. Imagine, for instance, two facts relating to your bank savings account. Label one factor “savings account bank balance.” Label the other factor “interest on savings.” Create a causal loop involving these two factors by connecting the factors together with an arrow going each way. You read this loop as follows: the greater the savings account balance, the greater the amount of interest that accrues on the savings; the greater the accrued interest, the greater the savings account balance; and so on. Each factor reinforces the other.

Sometimes such reinforcing situations result in an upward spiral, ever increasing your nest egg. However, as we know all too well, it also can frequently result in a downward spiral — the less you have in your savings, the less interest, the less you accrue, and so on (assuming no intervention).<sup>7</sup>

Let’s look at how causal loop diagrams are created and used in the ARMED method and in particular in the Sears example.

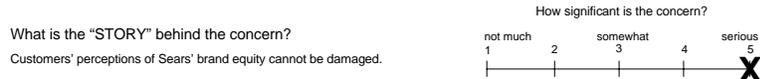
1. Why is (Lens) Customers a concern?

	Why	Key Idea	Factor Name	
2.	Sears brand recognition for value	Brand equals value	Brand equity value recognition	23A
3.	Expect high quality/low cost effective repairs	Customer expectations	Integrity of Work Performed	23B
4.	No rip-offs	Customers not getting value	Risk of Unnecessary Work	23C
5.	Collateral damage to Sears brand	Damage to brand name	Collateral damage	23D
6.				
7.				

<sup>6</sup> The literature on systems thinking, including causal loops, is massive. A good introductory reference may be found in the section on Systems Thinking, chapters 13-24, pages 87-190, of Peter Senge et al., *The Fifth Discipline Fieldbook* (New York, New York: Currency imprint of Doubleday, 1994). For an example of causal loops applied in the context of the CQM curriculum, see Gary Burchill, “Structural Process Improvement at the Naval Inventory Control Point,” *Center for Quality of Management Journal*, Vol. 5, No. 1 (Spring 1996, Special Issue on Design and Planning in Organizations) 22–31.

<sup>7</sup> Such upward and downward spirals are often referred to as a virtuous cycle and a vicious cycle.

Figure 8. Root Cause Factor Naming Example



On the root cause factor analysis sheets, the team follows a set of guidelines for developing, writing and numerically labeling factor names for each “Why?” on each sheet. These factors form the heart of the individual loops and of a large integrated loop. In the Sears example, Figure 8, note how the factor names for the “customers” lens are noun phrases. It is sometimes useful, when creating these factor names, to insert the phrase “the level of” in front of the prospective factor name. If the resulting statement makes sense when you read it, you probably have a good factor name; if not, you probably need to change the factor name until you find a statement that makes sense.

LENS: CUSTOMER (#23)

STORY: CUSTOMERS' PERCEPTION OF SEARS' BRAND EQUITY CANNOT BE DAMAGED.

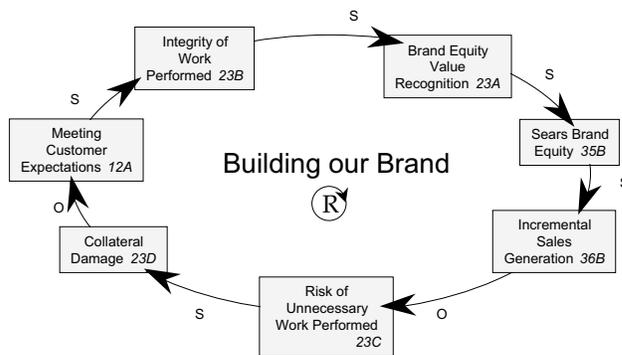


Figure 9. Customer Lens Causal Loop Diagram Example

With all the root cause factor analysis sheets displayed before the team, the ensuing construction of a causal loop diagram may incorporate not only factors from one analysis sheet, but factors from others, including some which may be created on the spot to close a gap in internal or external consistency and logic. See, for example, Figure 9. Factors 23A, 23B, 23C, and 23D (Figure 8) appear in the causal loop shown in Figure 9. However, factors 12A, 35B, and 36B in Figure 9 come from other root cause factor analysis sheets.

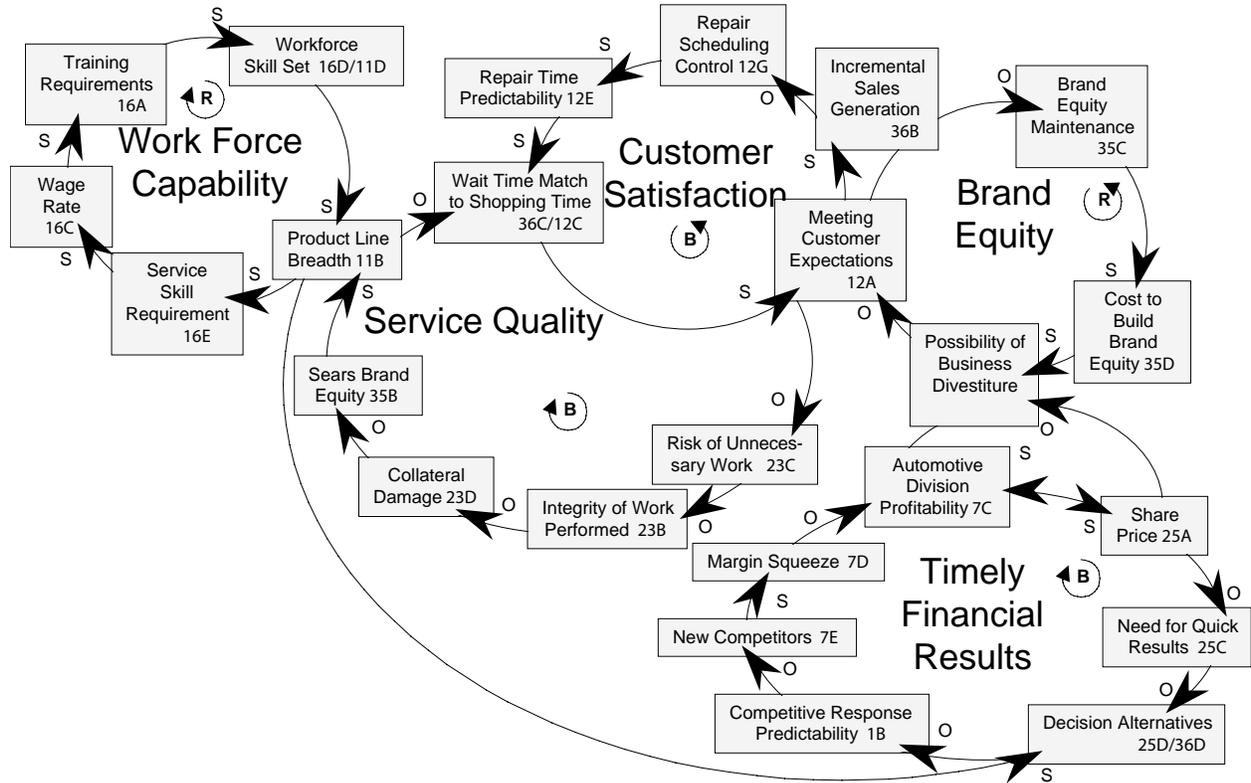
Figure 9 also shows the causal loop diagram convention of labeling causal arrows S when one factor causes the next factor to go up (or vice versa) — the factors move in the Same direction. A causal arrow labeled O means that when one factor goes up, the next factor goes down (or vice versa) — the factors move in Opposite directions. Another causal loop diagram convention is to label the entire loop as reinforcing (upward or downward spiral, indicated by an R in a circle-arrow), or balancing (in equilibrium, indicated by a B in a circle-arrow). Finally, loops are typically given labels that try to succinctly describe the essence of what the loop represents, i.e., “Building our Brand.”

As the team develops causal loops for each of the high-rated lenses, it will begin to notice that one or more factors are shared among the causal loops. These are integration points for the causal loops. For instance, factor 36B occurs in the causal loop of Figure 9, and it also occurs in another causal loop. Thus, bits and pieces of the two causal loops can be merged together with factor 36B as an intersection point. See Figure 10 for an example of a complete integrated causal loop diagram.

With this integrated causal loop diagram, the team can study the dynamics of the entire system. Arrayed in Figure 10 are both reinforcing loops (Work Force Capability and Brand Equity) and balancing loops (Service Quality, Customer Satisfaction, and Time Financial Results). The presence of an O (opposite) causal arrow in a loop enables the loop to be a balancing loop rather than a reinforcing loop. For example, at the top center in the Customer Satisfaction Loop, we observe that the more of the factor titled “incremental sales generation,” the less of the next factor, “repair schedule control,” indicated by the O on the causal arrow. Following this same loop in the direction of the causal arrows from “repair schedule control,” we repeat as follows: the less of the factor “repair schedule control,” the less “repair time predictability” (remember, the letter S next to the causal arrow indicates the same quantitative effect (less=less)).

An overall analysis of the causal loop diagram of Figure 10, shows several balancing loops whose outcomes oscillate. For example, the Service Quality loop goes up and down with over- or under-capacity

Figure 10. Analyzing Integrated Causal Loop Diagrams Example



utilization. There are two reinforcing loops, though: Brand Name and Workforce Capability. These can be viewed as potential engines for growth, where building them builds positive financial results.

## Stage V — Make the decision

Stage V combines the decision statement from Stage I with solution concepts through use of a Pugh concept selection matrix.<sup>8</sup> Developed in the early 1980s, this concept selection process compares alternatives against selection criteria (which in the ARMED process are carried forward from the causal loop labels of Stage IV). The Pugh matrix is a tool that works by comparing choices and depends on the expertise and creativity of the decision-making team who use the tool iteratively to achieve an optimum choice.

An example Pugh matrix is shown in Figure 11. The elements of each alternative are compared against the elements of one alternative selected as the datum (or benchmark). The elements of each non-datum alternative are rated better than (+), worse than, (-) or same as (S) the parallel element of the datum. Based upon the results from the first Pugh matrix, the alternatives can be run again against another selected datum, paying particular attention to the strengths (and weaknesses) of an apparently strong alternative so as to generate a hybrid solution incorporating as many of the best characteristics as possible from the full range of alternatives.

When a solution has been picked based upon iterations of the Pugh matrix process, the team evaluates the solution based upon a scan of the integrated causal loop diagram to reveal potential undesirable conse-

<sup>8</sup> Stuart Pugh, *Total Design* (Reading, Massachusetts: Addison-Wesley, 1990). Pugh's selection matrix has been used extensively by CQM companies as part of Concept Engineering, as described in *The Concept Engineering Manual* (Cambridge, Massachusetts: Center for Quality of Management, 1991, revised 1997), and in numerous case studies reported in the *Center for Quality of Management Journal*.

Figure 11. Compare Alternatives Example

Decision Criteria		Decision Alternatives						
		Raise prices on existing services	Close losing operations	Reduce cost through process improvement	Increase sales by putting mechanics on incentive	Open additional facilities	Expand services offering to include under the hood	Lower prices in exchange for higher volume
<b>DATUM</b>	Maintain customer satisfaction	<b>S</b>	<b>+</b>	<b>-</b>	<b>+</b>	<b>+</b>	<b>+</b>	
	Build brand equity	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	<b>+</b>	
	Achieve speedy financial results	<b>+</b>	<b>-</b>	<b>+</b>	<b>-</b>	<b>-</b>	<b>-</b>	
	Control service quality	<b>S</b>	<b>S</b>	<b>S</b>	<b>-</b>	<b>-</b>	<b>S</b>	
	Expand workforce capability	<b>S</b>	<b>S</b>	<b>+</b>	<b>S</b>	<b>+</b>	<b>S</b>	
As compared to Datum →	<b>+</b> Better	<b>+</b>	2	2	3	2	3	2
	<b>-</b> Worse	<b>-</b>	-	1	1	2	2	1
	<b>S</b> Same	<b>S</b>	3	2	1	1	-	2

quences. Using the integrated causal loop diagram, the team identifies the causal loop factors most directly affected as a result of the Pugh-selected alternative. Within the diagram, the team then traces how the predicted intervention at the level of this factor propagates through the loop and interacts with the other parts of the system (the other loops in the integrated diagram), identifying and recording possible, unfavorable dynamics (that is, risks).

Once key causal loop factors are identified along with the associated risks, the risk factors are placed in a risk factor characterization grid (see Figure 12).

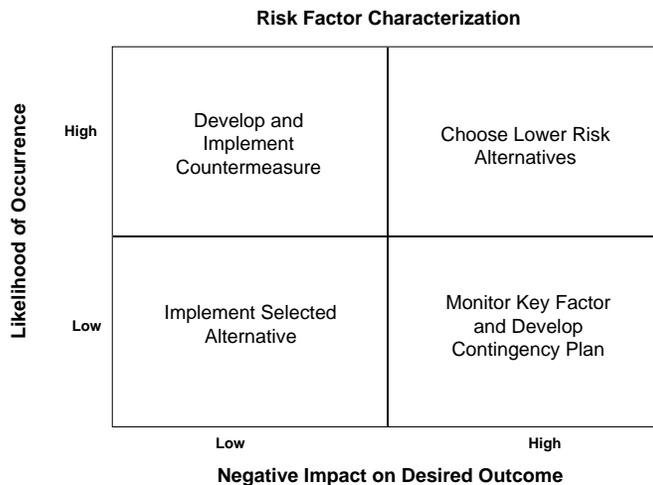


Figure 12. Risk Factor Characterization Grid insert

If countermeasures are necessary, the causal loop diagram helps locate intervention points to counteract the unfavorable dynamic. Note in the example of Figure 13 how the initial selection from the Pugh process received a “high likelihood/high impact” rating, suggesting to the team that a different alternative should be considered.

In the example we have been following, ARMED has provided the decision-making team with extensive insight into the problem and done so in a very short period of time. Feedback from teams using the ARMED process indicated that the entire process to this point typically can be completed in one work day.

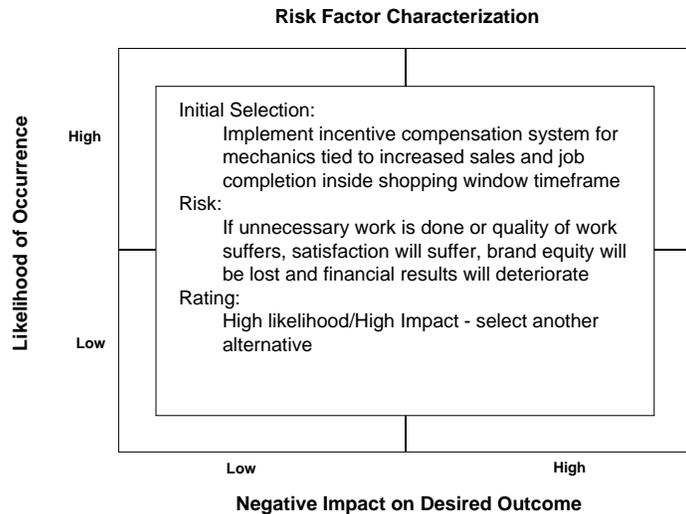


Figure 13. Evaluate Risks Example

## Stage VI — Plan the implementation

This stage of the ARMED process involves developing and deploying a good implementation plan. How the plan develops will depend on the time constraint as well as the scope of implementation — whether individuals involved will come from within or outside the span of control of the team. For these considerations, well-established planning and deployment tools are available (for example, 4W1H1C Table, 7 Infrastructures, 9-Step Planning).<sup>9</sup>

<sup>9</sup> See, respectively: *The 7-Step Problem Solving Method* (Cambridge, Massachusetts: Center for Quality of Management, 1996, revised 1997), p.45; *Mobilizing Change Using the 7 Infrastructures* (Cambridge, Massachusetts: Center for Quality of Management, 2001); and *9-Step Project Planning System* (Cambridge, Massachusetts: Center for Quality of Management, 1997).

## Stage VII — Reflect

No process is complete without a final stage of reflection. The accelerating speed of change, competition, and information requires accelerating the rate of improvement in how we make decisions. Better decisions require assessing the decision process. At the point a decision is reached using ARMED, the process includes time for reflection using a plus/delta format for consideration of the ARMED method’s strengths, weaknesses and changes required in its next deployment so as to ensure its best fit in the organization.

The three interviews at the end of this special issue include some descriptions of people’s experiences using the ARMED process.

**Editor’s Note:** The interviews at the end of this issue describe experiences using ARMED. See pages 80-82, 89, 91, and 102-104.





*This page left blank intentionally for duplex printing.*

# Leading Without Authority — The Four Gears Process

By Linda Ridlon

## Introduction

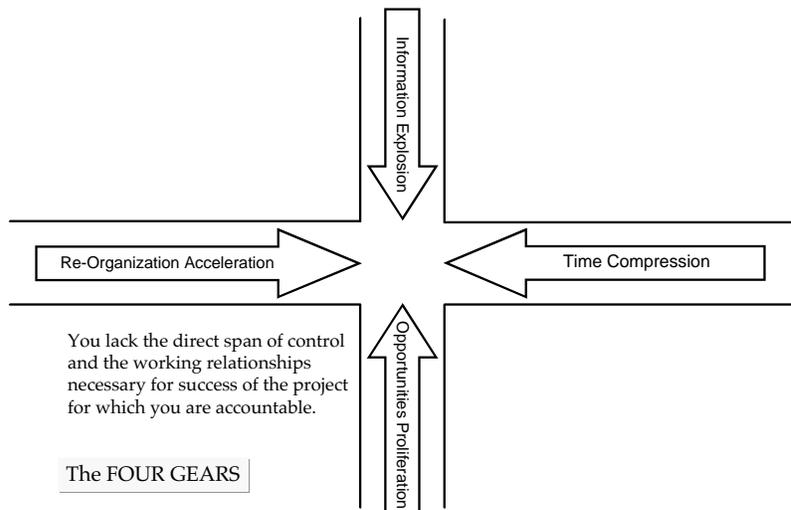
Linda Ridlon is a business consultant who frequently leads courses and workshops for CQM.

Previously she served in a variety of technical management positions at Bolt Beranek and Newman Inc. Her last position before she left BBN was as a vice president of BBN's Software Products subsidiary. Before that, she worked in various management, technical, and technical support positions for several other companies.

Linda also has provided consulting services to a variety of not-for-profit organizations and annually leads a two-and-one-half-day workshop at Tufts University's Gordon Institute.

As described in the introductory paper by Gary Burchill in this issue, increased management complexity results from at least four sources: the information explosion, time compression, proliferation of opportunities, and accelerating organizational change. These are show as the four arrows in Figure 1.

Figure 1. Four Forces That Increase Business Complexity



The intersection of two of these issues, proliferation of opportunities and accelerating organizational change, frequently leads to a situation in which shifting priorities and changing assignments leave insufficient organizational coherence to meet essential commitments of the business. More generally, a situation that managers in all organizations encounter is the need to make decisions and take action with people other than themselves and those who report directly to them. The skill required is one of making things happen, not through formal authority, but through collaboration and influence.

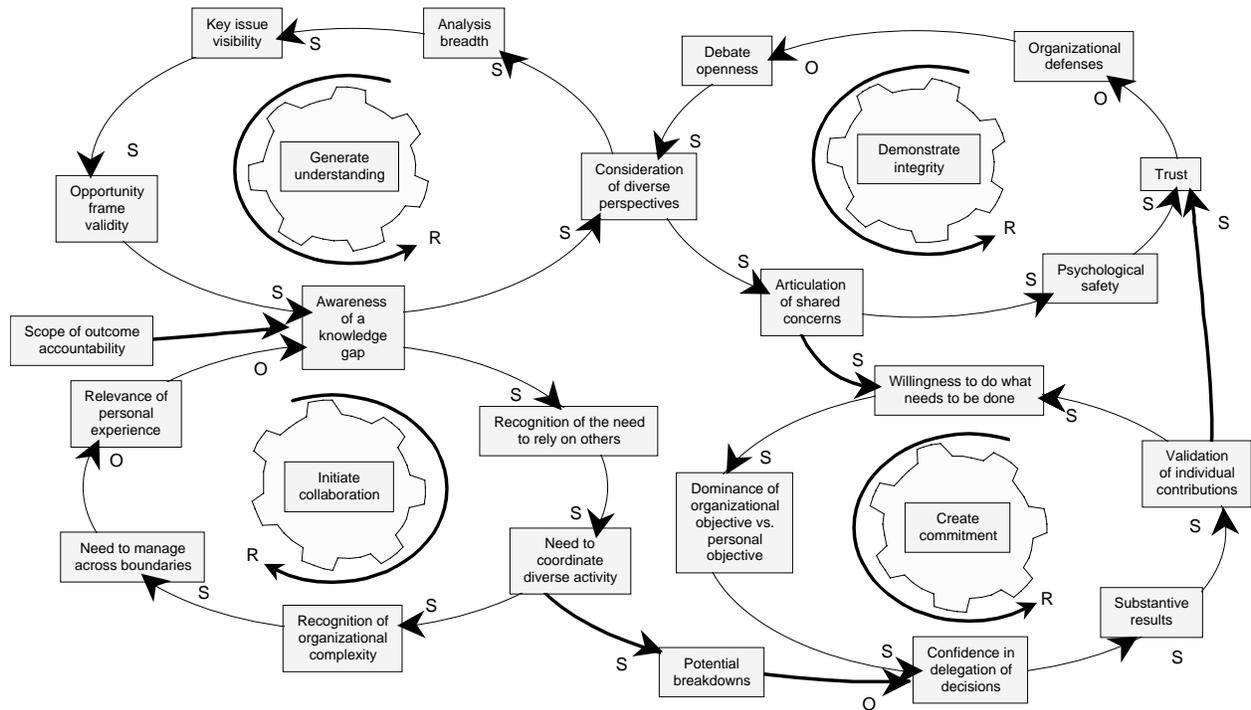
As with the development of any skill, getting good at it takes practice. Understanding the dimensions of what is involved, along with the utilization of some specific tools, goes a long way to enabling proficiency.

Recognizing the importance of managing by influence and clearly illustrating the required activities and interactions to so manage, the

CQM developed in 1999-2000 a model to describe and illustrate the elements involved and their effects on each other. A set of tools has been identified to strengthen the skill-building process and overcome particular areas of difficulty. This development was undertaken by a study group of people in close proximity to the CQM Cambridge chapter.<sup>1</sup> They called the resulting method the Four Gears (the bottom left quadrant of Figure 1).

<sup>1</sup> Active participants in the study group were Gary Burchill (CQM), Ron Butler (Teradyne), Christine Duvivier (CQM), Dennis Gleason (Eaton), Bruce Gant (APC), Ann Gray (HBS), John Petrolini (Teradyne), Linda Ridlon (consultant and frequent CQM contributor), and Bill Rose (MicroE).

Figure 2. The Four Gears Causal Loop Diagram



The Four Gears Process, shown in Figure 2, is a causal loop diagram demonstrating the interaction between the elements and helping to trace the consequences of actions in one area to desirable or undesirable results elsewhere.<sup>2</sup> It provides a useful way to illustrate, and help managers understand and navigate through, the difficulties hindering their effectiveness at managing by collaboration and influence across organizational boundaries.

In this model, each one of the four loops is shown as analogous to a gear. Each has its own structure, with identified factors related to the others in the loop, and is connected to other loops (or gears) at the points of interaction or intersection. As in a set of related gears, the smooth and effective operation of the whole system depends on each of the gears turning smoothly, in unison, and in equal proportion to each other.

At the highest level of abstraction, each loop or gear represents an individual process corresponding to one particular part of the overall system of managing by influence across organizational boundaries. As identified by the gear titles within each reinforcing loop, these processes are *initiate collaboration*, *demonstrate integrity*, *generate understanding*, and *create commitment*. While a causal loop diagram, by its very name, represents a loop and therefore has no specific beginning or end, it is useful to think of the following sequence:

<sup>2</sup> In the figure, S stands for same, O for opposite, R for reinforcing, and B for Balancing. These conventions apply to all of the rest of the causal loops shown as figures in this paper. For an explanation of these terms, see the descriptions of Figure 9 and 10 in the fourth paper in this issue by Barry Mallis. Also, a good introductory reference to causal loops (as a part of systems thinking) may be found in the section on Systems Thinking, chapters 13-24, pages, 87-190, of Peter Senge et al., *The Fifth Discipline Fieldbook* (New York: Currency imprint of Doubleday, 1994).

1. Initiate collaboration — preparing to do something with others.
2. Demonstrate integrity — making sure the relationships and framework are in place to do something.
3. Generate understanding — agreeing on what should be done.
4. Create commitment — determining what it is that will get done.

In the rest of this paper we describe the loops, steps within loops and tools and methods that make up the Four Gears process. Table 1 provides a summary.

Table 1: *Loops, Steps, Tools and Methods*

Loop number and name	Loop objective	Steps	Tools and methods	The tools and methods are used to: ...
1. Initiate collaboration	Figure out who needs to be involved, how they need to be involved, and how to involve them	<ol style="list-style-type: none"> <li>1. Map the network of individuals inside boundaries</li> <li>2. Specify possible roles of those in the network</li> <li>3. Identify key points of influence</li> <li>4. Develop action plan for initiating collaboration</li> </ol>	<ul style="list-style-type: none"> <li>- Network map</li> <li>- Stakeholder role table</li> <li>- Influence map</li> <li>- Collaboration action plan</li> </ul>	Identify the people who need to be part of the collaborative effort that is required to accomplish the tasks
2. Demonstrate integrity	Work to establish trust and understanding of shared concerns. Consider diverse perceptions through open discussion and debate	<ol style="list-style-type: none"> <li>1. Assess and improve the level of trust in the relationship</li> <li>2. Conduct a grounded exchange of views</li> <li>3. Articulate shared concerns</li> </ol>	<ul style="list-style-type: none"> <li>- Trust evaluation table</li> <li>- Cycle of reasoning</li> <li>- Advocacy and inquiry</li> </ul>	Determine how to build trusting relationships with the people with whom you need to collaborate
3. Generate understanding	Frame the opportunity, develop a solution, and devise a plan of implementation	<ol style="list-style-type: none"> <li>1. Agree on a topic</li> <li>2. Write and understand the data</li> <li>3. Group similar data</li> <li>4. Title groups</li> <li>5. Lay out groups and show relationships among groups</li> <li>6. Vote on the most important low-level issues and draw conclusions</li> </ol>	<ul style="list-style-type: none"> <li>- Language Processing diagram</li> </ul>	Gain consensus on how to frame the issues
4. Create commitment	Align the organization and assess commitment to action	<ol style="list-style-type: none"> <li>1. Preparation</li> <li>2. Negotiation</li> <li>3. Performance</li> <li>4. Assessment</li> </ol>	<ul style="list-style-type: none"> <li>- Commitment process</li> </ul>	Initiate, coordinate and complete the actions required to deliver business results; provide organizational support for doing so
Conclusions and reflection				



- Add to the map anyone who needs to be kept informed or will be impacted by the output.
- Draw connections between those already on the map to represent formal (authority) or informal (influence) relationships.

For step 2, do the following:

- On a chart such as is shown in Figure 4, specify the possible role(s) of each stakeholder on the network map. Make a judgment about the form of their dominant role — knowledge, action, influence, or go/no-go.
- Make an assessment of their needs, given their dominant role.
- Make a judgment about the concerns you believe will be triggered for each stakeholder

Stakeholder	Role	Needs	Concerns
(Direct)			
(Indirect)			

Figure 4. Stakeholder Role, Needs and Concerns Table

For step 3:

- Based on your analysis in steps 1 and 2, identify the individuals or groups who seem like they will be the key points of influence. Include the one that seems to have the most lines connected to it on the map.
- Make a judgment as to the influence you have on each key individual or group and that each has on you.
- Plot these stakeholders in the appropriate positions on a two-dimensional graph where the vertical axis is *your influence on them* from low to high and the horizontal axis is *their influence on you* from low to high (with the low-low point at the bottom left of the graph).

If you think of the two dimensional graph as having four quadrants, we can give a name to each quadrant and set down guidelines for how to deal with each category, as shown in Figure 5, next page. The people in the top right quadrant (the collaborators) are the people you want to engage early and often, generate conviction, and convert them to advocates.

Step 4 involves developing an action plan for initiating collaboration. A typical 4Ws, H and C table is a useful tool for this, that is, answering:

- Who:* With whom are you going to collaborate? (Output from steps 1-3)
- What:* What is the purpose of the collaboration?
- Where:* Where are you going to visit them?
- When:* When will the collaboration occur?
- How:* How are you going to contact them, e.g., one-way, bilateral, multilateral, in person, by phone, through an intermediary, etc.
- Check:* How will you acknowledge when the step is complete?

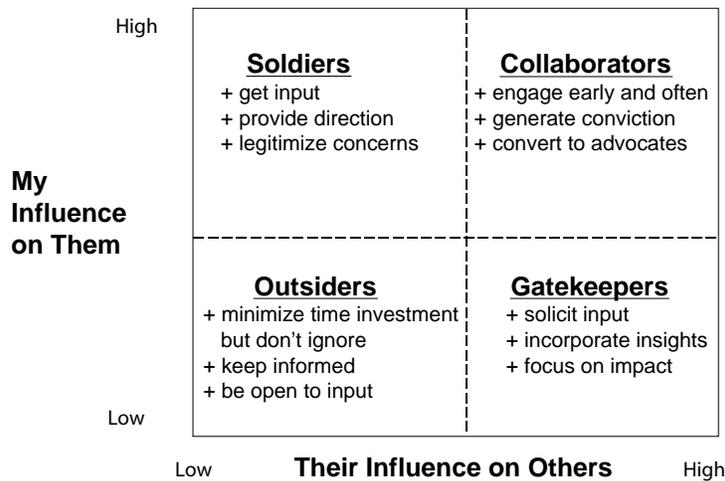


Figure 5. Different Types of Influence and How to Handle Each

### Loop 2 – Demonstrate integrity

Figure 6 is an expansion of the top right loop in Figure 2.

In this loop, the intent of the process is to strengthen trusting relations with those people participating in the collaborative effort. That, in turn, enables people to share openly, understand each other’s perspectives, and identify shared concerns that will lead to action.

For this gear to operate smoothly, both individual and organizational behaviors are involved. Being able to express shared concerns contributes to psychological safety, increasing trust, reducing organizational defenses, and enabling the open debate which allows for different points of view to be expressed.

From analysis of the demonstrate integrity loop, three steps were developed; these are shown in Figure 6.

Step 1 involves assessing and improving the level of trust in relationships. However, before we do this, we need a common understanding of the meaning of *trust*. Trust is a judgment of one person about another

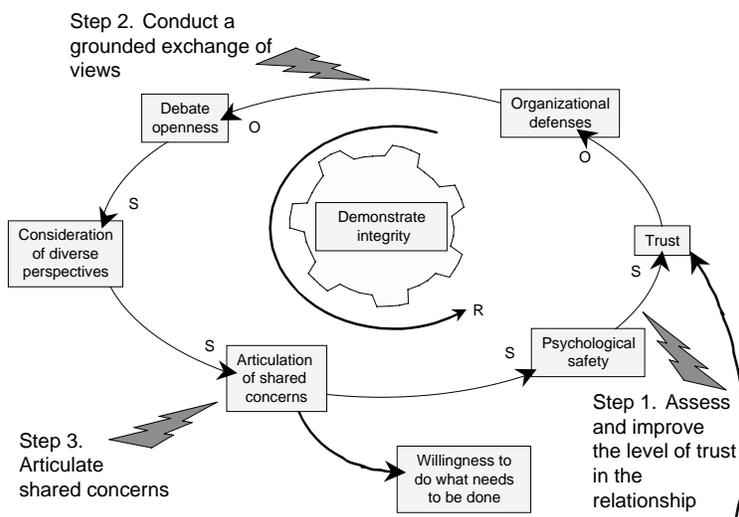


Figure 6. Demonstrate Integrity Loop and Steps

person. Everyone is continually (but perhaps almost subconsciously) assessing what other people say, especially when someone is apparently committing to something, in terms of the following:

- Sincerity — does the person really mean what he or she says?
- Competence — can the person do what he or she says he or she can do?
- Reliability — will the person do what he or she says he or she can do?
- Values — is this person concerned about the well-being of others in the organization, including mine, or only concerned about him- or herself?

Ideally we would assess our relationships with everyone identified on the chart in step 4 of loop 1; we never know who might turn into a road block or be able to offer great support. We should at least identify the vital few from the chart who can greatly affect success, and we have already alluded to the importance of having good relationships with the people identified in Figure 5 as people with whom we need to collaborate. For each person we need to complete an assessment chart, as shown in Figure 7, where three hypothetical people are rated in terms of the components of trust.

Assessment:

- Based on past interactions, what is the degree of interpersonal trust?

Component of Trust	Terry		Pat		Andy	
	me of them	them of me	me of them	them of me	me of them	them of me
sincerity	2	2	5	5	4	5
competence	5	3	5	5	1	5
reliability	2	4	5	4	2	4
values	1	4	3	4	4	4

1: low      5: high

Figure 7. Evaluation of Components of Trust

In the hypothetical example, there are some poor components of trust between the person filling in the chart (“me”) and Terry and Andy. These are indicated by the circled entries. For each component of trust for which there is a weak entry in the table, try to come up with three things you could do to improve the relationship with the person under consideration; initiate these actions.

Step 2 involves conducting a grounded exchange of views.<sup>3</sup> Therefore, we need to explain the difference between grounded and ungrounded viewpoints. Most of the time, operate in a world of what Senge describes as:

*“... self-generated beliefs which remain largely untested. We adopt these beliefs because they are based on our conclusions, which are inferred from what we observe, plus our past experiences. Our ability to achieve the results we truly desire are eroded by our feelings that:*

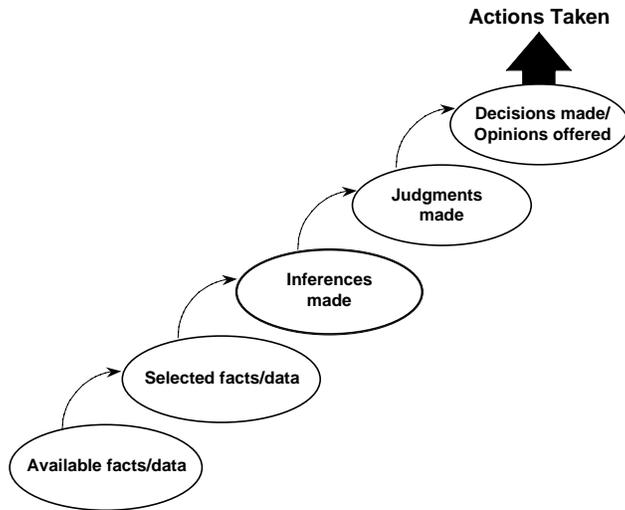
- Our beliefs are the truth
- The truth is obvious
- Our beliefs are based on real data
- The data we select are the real data.”<sup>4</sup>

<sup>3</sup> In addition to the trust-building actions planned in step 1, conducting a grounded exchange of views (this step) and articulating shared concerns (the next step) can also help build trust.

<sup>4</sup> Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday Currency, 1990) 242.

An exchange of views carried out under these conditions is *ungrounded* — the parties to the exchange of viewpoints are, in fact, typically putting forth unfounded opinions delivered in a factual tone of voice. As everyone has experienced, such an exchange seldom leads to agreement — more often than not it heightens disagreement (including motivating future sneak attacks).

A *grounded* exchange of views is one in which the parties to the exchange take the trouble to do explicit conscious reasoning and share their reasoning with each other. Experience has shown that exchanges such as these can, in fact, change minds and move the parties in a direction where at least some greater degree of agreement is possible. A model to help the parties make their reasoning explicit is the *cycle of reasoning* shown in Figure 8.<sup>5</sup>



<sup>5</sup> What we are calling the *cycle of reasoning* in the figure is derived from Argyris, Putnam and Smith, *Action Science* (San Francisco: Jossey-Bass Inc., 1985). It is also illustrated in Peter M. Senge et al., *The Fifth Discipline Field Book* (New York: Currency imprint of Doubleday, 1994) 242-246. In these texts, it is called the *ladder of inference*. CQM also sometimes uses the term *cycle of reasoning* for a more comprehensive model, see Shiba and Walden, *Four Practical Revolutions in Management* (Portland, Oregon: Productivity Press, 2001) 66.

Figure 8. Cycle of Reasoning

At the bottom level of the cycle of reasoning, a person needs to become aware of which facts are available. Not everyone has the same facts available, for instance, an accountant simply may not be able to see some of the facts a sales person sees and vice versa. Next, a person needs to become conscious of which of the available facts he or she chooses (and which are not chosen). Then the person needs to become conscious of what inferences he or she makes based on the selected facts (inferences are somewhat logical deductions) and what judgments he or she is making (judgments are often based on something other than logic, such as values, experiences, and so forth). From the inferences and judgments, a person draws conclusions (makes decisions); this should also be conscious. Finally, the conclusions or decisions can lead to action. If the parties to an exchange ground their exchange by becoming aware of and sharing their reasoning processes, the parties will learn a lot more about each other's frames of reference (and their own frames of reference).

The parties are now in a better position to develop a *multiview* — an intersection of some parts of their cycles of reasoning — a common belief or conclusion. The following guidelines better prepare people to develop a multiview:<sup>6</sup>

- Recognize that other observers may reasonably listen (or see) differently than you do
- Get curious about how others listen and what they hear that leads them to listen as they do
- Take responsibility for how you listen (and see) and how you are listened to (and seen).

<sup>6</sup> These guidelines are derived from a CQM collaboration with Rafael Echeveria and Robert Putnam.

Step 3 involves articulating shared concerns. This is best done when one understands and makes use of the distinction between advocacy and inquiry.<sup>7</sup> Advocacy is when a person tries to convince the other person of a viewpoint. Inquiry is when a person tries to understand and see the value in the other person’s viewpoint. High advocacy and low inquiry is the way people often approach conversations with others. This often results in the sort of unfruitful, ungrounded exchanges described in step 1, especially if both parties are using the same approach. On the other hand, when the parties alternate so that one is explaining (high advocacy) while the other is listening (low advocacy) and then they reverse roles, a good bit can be understood. It works even better, if one party is inquiring and the other responds with an explanation, and they reverse roles as necessary to really learn from each other; this is a form of high advocacy and high inquiry.

By properly balancing advocacy and inquiring, the parties stand a very good chance of discovering an intersection in their concerns — shared concerns. This may be done by concluding that one cycle or reasoning has more merit than another, by improving on both cycles of reasoning by combining elements of each, or by jointly developing an entirely new cycle of reasoning that better serves both parties than their previous cycles could individually or in combination.

<sup>7</sup> The CQM first became aware of this distinction through a collaboration with Robert Putnam. For more background on this collaboration and more details on the concepts introduced in this step and in steps 3 and 4, see chapter 16 on coordinating behavior in: Shiba and Walden, *Four Practical Revolutions in Management* (Portland, Oregon: Productivity Press, 2001).

### Loop 3 – Generate understanding

Figure 9 is an expansion of the top left loop in Figure 2.

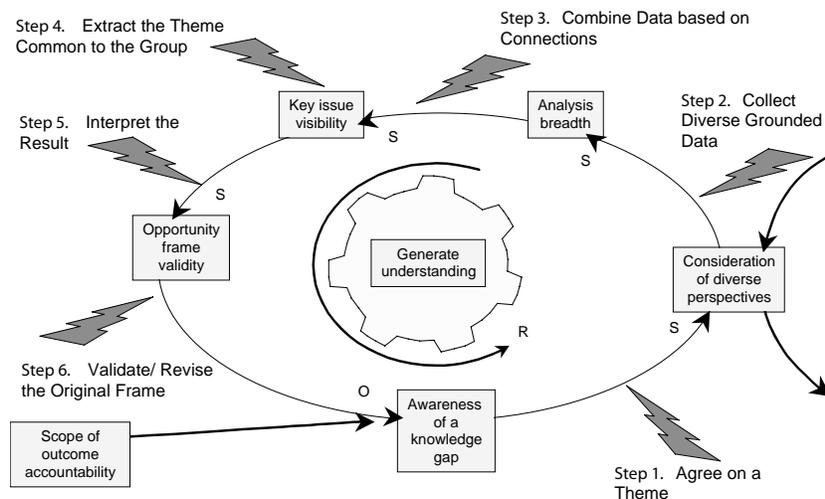


Figure 9. Generate Understanding Loop and Steps

In this loop, the goal is to gain consensus around the framing of the opportunity (and subsequently around the solution and implementation plan). Here, the consideration of a variety of perspectives enables a broad analysis of the opportunity that helps to surface the key issues. Once the key issues are made visible, the original framing of the opportunity (and subsequently the solution and implementation plan) can be validated or revised as appropriate.

A tool that can be used effectively to work through this process is the Language Processing (LP) method since it provides a way to gather individual data points, combine them, and, by consensus, surface the key points that can then be used to validate or revise the original thinking. The six steps of the generate understanding loop shown in Figure 9, map into the LP method as shown in Table 2.

Table 2. Six Steps to Generate Understanding Using the LP Method

	Generate understanding loop	LP method
1.	Agree on a theme	Clearly state theme
2.	Collect diverse grounded data	Write and scrub the data
3.	Combine data into groups based on connections	Group similar data
4.	Extract the theme common to each group	Title groups
5.	Interpret the result	Lay out groups and show relationships among groups
6.	Validate/revise the original frame	Vote on the most important low-level issues and draw conclusions

Since the LP method is extensively documented elsewhere, we will not explain it further here.<sup>8</sup>

<sup>8</sup> For a brief summary of the LP method, see pages 218-219 of Shiba and Walden, *Four Practical Revolutions in Management* (Portland, Oregon: Productivity Press, 2001). For a detailed tutorial on the method, see *The Language Processing Manual* (Cambridge, Massachusetts: Center for Quality of Management, 1994, revised 1997). For insight into how the method works, see Ted Walls and David Walden. "Understanding Unclear Situations and Each Other Using the Language Processing Method," *Center for Quality of Management Journal*, Vol. 4, No. 4 (Winter 1995) 29-37.

### Loop 4 – Create commitment

Figure 10 is an expansion of the bottom right loop in Figure 2.

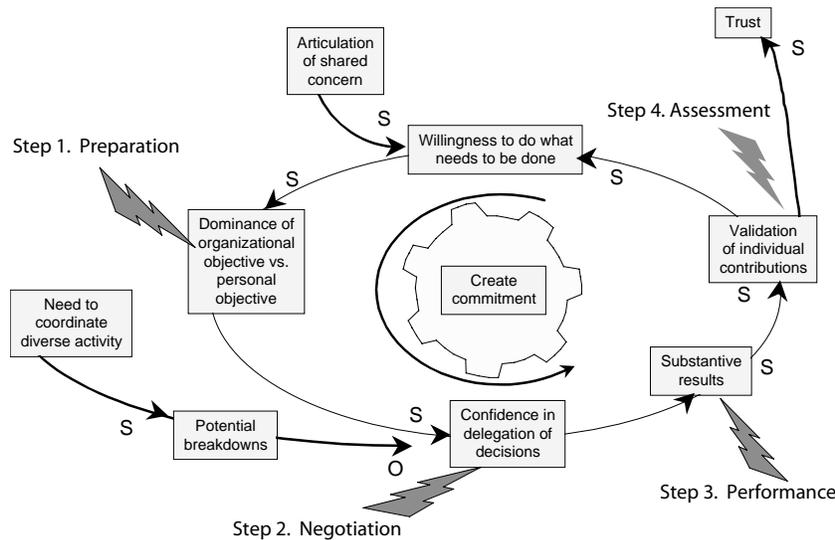


Figure 10. Create Commitment Loop and Steps

In the final loop, the individual factors support the initiation, coordination, and completion of actions required to translate the opportunity into business results. A commitment process — to make and honor commitments — is a key tool used to reinforce the actual steps required to be taken between individuals. This commitment process includes four steps:

1. Preparation — one party makes a request of the other (or makes an offer to the other), and the parties jointly work to sort out what the request (or offer) actually means by making all assumptions explicit; typically the two parties may be thought of as the customer and the supplier.

2. Negotiation — with a well-understood request (or offer) in hand, the parties do any necessary negotiation, ultimately agree on what is to be done, and one makes a promise to the other to perform in accordance with the agreement.
3. Performance — the appropriate party does the necessary performance<sup>9</sup> under mutually agreed conditions that state how changes in plan or unexpected events are to be announced.
4. Assessment — the customer evaluates the performance of the supplier, the supplier may evaluate how the customer supported (or didn't) the supplier's efforts, and both parties reflect on how they applied this commitment process and how they might do it better another time.

Each step concludes with a declaration in some form: a clear and explicit request (or offer), a promise, an announcement of completion, and an assessment of performance.<sup>10</sup> Since this commitment process is extensively described elsewhere, we will not describe it further here.<sup>11</sup>

In addition, the organizational support required to make broad use of a process such as the commitment process could be addressed by the 7 Infrastructures model.<sup>12</sup>

## Conclusions and reflection

In summary, the organizational challenge of getting results from people throughout the organization when needing to manage opportunity development by collaboration and influence is what drives this model. The individual loops (or gears) represent:

- Recognizing the need and initiating the collaborative effort required to address the opportunity challenge;
- Creating the environment for trusting each other and the data collected from the various collaborators;
- Identifying the range of possibilities from the data collected and working through to the best (and shared) understanding of what is required to make the opportunity development successful;
- Ensuring that the individual and organizational efforts will achieve results.

By viewing the components and interactions as gear-like, and understanding the effects caused by actions in each area, managers are encouraged to see the wholeness of the system. By learning and utilizing specific tools in each area, managers can be better prepared for realizing achievable results that address the effective development of real opportunities.

Of course, every step-by-step (or loop-by-loop) process, such as the Four Gears described in this paper, should end with reflection on the results of the process (if they are available), and at least with reflection on the use of the tool and what can be learned from the just completed use about how to use the tool more effectively next time.

**Editor's Note:** An interview at the end of this issue describes experiences using the Four Gears. See pages 93-94.



<sup>9</sup> Which, in turn, may require requests of and commitments from other parties.

<sup>10</sup> Oftentimes parties agree to do things for each other resulting in an exchange of commitments.

<sup>11</sup> What we are calling the *commitment process* was invented by Fernando Flores but goes by many names. In particular the CQM has previously referred to it as the *atom of work*. An introduction to the method may be found in chapter 16 of: Shiba and Walden, *Four Practical Revolutions in Management* (Portland, Oregon: Productivity Press, 2001). Page 300 of that chapter is a good place to look for citation of more detailed descriptions of this commitment process, including several citations to the work of Flores himself. The work of the Louisville study group mentioned on page 8 of this issue was relevant to the commitment process. Active participants in the Louisville Study Group were Gary Burchill (CQM), David Finley (Kentucky Transportation Cabinet), Carla LaRoque (Bramco), Nancy Moeller (CQM and RJ Corman Railroad), Elaine Monson Gravatte (SerVend and DD Williamson), Jeff Mosley (Kentucky Transportation Cabinet), Gary Reinhardt (Fetter Printing), and James Stith (CQM).

<sup>12</sup> The 7 Infrastructures model is a change management tool, for changing how an organization behaves. It is introduced in chapter 21 of: Shiba and Walden, *Four Practical Revolutions in Management* (Portland, Oregon: Productivity Press, 2001). *The 7 Infrastructures Manual* (Cambridge, Massachusetts: Center for Quality of Management, 2001) is a detailed tutorial on application of the model. It was developed by the Cincinnati study group mentioned on page 8 of this issue. A recent paper by Ford et al. in the *Center for Quality of Management Journal* provides theoretical background on the model: Ford, et al., "Theoretical Foundations of the 7 Infrastructures Model," *Center for*

*Footnote continued on next page.*

*Quality of Management Journal*, Vol. 10, No. 2 (Winter 2001) 51-75. Active participants in the Cincinnati Study Group were Jane Bledsoe (Great Oaks Institute of Technology and Career Development), Jim Braun (Grote Industries), Gary Burchill (CQM), John Cain (Viox Services), Brian Cundiff (LaRosa's, Inc.), Matt Ford (University of Cincinnati), Don McIntyre (Great Oaks Institute of Technology and Career Development), and Beth Robinson (Hixson).

# Dealing with Complexity Across Geography and Business Lines

An Interview with Marci Sindell of  
Haemonetics Corporation

Marci Sindell is currently Senior Vice President, Business Design, at Haemonetics Corporation, where her primary responsibility is to manage the CORE (Customer-Oriented Redesign for Excellence) Program that includes TQM methods such as Hoshin planning, 7-steps problem-solving, and improvement of teamwork skills.

Marci has been with Haemonetics for eleven years, previously holding positions including Vice President of North American Marketing, Director of International Manufacturing, Director of Advanced Manufacturing Technologies, Director of Staffing, and Manager of Marketing Support.

Prior to joining Haemonetics, Marci held positions in operations planning and production management at Millipore Corporation and Corning. Marci's undergraduate degree is in materials engineering from RPI, and she has an MBA from Stanford.

• • •

Interviewer Gary Burchill is CQM President.

• • •

Interviewer Chase Craig is CQM Production Manager

*"Haemonetics" is a registered trademark of Haemonetics Corporation.*

*Haemonetics Corporation began business in April of 1972, making and selling relatively inexpensive plastic chambers in which whole blood could be separated into its components. The disposable processing bowl in which blood is processed is known in the industry as the Latham Bowl, after its inventor, Allan "Jack" Latham Jr., the founder of Haemonetics.<sup>(R)</sup> Today, Haemonetics provides innovative medical devices to advance the safety, quality, and availability of transfusion products for patients worldwide. The company employs more than 1,300 persons in offices located throughout the world.*

*Haemonetics has used many of the CQM skill sets throughout its company. Marci Sindell has been at the forefront of applying these skills. On October 16, 2001, in an interview by Gary Burchill and Chase Craig at Haemonetics' headquarters in Braintree, Massachusetts, Ms. Sindell discussed application in Haemonetics of various elements of the Mastering Business Complexity (MBC) skill set to address varying business problems — from the company's ability to assess and formulate a new product launch to the specific skill development of business unit managers.*

*In the interview, Ms. Sindell provides considerable insight into application of the Enterprise Model and describes use of the ARMED process to help with complex decisions. She also notes components of the SCORE process Haemonetics has used to date.*

## Business Challenges

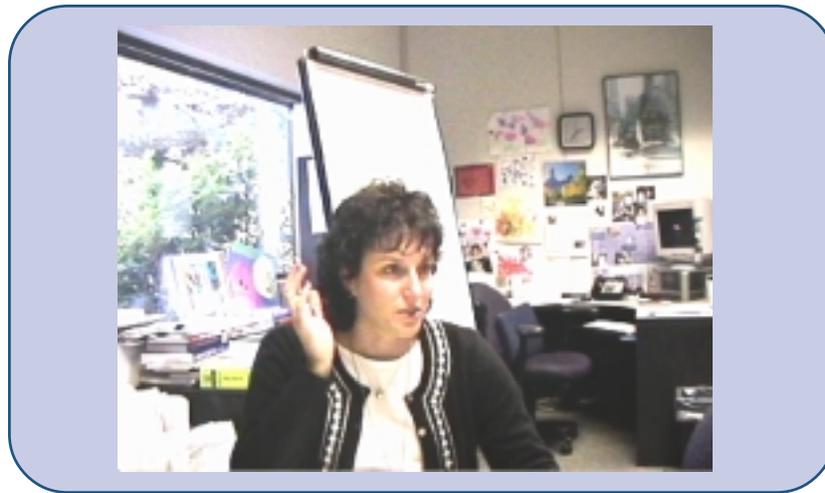
*Question: What kind of business challenges led you, CEO Jim Peterson and the rest of the Haemonetics senior management team to want to use the CQM's MBC problem solving methods?*

**Marci Sindell:** About a year ago, as we looked at the challenge of achieving sales growth, we decided that a key problem was how we were organized relative to being able to launch new products. We had created a new organization structure that was focused on business units, which are a corporate marketing function, for the first time at Haemonetics. These business units were chartered with identifying our opportunities for new products and then figuring out how we would launch them into the various geographic regions around the world.

Previously our organization had been very focused on the geographic regions. With this structure it wasn't unusual to have different versions of the same product in different regions. So, an objective of the business unit organization was to sort out all of that and to make sure we were doing things most effectively around

the world to improve our ability to introduce and launch innovative new products.

We conducted a language processing exercise to understand obstacles to growth, and one of the outcomes was to ask ourselves, “Do the managers of these business units have all of the skills to manage this new organization to insure that we really can launch new products effectively?” Our answer to this question was, “No.” So, we identified the need to train business unit managers”— the senior people reporting to our executive vice president, Tim Surgenor — on how to launch products effectively. While we were thinking about this training need, the MBC problem solving methods from CQM came to our attention. These seemed like a good fit for our needs. So Jim, Tim, the business unit managers and I undertook and completed the MBC training program.



*Marci Sindell, in her office near Boston, speaking to CQM interviewers.*

## Applying the Enterprise Model to Business Units

Coming out of the first part of the course, we decided that each business unit would go through the exercise of doing an Enterprise Model<sup>1</sup> for their business unit, in order to understand what they needed within the organization to support what they were doing. In all, we did six Enterprise Models to support the five business units (one business unit did a model for each of two product lines). I think that the Enterprise Model turned out to be an excellent way for each business unit manager to get their arms around some of their priorities. We then held a meeting where an extended management team reviewed all six of the Enterprise Models done by the business units. This gave everyone else a really good window into what each of the business units needed to focus on.

*Q: Can we discuss the actual approach to completing the Enterprise Models? How did you focus the analysis for the different business units?*

**MS:** Basically we used two approaches. As I mentioned, the people in one of our business units — our red cell business unit — had two products that were in very different stages in their product life cycle, so they needed to have a separate model for each product at a lower level of abstraction. On the other hand, when we looked at our surgical product business unit, we observed that all of our products generally do the same thing, so we were able to do only one model at a higher level of abstrac-

<sup>1</sup> Editor’s note: The complete MBC program consists of four modules as described in the first five papers in this issue: Enterprise Model, SCORE, ARMED, and Four Gears. At the end of this issue is an abbreviated index to the methods described in this issue.

tion. However, in retrospect, using this second approach we ended up missing some of the nuances of what we needed to know for the new products. We concluded from this experience that we should try to focus the analysis at an organizational level in a way that results in the most useful level of detail. Thus, I think both approaches were effective.

The overall comments I heard most were that the Enterprise Model method was particularly helpful for crystallizing what we already knew, and it allowed for quick and easy communication about the results. The people involved also appeared to think it helped the business units launch their year by providing each of them with an action item list. Some followed up on these action items fairly well, and others did not.

## *Other Applications of the Enterprise Model*

We have also used the Enterprise Model in a couple of other settings. The most recent was actually last week in an application that worked really well. We have a new quality systems organization, and they had never met as a group on a worldwide basis. So we arranged a two-day meeting in which we started with a Net Touch diagram<sup>2</sup> to understand the issues that we might want addressed as a group. It turned out that the number one issue was that the group didn't have a vision or a plan. Already anticipating this as a starting point, we had decided to use the Reason To Be Statement tool that is part of SCORE.<sup>3</sup> This resulted in the group having their vision statement completed in an hour, and they were thrilled with the result.

They then used that vision statement to drive their Enterprise Model which generated a list of the gaps in their capabilities and competencies which they used, in turn, to create an action plan for improving the performance of their organization. The action plan was viewed in light of the 7 Infrastructures approach to managing change and, thus, to describe how we could change the corporate mindset about quality systems versus product quality; this resulted in additions to the action list. Most of the people coming out of that meeting thought it was the most effective meeting in which they had participated. From the 7 Infrastructures approach we were able to create a "marketing" campaign to our employees about our new vision for quality systems.

Around the same time as we were working with the business unit managers, we also used the Enterprise Model with a group who went through a CQM training program in Germany. They were about to integrate our Scandinavian subsidiary into our German subsidiary for operational purposes. Our Scandinavian subsidiary is tiny; integrating operationally involved merging a few people into the larger German organization. The people involved wanted to insure that they were doing a good job of communicating to the German management team what needed to be maintained in the Scandinavian organization to insure continued delivery of the customer value proposition. Around the Scandinavian customer value proposition, I led them through the exercise, using the Enterprise Model, of making organizational changes that work. We looked at their processes to make sure we captured what was important in the model. They felt that was helpful to them; and they continued through development of an action plan, which they then implemented.

*Q: How does this differ from the way Haemonetics might have tried to merge the Scandinavian organization with Germany or might have tried to pull together a worldwide quality systems group in the past?*

<sup>2</sup> Editor's note: A Net Touch diagram is a tool that is often used to gain consensus on a problem solving theme, as it was in this case. A brief description of this tool is available on the "NetTouching Summary Page" (Cambridge, Massachusetts: Center for Quality of Management, document number 1278).

<sup>3</sup> Editor's note: See the third paper (by Murray) for a description of SCORE. Also, see the last document in this special issue for a cross-reference list that includes where an introduction to the *Reason To Be Statement* can be found and where its application is mentioned.

**MS:** Using the Enterprise Model is much more structured and much faster. Previously we would merely have used a NetTouch exercise or a brainstorming approach to do something like this. I think the Enterprise Model does a much better job of capturing the team's thought process for other people who will review the results later. People are amazed at how much information they can pull together in a short period of time. All-in-all, I think it's a very slick tool — for me, a favorite tool.

## *Time and Place to Apply the Enterprise Model*

*Q: How long does it take you to develop an Enterprise Model?*

**MS:** Generally, we have gotten pretty good at getting a group through it. It took us a little over four hours for the one in the quality systems organization, although, in retrospect, I think the participants would have liked a little bit more time to understand the process mapping step in the model since it's really more of a listing of processes than a map (which was an interesting insight for me). In other cases, I've had groups take all day if they start without a defined customer value proposition. In such situations, they can spend almost two hours sorting out their customer value proposition and take all day to get to an action plan, and even that might be tight. Generally, however, doing an Enterprise Model flows smoothly, and one can be done in three or four hours. I don't think you can do it in less time than that.

One challenge I think people discover is not having enough skill at getting the wording exactly right, if they try to do an Enterprise Model without facilitation help. As a facilitator who has worked with language a lot, it's easier for me to come up with good wording. However, this skill needs to be developed. I don't think I can initially just say, "Here, go do this on your own;" it would probably take that team a little longer.

*Q: In the three or four hour time frame you described, do you get to an action plan to close the gaps?*

**MS:** Yes, depending on how long you want to spend on the action plan. When we did the work with the quality system group, it took four hours to do the Enterprise Model, and then maybe we spent another hour on the action plan. Maybe five hours is a more accurate estimate of the minimum time including an action plan.

*Q: Have you found that you've been able to use the Enterprise Model in your business units around the world?*

**MS:** The business units are Braintree-based although they have worldwide implications. The one that we did with Scandinavia and Germany was specifically with a group of European managers. The quality systems exercise was an international (that is, worldwide) group.

## **Use of ARMED**

We have also used the ARMED process for managing decision risk. During the ARMED class attended by our business unit leaders, we began working on two different problems, which I will speak about only very generally for company confidentiality reasons.

One of the problems was a new product launch, and we started with the question, "How are we going to supply this new product to our customers?" We initially thought it was largely a manufacturing prob-

lem and, in fact, we weren't even sure how we could even work on the problem because the person who heads manufacturing was not in the class. However, in doing the analysis (especially the causal loop diagram), we quickly identified that the key to this product's success was getting the cost down by taking advantage of economies of scale. Thus, the fundamental issue was how quickly we could ramp up the market volume to achieve economies of scale. It was not fundamentally a manufacturing problem at all. This was an eye opener for us in terms of how to think about what was important with this product.

Subsequent to this first look, we formed a larger team in-house to review and expand the analysis. We took this larger group through the causal loop diagram, merged the result with a financial analysis, and then used the combination of the two to evaluate our different decision options.

That was in February. Reflecting back now, eight months later, the only missing piece was that we really didn't have some of the information about the distribution decision options that might have been considered. We probably could have gotten more information on these options. At this point we are still following the implementation path that came out of the analysis and so it is still too soon to see the results of our decision.

The other complex decision problem that we worked on in class was one that we already had been working on for a while. Actually we had previously used a scenario planning exercise on this topic. The issue involved looking at a fairly uncertain technology that we believe is going to affect our industry over the next five years. We wanted to determine how Haemonetics should become involved in that technology. Using ARMED, we made the decision about our involvement with the technology, and I think the causal loop diagram that was developed in the class was particularly useful for reference when thinking about what implications our decision might have.

Another use of ARMED resulted from our German management team taking the course. In the course, they looked at a new product we acquired that is sort of analogous to the razor and blades concept — a machine that doesn't get used up coupled with a consumable that does. They wanted to improve the profitability of this business. The analysis pointed out that the razors (the machines that we had in the field) were not able to be upgraded to support some of the new features that we're trying to add to our machines. So, that team of managers used the ARMED process to evaluate whether they should leave the existing machines in the field and suffer the consequences on the consumables side versus other possible choices. After completing the ARMED analysis, the team came up with a recommendation, which was funded by the company, to replace all of the old machines with new ones. The team would not have been able to get approval for such a substantial change without having a method to explain their logic to the company. It was the team's ability to apply a useful common language — the ARMED problem solving method — that brought the team's thinking together in a way that allowed them to make a successful recommendation.

*Q: In the past how would the company have made this kind of decision?*

**MS:** It would have been made emotionally? Something like,

"We need to do this."

"Well, I don't understand why you need to do this."

"Well, because our customers are going to get upset."

"Well, where is the data?"

So the use of ARMED was a way of getting our arms around the decision, to gain the understanding we needed to explain it in a way that people could listen to.

While, it's too soon to tell what will be the ultimate growth in our market as a result of this decision, in the short run we seem to be doing very well.

## Use of SCORE and Its Components

We have also used the SCORE process to help us select the right opportunities. As part of attending the SCORE course, we broke into two groups. One group worked on evaluation of a possible new product distribution option for a partner company that one person on the team was going to visit the following week. We didn't have a lot of information about this idea, so in some cases we had to make guesses and, as a result of the analysis, we decided not to go ahead with that distribution. The other group looked at a fairly complicated business alliance with another company which we are still evaluating.

So far where the SCORE process has been most helpful for Haemonetics is in the application of its pieces rather than the total method. Let me describe some examples of use of components of SCORE.

### *5P frame*

First, I have to say that everyone loves to use the 5P frame. We have quite a few new products that we're launching, and our program managers have not had a method that has been able to convey in a concise way their strategy for their products. So, I taught the 5P's to the program managers, and we took every new product that's coming out this year and showed them how to put it into 5P frame. They now use that format as the way they describe their products to internal groups, for instance, at our worldwide sales meeting. Sometimes this can clarify differences in understanding about the product. I remember one case where Jim Peterson, our CEO, said, "Oh, is that what we think we're doing?" This was an interesting result. I think we will increasingly incorporate this 5P Frame into our new product development process.

### *Reason for being statement*

Another tool from the SCORE process that we have used in a number of different ways is the Reason for Being Statement. Initially we struggled over the question of how this tool compared with our company mission statement. This struggle, in part, was due to the fact that we were evaluating acquisitions that may or may not fit into that mission statement. So we decided that we would leave our mission statement as it was to cover our current businesses, but then create a Reason for Being Statement for use with our new business development program.

Tim Surgenor, who heads up our business development effort, got a team of people who work on acquisitions together to develop a Reason for Being statement, and they came up with a good business development vision, and then took all of the things they'd been evaluating, and went through them as acceptable and unacceptable possibilities. In fact, down the hall in the office of our director of business development, you can see the list of acceptable and unacceptable offers as a living docu-

ment hanging on her wall. For them the Reason for Being Statement has been a really useful way to think about some of the things they are doing.

We also have used the Reason for Being Statement tool with our customers. We had one of our biggest customers visit with us to talk about how they were going to roll out one of our new products — an automated red blood cell collection device — in their organization. Typically, customers think about a new technology product like this one only in terms of training their people on the equipment so they can run it. Well, we've learned that getting people to move from the old method of whole blood collection to automated red cell collection where now a donor is getting back some of the blood components as part of the donation is difficult. People who used to be just phlebotomists now have to operate equipment and deal with electronic error messages and alarms. They have to think differently about how they talk with donors about their donations, how they manage inventories of blood components by blood type, and so on. This new product approach is really a significant change.

So, when this customer came in to think about planning for the product shift, we had the idea of starting them off with the Reason for Being Statement for their particular application. We decided to do this so they would be clear on their vision for why they were starting to use this technology. We helped them come up with a very nice vision around that change and it took us less than an hour.

*Q: How has the use of the Reason for Being statement, and some of the other tools that come out of SCORE, differed from what Haemonetics would have traditionally done in the past?*

**MS:** Three years ago Haemonetics was a totally different place than it is now. I think that the use of these new methods builds on other CQM methods that we've been teaching here over the past few years. So, unlike in the past, a large chunk of the organization will reach for a structured method first and, as a result, I think we are a much more participatory environment. People are much quicker to say what they think and to have their ideas captured in a way that allows the company to move forward.

I think another very positive outcome is we're spending a lot more time focusing on key problems than we used to. We're much more inclined now to get a team together for a day or half a day to hash through some part of a difficult problem and really talk it through. This isn't something we used to do. Historically, this company had a culture where people would do their work outside of a meeting very independently (often individually), show it to somebody else who would give them some input, and then they would go present it to whomever they needed to. We're doing a lot more group work now which I think is improving the quality of the discussions, the interactions and the results.

## Difficulties

*Q: What aspects of using these different MBC skills have you found to be the most difficult here at Haemonetics?*

**MS:** Well, I think the methods that take a long time to apply are more difficult to use, so the problem has to be of a magnitude that it's worth the effort. We like the ability to think about our problems from all different angles, to gain new insight, but you just don't have that many problems that warrant the kind of attention required by using tools that take a long time to use. Also, because you don't use the longer cycle

time tools very often, it's hard to gain the skill to make them go faster. But, if you can't make them go faster, then people are less likely to use them. There's a causal loop around about why we aren't using some of the skills more of "it takes too long," so "we don't get good at it," and so forth. Perhaps we need to have better facilitators, perhaps on-site to help people use the methods. I'm thinking that a train-the-facilitator class for some of these skills would be helpful.

Another concern is that we don't always have two days on which we can get all of the required people together. To give you an example of how this issue impacts us, I know someone who is trying to schedule Jim's (the CEO's) staff for a meeting, and the only time she can come up with between now and the end of the year is Thanksgiving week. Even then I can't make it. It's very hard to get people together to work on big problems.

## What Would Help Me

I think for us the biggest value for us has been our being able to take the methods apart and mix and match them and use them to create a new solution that can be used to solve important company problems. It would be useful to have some aid to understanding all the different ways you can lead into and come out of each of these tools. This would give them broader application and people would get better at using them and thus use them more often.

More generally, it would be helpful for me to see how other people have used the MBC methods. We could share some of the ways that we have used them that would be useful for others and vice versa.



# Controlling the Complexity Inherent in New Product Line Development

An Interview with Doug Rademacher of  
American Power Conversion (APC)

Doug Rademacher joined APC in 1990 as a software product manager. Shortly thereafter he was given the responsibility for leading and growing APC's software development organization, which he did for 10 years. In 2000, Doug took the lead in establishing the Availability Science Center within APC; the center applied reliability science to APC's product architecture development and consultative selling. For the past one and one-half years, Doug has been program manager for the project described in the interview.

Before joining APC, Doug was with Andersen Consulting in the New York metropolitan area, consulting on information processing systems for a variety of clients, including United Air Lines, IBM, United Parcel Service, and AT&T. Doug's college degree is in computer science.

• • •

Interviewer Steve LaPierre is CQM Director of Education and Advising Services.

• • •

Interviewer Chase Craig is CQM Production Manager.

*American Power Conversion (APC) was founded in 1981 by three electronic power engineers from the Massachusetts Institute of Technology focusing on research and development efforts with solar electricity. In the years following, APC shifted its focus to power protection and the need for uninterrupted power in the desktop computing environment. Today APC is perhaps the most well known company in the field of power availability solutions. To further its position as a world leader in its field, APC expends great effort on its quality, innovation, and support systems in order to develop and deliver comprehensive power solutions for home and industry environments.*

*Following is an interview with Doug Rademacher, Director of Strategic Initiatives at APC corporate headquarters in West Kingston, Rhode Island (the interview was done by Steve LaPierre and Chase Craig of CQM, on October 19, 2001, at APC's headquarters). Doug has been with APC for twelve years, undertaking a variety of increasingly important tasks and projects. Doug has been involved in applying CQM's Mastering Business Complexity (MBC) skills as Project Manager for a product line APC intends to roll out in the Spring of 2002.*

*In his interview, Doug particularly emphasizes the benefits of SCORE to anticipate opportunities and difficulties in a large, cross-functional project with major business potential. He also discusses use of the causal loop component of ARMED to plan, for example, marketing strategy. He mentions use of the Enterprise Model to make sure the organization has the necessary capabilities to deal with all the issues resulting from the project.*

*Question: How would you describe APC as an organization?*

**Doug Rademacher:** We're pretty intense around here. I like to think that we work in a collaborative way. We have really tried and, I think, been mostly successful, in making a transition to a process centered company. We have process owners through all major processes of the company, and naturally those are going to cross organizations. For instance, I can go to a process owner for supply chain order fulfillment and say, "Look, we have to change things — so, work with us," and that person can affect a lot of different organizations.

## Doug's role as a program manager — managing his project

*Q: Talk about your role, for a minute if you would, as a program manager. What kind of a challenge is this project for you personally?*

**DR:** Well, it is the largest project I have ever run in my career. In the past I have mainly been involved in software development — projects that are complex, but they just deal with software. This project includes software, hardware, logistics, manufacturing, service, and sales. So, for me, this project has been a challenge. I am now dealing with virtually all aspects of the organization within the company — aspects that I just haven't had exposure to before. So I have to ask a lot of questions, with a blank face, which sometimes works to your advantage because people allow you to ask dumb questions. I also have to rely on the people on my team that they know what they are doing and to trust their judgment.

## The challenge the company was facing

*Q: For context, can you describe the challenge or problem you were faced with that led to your use of the MBC methods?*

**DR:** We had just hit upon this idea of a new product line and system and the business to support it, and I was named to be Program Manager. Every time we looked at the opportunity, it looked bigger; we were very excited about the possibilities of it. Then came a period of uneasiness, "How big is this thing?" The challenge became, "How do we scope out a project of this magnitude?" And it was not only scoping out the development effort. We realized that the product and the product line we are developing is also pretty much going to result in a new business or new approach to business — all new back end processes and a new business model. We knew it was going to touch on many of the pieces of the organization. That is when I said to myself, "Oh gosh, how big is this thing?"

*Q: You used SCORE to think about the opportunity as a whole, to anticipate these things ahead of time, plan for them and deal with them. How would you describe the benefit of that?*

**DR:** Well, I am expecting that the project won't take as long as it probably would have, because now we are getting alignment or buy in from the other internal organizations. For example, up front we know we have to change the order fulfillment process. Using the SCORE<sup>1</sup> process allowed us to address this issue up-front versus having the product ready, sending it to the factory, then having the order guys say, "How do we let the customer order these things?" — you're faced with a hurdle you haven't thought about. By Scoring it up front we said, "Wow, that is going to be a problem. We have got to get those folks involved now."

*Q: In the past, how would you have approached planning for this kind of problem?*

**DR:** I think we would have used the hard work, smart people approach, which is,

"Okay, you are all smart people."

"What should we be doing?"

"Let's work hard."

<sup>1</sup> Editor's note: The complete MBC program consists of four modules as described in the first five papers in this issue: Enterprise Model, SCORE, ARMED, and Four Gears. At the end of this issue is an abbreviated index to the methods described in this issue.

We would have been able to foresee a few of the barriers, I am sure, based on individual experiences. But it would have been more like,

“Work hard”

“Oh shoot, we hit a barrier”

“What are we doing to do?”

“Knock it down.”

“Work hard some more.”

“Oh shoot, another barrier.”

Maybe we wouldn't have learned how big of a project this is until after we were done.

*Q: Do you have any other descriptions of this problem?*

**DR:** We kind of looked at the question of how would we be able to run two types of businesses at once — a high volume transactional business and a relationship business. In the *transactional business* you really don't want to necessarily interact with customers. It is kind of blasphemous to say it that way, but that is what transactional business means. You want customers to come on the web where they figure out the answer to their questions. Then they order the product, and we fill the order. Great, no humans involved. This is a high volume kind of business. The *relationship business* is a very intensive interaction with the customer, because they need more of a consultative approach. They are a client, which is very different from the transactional business.

The differences between these two types of businesses can give you schizophrenia inside your organization. How do you approach managing these differences? On the transactional side you think very low cost and how can I get high volume? But on the relationship side you can't think that way. You have to think of the client you are dealing with as your only client.

*Q: As you are sitting here now, sort of in the middle of this project, what has been the biggest challenge for you to deal with in managing this project?*

**DR:** Really just getting an appreciation for the scope of it, I think, has been the biggest challenge. It is easy to think it just impacts the areas of the business that I am comfortable with. For example, I know software; therefore, I can drill into all the software issues and identify the things I should work on. But, really, there are many other things to be worrying about — on the manufacturing side and the sales effort. How are people who work on this project going to deal with those things? The challenge is the difficulty in having appreciation for the scope and then understanding the linkages. In fact, it ends up being just a very complex system when you look at the whole company.

## Applying the MBC methods

*Q: What was the time frame between when you recognized this idea and when you said, “maybe we can use these methods from the CQM to help us manage it?”*

**DR:** We had attended one of the CQM segments on MBC just after we hit upon this product and business idea. We said, ‘Okay, let's use this problem solving method and apply it to our new idea.’ Actually, we had already told ourselves that we were going to do this project; there was no question about that. So when we thought to apply the MBC tools, we were seeing if we would still think we should do it, or see how crazy we were for thinking of doing it. That is how we got started using the MBC methods.

*Q: What might have happened if you were not able to use the MBC methods?*

**DR:** I think using the MBC skills is like looking down a race track and being able to see all the hurdles in front of you. You can say, “Okay, now I have a pretty good idea how long this race is and how many hurdles I have to jump over.” Without MBC, I might have been able to see a few hurdles up front, but while I was running the race, I would bump into other hurdles. Of course, at the end of the day, I want to win the race, so knowing as much as possible about the race track up front really helps.

*Q: What parts of the MBC tool set did you apply to help you manage this project?*

**DR:** The MBC method that applied the most was the SCORE process. I think what we said was, “Wow, we really have to SCORE this opportunity.” We have begun to use the process name as a verb too, “You have got to Score that project.”

And the Enterprise Model was certainly very useful, especially because this is a cross-organizational project. Again, the Enterprise Model ended up identifying a lot of the areas that we hadn’t thought about. Before we thought we might have a big project, but now we *know* we do!

*Q: Who has been involved so far in the work that you are doing? How have you organized to manage this program?*

**DR:** For applying the MBC tools at the beginning, most of the executive team was involved. As far as me being the program manager of the project, my number one job is to walk out in the halls and find someone who isn’t working on my program and then get them to work on it! That’s because the program crosses so many parts of the business. So, at the executive level, our Vice President of Sales, General Managers of the Product Development Divisions, and CEO have been involved. Our strategic sales folks have also been involved.

*Q: How have you been able to convince them that it is worth being involved in this program?*

**DR:** I think the way we have been able to address that question is by just getting real with each other. We all know that the potential of this project is very large. That is another thing SCORE has helped to do early on by answering the question what will be your payback if we work to make this thing happen.

And so, I might tell the person, “You’ve got a gap, and you have to address it.” And if I get some resistance I can say, “Look, here is what’s going to happen if we don’t address this.” And I think a little bit of that sort of —call it peer pressure — is useful.

*Q: You are calling it peer pressure, might it also be called a very desirable mutual goal?*

**DR:** Yes, that’s a good point. It’s useful to be able to show people that the idea is not a pipe dream — that something can happen. I am sure if you had a situation where people didn’t buy into the idea that the result was worthwhile, then managing that project would probably be pretty tough.

*Q: What parts of the MBC skill set did you apply to developing this idea?*

**DR:** By using SCORE, we got a much longer view right up front. We were able to “Score it.” We also used the top-level reverse income statement. We had already thought about how much we were going to get in profit. So, we decided to back up and use the reverse income statement as if we hadn’t thought about this question yet.

Later on, we went back to the SCORE process, looking at things like the Enterprise Model and saying “If this is how we are going to go to market with this product, the product better have these attributes, and do we have the engineering processes in place to support that and engineering skill sets to support the processes?” So, SCORE and Enterprise really worked well.

For this particular project we also have been using the causal loops diagrams from ARMED, but in a slightly different way. We wondered, “What is going to be the special sauce when we launch this new product line? What are going to be the causal and effect factors that makes this thing go the way we want it to?” We saw the power of using the causal loop diagrams to identify the reinforcing loops that impact each other; if we can find the easiest one to change, it will ratchet them all up. Also, I want to identify any balancing loops that are going to retard my progress and, for those, I either want to eliminate them or make sure I have a good handle on managing them.

We also looked at what will be the transactional side and the relationship side of this causal loop diagram. What is going to be so great about what we are doing that will cause this thing to spiral itself up in a positive way? Because, you know, the old way was just, well: get it out there, do a trade show, do a press release, tell the sales guys to go sell it...see what happens. But we wanted an easier way: Where it is going to catch on? Where will it do something good that will come back and will give us a little kick start, that will go around better the next time? So, we used the causal loop parts of ARMED to answer, “How can we make those things work for us?”

*Q: You mentioned the challenge of guiding a project that runs across your organization. Can you describe how the MBC tool set might have been helping you address that challenge?*

**DR:** I think the SCORE process did this when it identified the gaps in the Enterprise Model. The gaps typically show up at the interconnections of the functions in a particular process. Different organizations know their area of the business, and they can deal with that. But when the organization as a whole has to deal with a change you want to implement to fill a gap, it becomes very difficult. So, when we used the Enterprise Model, we brought representatives from those different functions together and looked at the whole organization. As a team, we were able to say that we really need to implement a new process to handle this change. For example the engineering guy might say, “Well, we are all set. You can cover that.” And the sales guy would say, “No, no, no. Let me tell you. From my standpoint you are not ready because of some other consideration.” From this dialog, they start to see each other’s perspectives. These conversations caused a lot of those gaps to surface, which led us to a long list of risks for the project.

*Q: In the Enterprise Model, we assign accountability for process outcomes. Have you been using that element of the Enterprise Model as part of the work that you are doing on this program?*

**DR:** Yes we are. We have found that it helps you identify which function you are speaking about when you identify a gap. I have found that often times the gap is not identified by that function. I will give an example. Let’s say an engineering gap is identified by Sales and then you tell the engineering guy, “Well, you better go fix it.” But he didn’t think he had a gap to begin with. So, now you have told him he has to go fix a gap that he believes is not really an issue. And that definitely has been a problem. It has been difficult to get these different groups to

say, “All right, I own this, and I’m going to fix it.”

*Q: Have you used the assumption management part of the SCORE process?*

**DR:** Yes, we used it in a way where we bubbled up the really top ones. The team basically narrowed those down to the vital few, maybe ten of the top ones. And the less important ones, to be honest with you, we haven’t really pursued as diligently. But think we keep our eyes on the top ones, I’m OK with that.

*Q: Are you pursuing the clearing of those top assumptions using the project time line?*

**DR:** Yes. As a matter of fact, we ended up mapping a lot of the assumptions involving highly rated gaps onto the causal loop diagram. That was our recipe for success because we can see right away how that gap might impact us, if we don’t fix it.

## Doug’s reflections on his experience with the methods

*Q: In this particular case you saw a large number of risks, but you still thought that in the balance this was a good project?*

**DR:** Well, by going through SCORE we saw the cost of failure — if we poorly executed the project, or if we forgot to identify some gaps so the project would have taken longer. We would have wasted many millions of dollars on a project we could have executed more efficiently. But I think the bigger cost was the opportunity cost: if we don’t pull this off successfully, what are we going to miss out there in the marketplace?

*Q: So would that have been called error of omission?*

**DR:** Yes, surfacing all of these considerations convinced us, “Wow, we better do this. I don’t care how many risks you see, we’ve got to do this.”

*Q: You mentioned using causal loop diagrams to help develop your market development strategy.*

**DR:** Yes, basically it helped us develop our channel strategy and our messaging strategy. And it was only after we identified those — and we could draw them for both transactional and relationship spaces — that we came to believe that we were onto something. And once we had that, we knew where we needed to focus on. We said, “Look, it’s right in the causal loop. If we don’t fix that, this isn’t going to work. So, let’s redouble our effort to prioritize where we focus our effort.”

*Q: How did this work in the engineering development end of your organization?*

**DR:** Just as an example, one of the things that really jumped out for us was the fact that we had some high gaps in the service space. We knew that we would need a new approach to the way we serviced our product. When we went to the Enterprise Model we could see the gap. So now we can focus our product development activity on closing that gap.

*Q: Can you tell us other important aspects of your experiences?*

**DR:** Well, I remember when we finished SCORE, I said to our CEO, “What this has done has given me about fifty reasons why we shouldn’t be doing this project. SCORE is an excuse generator.” On the positive

side, we identified all these ways such an important project could fail, so I could deal with them. But, on the negative side, we identified all these risks, and it can be a bit intimidating.

I suppose if there weren't a lot of strong support and confidence at the highest levels of the company, it would make this really difficult. But I cannot imagine saying I could do a project like this without the support of the CEO. I want to be able to say to the CEO that we have this great project we want to do, and let me step you through our analysis of it.

During this discussion he might ask, "What are these fifty things you identified that say high risk?" Because of Scoring the project, I can list all the risks with this project. This could damage the project, because there might be another project with only three risks. But, you know, sometimes the analysis should damage the prospects for the project; sometimes you have to say, "This project has fifty risks. We've got another one that has only three. Let's go with the one that has only three."

*Q: Do you see the use of SCORE and ARMED and the other MBC methods becoming more prevalent within APC as you go into the future?*

**DR:** There have been several people who have come in and said, "I was told I am supposed to look at your walls" — I keep the SCORE and ARMED output documents taped to my office walls, as you can see.



*Doug Rademacher of APC in his office, surrounded by wall charts.*

And I step them through the SCORE process. And people have taken it and used it. I have seen the Enterprise Model getting used in different areas — people trying to identify what they are missing if they try to do something new. And I know there are some efforts to try to make using [the MBC methods] a little more systematic — maybe create some database of forms to fill out to make it a little easier to go through it.

I think the idea of causal loop is catching on more. It has started to become a buzz word, although it is not quite there. But people are really seeing that when you say causal loop, you are saying, "What is going to be the thing that is going to keep the momentum going?"

I think another benefit of the SCORE process is the documentation trail it creates. If someone wants to understand the program or why we do certain things, I can point out the reasons. I can point out the 5P chart and say, "This is what we're working on right there." I can point out the Reverse Income Statement and say, "This is what we're going to do, and let me show you how it's going to impact the organization," I can show you the Enterprise Model and say, "Well, what are the risks?" And it's not a very complicated format; it's a pretty simple one. Some

people, after I show it, say, “Oh that’s pretty much common sense,” and I look at that as a positive comment because it doesn’t mean I have to convince anyone that it is a good way of doing things. But, with all these people who said it was common sense, if I said, “Well, how would you do it? Without showing them the CQM method, they would probably have to think a while.” It’s logical and it leaves that nice documentation trail.

*Q: How do you get people to sign on to something like this program?*

**DR:** Typically, it is very difficult because there are lots of different projects going. For you, your thing is most important. You are trying to get a particular function in the organization to work on your program. Their response can be, “All right. take a number.”

In my case it was a little easier because it was made very clear that this project we are working on is a pretty significant one. So it was almost as though I just had to mention the project name acronym and that was the magic word — almost to a fault, where I can get people to do anything by saying this magic word. The CEO of the organization making it known throughout the company that this is an important project helps a lot. I have that kind of support behind me. Also, there is the fact that it is an exciting project. So people want to help out. There have been some times when the functions I needed have had to work on issues that are just as burning as this project, so it is not like they can just drop that and work on this project. Certainly, there are areas where it is a struggle. You have to go in and try to get support.

*Q: How do people think about being accountable for closing gaps?*

**DR:** You want them to feel ownership. But, it is almost like having to admit a sin. The accountable person has to admit a sin and say, “Okay, I really have a gap in that area. I better fix it.” Well, you know, it’s human nature that people don’t want to do that.

*Q: When do you think you are going to know about the success of this project that you are working on?*

**DR:** We have schedules for when the product is going to be developed. But I don’t think we will see if we got it right until we see some success out in the field with the selling effort. Did we get the causal loop right? And also, once we have to start supporting the product, did we get all the back end support right in the company? So, we have to almost go through the life cycle of the product before we can say, “Hey, did we really catch it all?” If we find that a customer calls up and they need some kind of attention and there is nothing to catch it back at the company, then I would say, “Well, that was a failure; we forgot to identify something.”

*Q: Have you got a final thought on beginning to use the MBC methods?*

**DR:** Well, I think that when you want to apply these methods, there must be a bit of an investment. You have to pull in people from different aspects of the organization. I think it is most effective when it is a problem that naturally hits different organizations within the company. If you are just dealing within your own organization, you probably already have a handle of where your gaps are. So, I think these methods are best suited for when you have something that is going to cross a couple organizations — to bring those people together to get more alignment into the project and see where the holes are. I think that is the best way to apply these MBC methods.



# Getting the Company from Where It Is to Where It Isn't

## An Interview with Sherwin Greenblatt and Joe Veranth of Bose Corporation

Sherwin Greenblatt recently retired from Bose Corporation where he was president for many years.

Sherwin received a bachelors degree in electronics from MIT and was finishing a masters degree in 1964 when MIT professor Amar Bose founded Bose Corporation and asked Sherwin to be the first employee.

Bose Corporation was a founding member of the CQM in 1989, and Sherwin has served on the CQM Board of Directors since that time. He also serves or has served as a board member or trustee of a number of other worthy institutions.

• • •

Joseph Veranth is currently Vice President of R&D at Bose Corporation. Previously he has served as Director of Engineering, Chief Engineer, and as a member of the technical staff. Joe graduated from MIT where he earned a bachelors and a masters degree in electrical engineering.

• • •

Interviewer Gary Burchill is CQM President.

• • •

Interviewer Chase Craig is CQM Production Manager.

*Bose Corporation was founded in 1964 by Massachusetts Institute of Technology Professor Dr. Amar Bose to help deliver the emotional impact of live music with the ability to cross industries and arenas. Bose maintains an unusually strong commitment to research, and the list of major technologies emerging from Bose continues to grow.*

*On October 15, 2001, Gary Burchill and Chase Craig of the CQM interviewed Sherwin Greenblatt and Joseph Veranth of Bose. In the interview, Greenblatt and Veranth discussed Bose's use of CQM's Mastering Business Complexity (MBC) skills. They describe their success in using the Four Gears for getting organizational alignment and in using SCORE to understand and plan high risk opportunities. They also described unexpected difficulties they had with making use of ARMED and where they might try to apply ARMED in the future. Finally, they also discussed general issues of deploying such methods within their company, which depends on technology innovations being converted to simple implementations easily deployed by customers and users.*

## Experiences with the Four Gears

*Question: Can you tell me about an experience you have had using the Four Gears process for leading without authority?*

**Joe Veranth:** Sure, the one the project where we used the Four Gears is called Tempo. It's a product document management system project, which we were just launching that at the time we learned the Four Gears. I thought that the four gears tools, all the way down to the atom of work, proved very valuable, because we were using someone who had experience only as an engineering project manager (that's all he ever did before was engineering projects) and now we were asking him to do a big cross-functional project which is a systems project that involves a lot more people across the entire organization.

Since it was our first usage, it turns out we missed a lot, as you might expect, but we did all of the steps from the role playing to laying out who the critical stakeholders were and how we needed to communicate with them. We kind of gave the project manager, Dennis, a challenge to make sure he built the consensus and collaboration with all of those people.

The reason I chose Tempo, to deploy the tools for leading without authority, was that I looked around and thought, "Well, who do I think is the right choice to use these tools?" And I chose Dennis because I thought, "Look, he's the kind of guy who can relate to

structure, and he thinks methodically and logically. My guess is that if we expose him to this, he's really going to pick up on it." And, near as I could tell, that was exactly right.

But there are a lot of other program managers around here for whom I wouldn't have had the courage to try to involve them in using this tool.

With one exception, a group we didn't have on our list, Dennis did an outstanding job. As it turns out the exception was IT. They were nowhere on our radar screen, because they were using another system, but it turned out that they were an issue. As it happens, with the manufacturing purchasing groups, where we thought we were going to have lots of difficulties getting all of those people on board, the method worked great and we managed to get almost perfect alignment with manufacturing and everything there went much more smoothly than any previous project we've had.

**Sherwin Greenblatt:** The problem was omission rather than commission, so you would go back and think about how can you avoid the omission the next time around.

**JV:** We had identified stakeholders. Amazingly enough, we did not identify IT as a stakeholder because they don't normally deal with the existing program. So, when we thought we were introducing the new product document management system, we identified manufacturing, marketing, purchasing, all of those big players people, but IT proved to be a factor. So we missed that one. But otherwise, the method worked really well with the groups we did identify.

**SG:** You might think about developing a tool for scanning for unanticipated stakeholders, because, interestingly, that was where we got caught.

*Q: You said this project has gone much more smoothly than other similar kinds of projects in the past. Is there something specific that helped it go more smoothly?*

**JV:** Well, the thing I was the most concerned about was whether or not we would get manufacturing buy-in — because the typical engineering project often struggles with that, as you can imagine. And though this isn't a typical product development project — rather, this is putting in place a new system — we nevertheless expected to have a lot of difficulty with the manufacturing people, who need to play a big role.

So the challenge was identifying all of those folks, finding out what their concerns were, and making sure that the program identified their needs. That's where I think we had a really big success — identifying the needs of the manufacturing people and putting them right up front on the top of the list as what we needed to work on. That made the whole project go very well.

## Experiences with SCORE

*Q: Can we talk about some of the other tools that you may have used, particularly the SCORE process for selecting the right opportunities?*

**JV:** As I think about it now, we used SCORE<sup>1</sup> in two programs, one of which we call Project Sound, and one of which is called Blinky, our code names.

**SG:** The common characteristic of these two projects is that they involve new technology and they are ideas that don't readily fit into the business that we're in. It's not business as usual, but it's something that's very different.

<sup>1</sup> Editor's note: The complete MBC program consists of four modules as described in the first five papers in this issue: Enterprise Model, SCORE, ARMED, and Four Gears. At the end of this issue is an abbreviated index to the methods described in this issue.

In one case, it's something that's different but it would expand our business, and we couldn't figure out how to do that expansion. In the other case, it was something that was just brand new, a whole new business, using exciting technology that was within the company and technology we wanted to move forward with. So, that kind of sets scene for using SCORE on these two areas.

**JV:** From my perspective, the reason we needed to do it was because, though we see both Sound and Blinky being well into the future when it comes to actual product introduction, we're already at the point where they require sizable engineering commitments. We are spending a couple of million dollars per year on Project Sound, and Blinky is also ramping up at this point to where we're probably going to spend a half a million dollars more than had been budgeted.

So both projects are having a sizable engineering impact now, and yet nobody had started to think about where they were going to go in the future: What will the end result be? Was it going to pay for itself? How are we going to justify this? So, at this point, we really needed to step back and scope the entire program. We wanted to make sure we weren't neglecting some major item that may be not be in engineering area.

*Q: In the traditional development activity at Bose, which has been quite successful, has your history been to sort of charge ahead with the engineering piece?*

**SG:** Yes, I think so. The problem is that this approach lacks context for moving forward beyond engineering. So, people tend to make their best guesses without any context, and then some guesses turn out to be wrong.



*Sherwin Greenblatt*

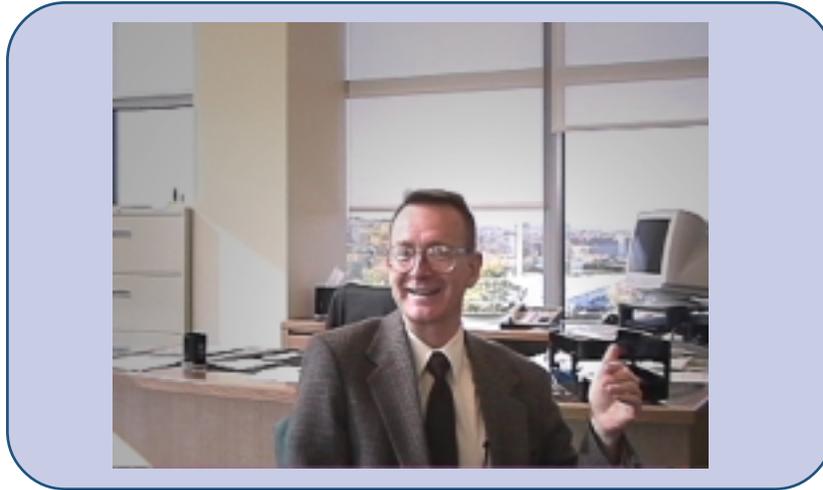
The way I think of it is that, when we have new ideas that start new activities, we need to have a dream. The further we get into the activity, the more complete the dream needs to be, and the overall goal has to be to make the dream a reality. The problem is that when you're at the front end of it, the dream is very incomplete. Usually, you can't even see where you're going.

So, we have been looking for tools that would help us add completeness to what we were thinking of as just an idea and, thereby, give people context they need to carry on their work, and ultimately to make the dream a reality.

SCORE turns out to be a really good tool for doing that. It can take these vague kinds of feelings and thoughts and what not, and the differ-

ent ones that different people have, and help us bring it all together. Also, it make us think about the things that none of us thought about before. I think, in that regard, it's been really useful for us, really useful.

**JV:** Let me contrast SCORE a little bit to our stage-gate process, which we normally use to manage new product development projects. One of the disadvantages of stage-gate approach is that the first gate is something we normally call "concept approval," which is the point where we decide whether or not we're going to make a company commitment to a product development concept.



*Joe Veranth*

The challenge that we have faced, and SCORE is one of the tools we're starting to use to try to address it, is that these concept approvals requests sort of come along out of the blue. A group from a core team shows up at a concept approval meeting saying, "Here you go, executives. We'd like you to approve this program, and we've developed this prototype and we've got this engineering technology, and we think this is going to be the greatest thing since sliced bread. We don't necessarily see what the market is going to be, but we need \$10 million dollars. So how about blessing this?" That kind of request is very much out of context. So, one of the things that we've been looking at doing is trying to find processes to put this more in context.

Another problem is that we typically have already spent a fair amount of engineering money by the time the team gets to concept approval. They maybe already have a prototype, already have a technology developed, already have some inventions created. Then we look at it and say, "What is missing? Why can't we approve this concept?" Often we discover that what's missing is something outside the realm of engineering. Nobody has done any kind of analysis of what the magnitude of the market could be. Nobody has looked at what the distribution channels might be. Perhaps nobody has considered what the cost of bringing the product to manufacturing is. So we often discover that this is very nice idea, but having done all of this work, we now have a whole bunch of non-engineering work to do also to bring the program to a point where it's ready for concept approval. We realize we haven't been working on the gating problem.

The thing about SCORE is it enabled us to step back, particularly in the case of Project Sound, and take a look at, "What are the gating problems here? Are we working on the right thing? Is it only an engineering problem, or are there some other dimensions that must also be addressed?"

*Q: Can you contrast the use of SCORE with the traditional process has been at Bose leading up to concept approval?*

**JV:** Normally we would not have done anything with Project Sound until the team said, “Okay, the technology is ready to go.” At that point we would then normally take a look and ask, “Okay, what, besides the technology, do we need to have in place for us to make a determination that it is worth making this a ‘go’ program for the corporation?” Does it make sense financially? Will there be pay back? Do we have some known customers for it? Does it fit within the context of our manufacturing, and so on and so forth? We have usually waited until concept approval to address those issues. And SCORE forces you to address those issues up front.

*Q: You’ve indicated that you’re spending millions of dollars per year on Project Sound. Has the timing of the investments, or perhaps the confidence levels of the investments being made, changed using SCORE versus your traditional approach?*

**JV:** I’m less confident now than I was before [laughter].

**SG:** One of the things that SCORE did was make us put all of the issues on the table, not just the ones we wanted to address. You know when you’re in R&D you want to address the research issues. SCORE forces us to put the whole array of issues on the table, and then we have to deal with them in some way — to consider them, to quantify them, to develop them, to think about them. And, as you know, in any new thing there are a lot more issues than you think of at first. So, with regard to Project Sound, I think our first reaction on applying SCORE was, “Oh my god. This thing is probably impossible, there are so many issues here.”

But as time has gone on, and I can say this is a consequence of, not part of, the SCORE process. We’ve had time to digest the results, think about each issue, one-by-one, and determine that there is a solution path for each of these things. Not that it’s without difficulty or without hurdles, but that there is a way to proceed in all of these areas; many more challenges than we might have thought originally, but practical challenges that we can address.

What was initially a good idea with some wild and maybe not possible views, comes down to the possible, with a lot of things to do, but possible views on how to proceed.

*Q: I recently had a conversation with a CEO who said the most valuable outcome of using the SCORE process was a decision they made not to go forward with a particular opportunity idea. Joe indicated earlier that he’s less confident now about these two projects.*

**SG:** I don’t really mean I’m less confident. I’m more knowledgeable about what the challenges are. And to the extent that knowledge can make you confident or what not — I am actually more confident now.

*Q: This is purely a hypothetical question, but had you decided you could not have overcome some of these issues and therefore decided to pull the plug on Project Sound, what the potential investments might you have avoided?*

**SG:** I think it would be astronomical, hundreds of millions of dollars in this case. Truly astronomical. We were really prepared to put the whole company behind this project. And if it were not practical, it could conceivably have taken the company down if we had gone forward. But I now think it is practical. That was one of the benefits we got from using SCORE.

Interestingly enough, when we finished the SCORE process, my preliminary conclusion was that this idea was not practical and we shouldn't go forward. But we decided we didn't have enough data to make that decision. One of the things that SCORE did was it made clear where the real hurdles were, not just the problems — there are lots of problems — but where the real show stoppers were. And by focusing on the show stoppers, we were able to, at least up to this point, hypothesize ways in which these problems can be solved, and that is what makes this project practical.

**JV:** In the past, we have almost never approached an analysis of an opportunity in the context of, "should we or shouldn't we." I would say almost always we approach the analysis as an opportunity saying, "Well, if this doesn't seem to work, what hurdles are there to be overcome to make it work?"

So I guess it was never seriously considered, at the time that we applied SCORE to either of these ideas, that we could conclude not to do the project. Though as Sherwin said, there were at least two occasions when the data said that that's what you should do, you should cancel the program. The first was halfway through the first day's work when we developed a set of financial targets, here we identified some revenue and assets and manufacturing costs and margins of profits, and we did a reverse financial statement which we'll call Rev A. This reverse financial statement indicated the idea was clearly a non-starter.

So we went back and said, "Look, the original analysis didn't work. So, let us try to assume something at half the cost." And we did a Rev B reverse financial statement of what was necessary to even get in the ballpark of making something fly.

Notice that we hadn't even gotten to the point of completing that first day's work when, looking at the total investment, we discovered that the program still needed additional work. But that forced us right then to set a different set of targets.

*Q: So you just indicated that through the first half day of applying SCORE, you had come to an "ah ha" about the operating assumptions at that point?*

**SG:** They just didn't work at all. Couldn't even dream how they could work.

*Q: Can you lay out the time line for us for the investment of time that you all and others involve with Project Sound put into SCORE, and then the implications that it had on the downstream development?*

**JV:** First order, we put in two whole days.

**SG:** Two whole days and then another half day to review the results some time later after we had time to digest them. Some prep work by some of us, but no more than a day or two. So it was some time, but small compared to the magnitude of the project. Nothing that compares to what we've already put into it in the research side of this project. And it was a look that hadn't been done. Most of what we did in the SCORE workshop was uncovering new "ah ha's" about the program. It wasn't a recap of work that had already been done. It was a good test of what people thought and what they hadn't even thought yet.

**JV:** What's kind of interesting is that, up to the point of doing SCORE, we had spent all of our time thinking about the engineering project — what it would take to make this project work.

For the SCORE effort, we put in one day, at the end of which we laid out a plan of what we thought the program might take, and realized that the numbers hadn't been thought through enough to be meaning-

ful. So, between the first day and the second day, two of us got together, and we went back and said, "Let's put in some realistic estimates for all the other numbers." When we got back together for our second day, we wound up sweeping all of the engineering activity into a little clump here at the beginning and said "There are just a couple of issues about the engineering work, and then there is all of this other stuff!"

I think now what's interesting is — and I'm speaking of Sherwin here — that there are some other people at least thinking about or working on all the other stuff, but up to that point, nobody had included that.

**SG:** In that two days' worth of work (plus a half day) eight or nine months ago, we came up with a program that we are now executing.

*Q: Can you comment on the value of that investment of time by the top team here in applying SCORE to this project?*

**SG:** It got us all on the same page. It got all the different ideas on paper, got them tested and, I would say, got them harmonized, so that we don't have people going off in different directions.

I also would say that it gave the people who aren't actively pursuing the program some confidence that there was something here and that it was being logically developed so that they didn't have to worry about whether this was going to become one of their headaches. So, at least my experience is, I've had good support from the other folks, even if they're not actively working on the program.

*Q: How does this result contrast with the traditional approach?*

**SG:** Traditionally, we don't harmonize our different points of view, and there is always evidence that people are going off in different directions. And it's only later in the program that we get back together and one way or another come back to a common way of getting the thing finished. I think we've taken care of a lot of what could be problematic in that regard, at least for getting this started now. This isn't the be-all, end-all. There are still going to be a lot of challenges in moving forward.

**JV:** Anyway, we can identify what the pressure points are. I'm not sure we've done all the work yet to get the complete alignment we need, but we now know where the issues are going to be.

**SG:** And there still are unsolved problems. But we know what they are and we know what effort we have to put on them. But of course if they don't turn out favorably, this whole thing could blow away.

And I would say that another useful thing that came out of our SCORE analysis is it allowed us to realize what those show stoppers were — those really important problems — and, therefore, now we can be focusing our effort in solving those, rather than solving other things that are interesting problems but are not the show stoppers.

*Q: What do you like most about this approach?*

**JV:** I have the feeling if you asked me on different days of the week, I'd come up with different things. One of the things I liked about the approach was at the very beginning, when you spend some time deciding on Bose's reason for existence as one criteria by which we decide whether a program makes sense for us or not. It's something we don't usually do, and it will be necessary in any major program as a constant reinforcement for the team working on it, particularly if it's going to take multiple years. You have to keep team morale and motivation up, as well as to be able to come back and point to why are we doing this project.

Another one is what you call the 5P frame. From my perspective, we probably haven't done enough with this tool. Spending time thinking through what the customer value proposition is, and what the other four Ps are, is very useful. In fact, often we tend to sweep some of the four P's under the rug and say, "We'll worry about those later." And yet it turns out that some programs crash and burn later on when we start to address, for example, the issue of price, or they fail to be successful in the marketplace because we have not properly identified the promotional activities or the channel building activities necessary to make it happen. I see some of those being big investment risks for us.

*Q: The flip side of that question: what did you like least about the use of SCORE?*

**SG:** There were some pieces that just didn't seem to work for this project or, at least, didn't seem to work for us. So we need to take some time and possibly develop a Bose streamlined version of the process. If something doesn't work for us, we shouldn't hang on it.

**JV:** There are some things that should have been pre-work—the kind of analysis that was common for both Blinky and Sound. When you know something that's practically the same, rather than tying up time doing it as a repeat, we probably should have had done that ahead of time or, at least, had the analysis available from a previous use of SCORE. I think there may be a few other examples of parts of the analysis that were very generic. They would be different from company to company, but would be the same for every project within a company or, at least, within one division.

*Q: Can you describe some of the differences in your use of SCORE between Project Sound and Blinky?*

**SG:** In Blinky we did two rounds of SCORE. The first round was to look at the program as a whole, and the second one was to look at just the R&D part of it. I made the decision to restrict the scope of what we looked at when we did the R&D part—actually not consider, not even look, at the marketing aspects or the field installation and support aspects of the product we were considering. In hindsight that was probably a mistake. Even though we were dealing with the engineering and development community more than the business folks, it would have been good exposure to have done the whole process the second time around with everyone. I think it would have been a richer and more complete view, even within R&D, if we had done the whole process. We tried to take a shortcut, and I don't think it worked as well for us.

**JV:** I think I agree with Sherwin. Part of the problem was when you try to do certain aspects of the process—the reverse financial statement, for example—you couldn't do it if you were only looking at part of the project.

**SG:** There were pieces that just didn't hang together, and there was actually more interest than I had thought there would be in the big picture. So, I probably would not take that partial approach again.

*Q: Any other differences between Project Sound and Blinky as you applied SCORE?*

**JV:** Well, we spent more time on Blinky actually trying to define the product. With Project Sound we really defined the value proposition, but we didn't really spend a lot of time—other than on some "make or buy" issues—on the details. With Blinky we spent more time getting

into details of exactly what the features would be using a block diagram. I don't know whether that was time well spent or not.

**SG:** I think with Blinky, we also uncovered some major issues that we hadn't thought about at all before. And they were so major, that probably we would have benefited if we could have taken those issues off-line for a while, and then come back to the process. It's not clear that the best thing to do is force your way all the way through the process (at one time). Although that worked for us well on Project Sound, I think it hung us up with respect to Blinky. But the results were still very useful.

*Q: Can you scope this for us. Project Sound was going to be hundreds of millions of dollars worth of investment. Blinky is what order of magnitude?*

**SG:** A few tens of millions of dollars.

*Q: And you're at a point now where you're going to invest a half a million dollars more this year in Blinky than you had budgeted?*

**JV:** Yes.

*Q: Is that in any way related to the SCORE activities, or is that some other factor?*

**JV:** I think that would have made the investment one way or the other. It's just that Scoring activities gives us at least a perspective with which to evaluate whether we're doing the right thing by doing that or not.

*Q: One of the issues which I haven't heard you talk about, when we went through the benefits of SCORE, is the effort to uncover the assumptions upon which the project is based?*

**SG:** It was central to the Project Sound activity. We had a lot of assumptions running around that we had never brought together. Everybody came with a different set of assumptions. Just bringing them together and putting them on the table and examining them was very useful. What actually resulted was a base line of assumptions and their consequences that, I think, has allowed us to move forward on that program.

Now, the first assumptions that we put down and the base line that we created looked pretty bad in terms of where this thing might head. But by looking at those bad parts, we were able to revise our assumptions, do some actual work on revising our expectations, and now, I think, we have a very realistic plan, much more realistic than we had going in.

*Q: Did you do any experiments to try to clear any of those assumptions?*

**JV:** Actually, I felt like, by the end of the day, we neglected to write down 80 percent of our assumptions, and that was true with both projects. We managed to not really close the loop on the assumptions. That's something we probably need to tighten up.

I think I see a lot of assumptions on the table for Blinky that have to do with some of the details of the engineering work — exactly what were going to be the specific features that we are going to build into the product, and to what extent would we be able to platform it and to tie it to other projects that are being developed. There are a bunch of those kinds of things that we still have to close the loop on. Doing that will make a big difference in the scope of project, by more than a factor of two. This difference in scope would depend upon some of the assumptions about whether it's going to be something cut from whole cloth or built from other projects that we're working on. I don't think we have addressed that question yet.

*Q: In your traditional approach would these kinds of issues have come onto the table?*

**JV:** Let me answer the question by describing a specific example. Going into the SCORE process, we had in mind two programs that we were going to be working on in the future. One was Blinky, the one we're doing the SCORE on, and there was another project we were calling Next Man. Prior to the SCORE process, those were completely unconnected in everybody's mind. But, when we came out of the SCORE analysis, we recognized that those two were both the same program. Now, in the normal course of events, we might never have discovered that. We might have assigned those two projects to completely different groups of people, and they might have never have discovered that they were working on the same program.

*Q: What's the consequence in terms of the schedule and resource investment you will make versus what you would have made if you hadn't discovered this situation?*

**JV:** Roughly speaking, I'm going to stick with my original estimate of a factor of two. I think we were looking at two \$10 to \$20 million programs, and now we're looking at one \$20 million dollar program. And they are clearly going to platform it.

*Q: Other observations that either of you would like to make about SCORE before we make a transition into some other experiences you might have had?*

**SG:** I think using SCORE is a different approach for most people; it's not something that they normally do. It is not necessarily something everybody is comfortable using because it's an organized and structured approach. But at least in the times that we've tried it, when we have finished and put forth the results, they've been very appreciated, and they're very useful. So you kind of get over that initial hurdle of: "Why do I have to do this? I know this already. Why can't you just listen to me, and I'll tell you everything." I think we've gotten over that. It's a process that's different enough that it probably needs some time to introduce to people who aren't familiar with it so as to make them comfortable with it. We haven't always done that. But it's been very useful. It really has been useful.

*Q: Please compare SCORE to other CQM tools and methods?*

**JV:** One interesting thing about SCORE is that all of the pieces were similar to things we have done before. In other words, while a reverse financial may be backwards, it's still a financial, and so one could see the tie to work we've done before. The development of the 5P frame was related to our efforts in the past to try to identify the customer benefits of a product. The development of the time line and the resource allocation are not dissimilar to just making a project plan for any project. And that, I think, made it a lot easier to do.

## Experiences with ARMED

*Q: What can you tell us about your use of ARMED for managing risk?*

**JV:** Well, to start off, all of the various aspects of ARMED are things that don't seem to have any relationships to things we've done before — everything from causal loop diagrams to writing factor names, etc. So, with ARMED it was much more difficult to get people to go along that with SCORE where every piece of it looks like a spin on something they knew they were going to have to do sooner or later as part of a new product development project anyway. With SCORE everybody says,—

“Yup, I see the value of this.” The pieces of ARMED all looked unlike anything pepole had ever done before, and they didn’t understand the value. A lot of the effort was required convincing people that “Look, you have to trust me here. We may be doing all of this stuff that looks like make work to you but, believe me, at the end of the day you will see the value in this.”

Getting people to carry that load of trust was very hard. In general I find this to be true of a lot of CQM tools, that you’re trying to get them to carry a big load of trust because you’ve got this really weird thing that doesn’t look like anything they’ve ever done before. The beauty of SCORE was all of it looked like pieces of things that they’ve done before or knew they had to do sooner or later. Everybody could see the values of them, which made SCORE easier to do.

Anyway, the project which we first used ARMED on was a program called Postman. The issue there had a lot to do with focusing on an engineering project and trying to identify the appropriate architecture to use for a family of products. There were a number of things that proved to be difficult, but the biggest issue was the fact that we lacked information. Even after we created a set of criteria and put together the choice matrix,<sup>2</sup> we found was that we lacked the information to decide upon the relative value of the choices in the matrix. Even with five people in the room, we found that no two could ever agree on which alternative was more important than another one. We found even if we only looked at resource needs, we couldn’t get people to agree whether choice “D” or “E” took more resources. So, we found that the original billing, that this was a tool we could use to make a decision in twenty-four hours, was way off base. We discovered that we had to go away for weeks and try to resolve some of the technical issues of what the facts were. On some of these, we had too many opinions. I think that was probably the biggest difficulty with ARMED. This really was a decision for which we needed data rather than opinions. You could not make a decision simply based upon identifying what the criteria was and hoping that the decision would therefore become clearer. It did not become clearer. We still needed to gather data, which we had a problem doing.

<sup>2</sup> Editor’s note: A Pugh selection matrix.

*Q: Have you tried to apply ARMED a second time?*

**JV:** No, I haven’t. Again, one of the difficulties was a lot of work up front, you know, in developing all the factor names that came from all of the different lenses. It was a major struggle to keep people motivated through that process. So, for now, unless I see more benefit than I did in the first round I am unlikely to try it again.

*Q: If you were to try using ARMED again where might you do so?*

**JV:** Well, I guess I would want to take another look at using causal loop diagrams from ARMED in a place where we could exploit its potential, a place where our approach to understanding our problems has been mostly the result of linear thinking. It has to be a place where I think we have been bogged down in a bunch of issues where we seem to be stuck in a loop, or an unstable situation, or where we are not making decisions or going back and re-thinking the ones we have made again, and we don’t know how to break out of this kind of rut.

One of the areas were I’m eager to look at more using causal loop diagrams more is the whole question of innovation. There is a real challenge in trying to figure out what it means to be innovative and whether or not we are methodically encouraging it or stamping it out. The line seems to be very fine. Like some of the other things that I’ve mentioned, where it seems you can get two people looking at exactly the same thing and have

very divergent views, that seems to be the case with innovation as well.

My belief is that the innovation process probably consists of a number of causal loops. Therefore, depending on where you are in the loop, you're either looking at something that's going in the right direction or going in the wrong direction; and what matters more is, "What is the robustness — the stability — of a process? I think we need to step back and take a look at this question. So, that's what I'm interested in pursuing; where I see potential for using ARMED at Bose.

## More general issues with deploying the MBC tools

*Question: Have you any more general thoughts on deploying tools such as the MBC tools in an organization such as yours?*

**SG:** Yes, a comment on organizational complexity in general. I think Joe and I both are involved in moving the company from where it is to a place where it isn't. Unlike many other people in the company who are involved in making the company better where it is, or achieving goals where it is, we want the company to go to where it isn't.

CQM's organizational complexity problem solving methods, in general, are really useful for addressing just that — making the company go someplace else. A lot of the ideas that we have are such that we must change what you have in order to do them. You can't easily incorporate into the day-to-day work of the company either dramatically different ideas, because they involve technology, or new kinds of systems, that require that everybody change the way that they look at their job and their responsibilities.

In either of those cases, we're trying to make the company go where it isn't. And it's hard to do. People want to stay where they are. We really need all the tools that we can use that will help us let us change where we are. So, I find it very useful and comfortable using these new problem-solving methods.

*Q: How do the MBC methods differ from the traditional CQM skill set?*

**SG:** I think a lot of the CQM tools are continuous improvement tools, so they don't necessarily take you to someplace dramatically different; they take you to someplace that's better, but perhaps adjacent. We're trying to move to areas that are discontinuous.

We're also trying to find tools that are operationally useful. There are a lot of tools that are useful in principle and useful for having broad thoughts. These MBC tools really are operationally useful. They let you move forward with the day-to-day work; either giving guidance in terms of how you manage with respect to the people and the things or, in the case of SCORE, how you look at dramatically different business opportunities and get away from all of the constraints that you have within your present operation and look at it as a new way of doing things.

*Q: Is there a distinction between the application cycle with the MBC methods versus one of the more traditional skills, for instance, the length of time it would take to apply?*

**JV:** The projects we've applied these methods to, by their very definition, are big, long-scope projects.

**SG:** I think we tend to use the tools on an as needed or just in time basis, rather than as let's train and then if we find an application we'll use

them. That's what we've been doing with the MBC tools.

Also, from my point of view, these MBC tools have been principally useful to people who are already problem solvers. They give better problem solving skills to professional problem solvers. We haven't had much success in transferring these tools to people who are not organized problem solvers. I have the feeling that there is some enormous benefit to be gained by use in our sales areas for these kinds of problem solving tools. But I can't see how we're going to easily transfer these tools to those folks — they need to learn first that you can be organized in solving problems.

We tend to be engineers working on these things, and we come up with good solutions. We try hard to make these tools usable by everyone, but I think there is still a big gap between where some of us are and where the bulk of the employees in our company are. We're not technically sophisticated across the company. We have a lot of technical innovations which we make very simple, and then the other folks in our company carry those things on. If we could get those tools to be usable for those folks, it would be a really good step.

**JV:** Undoubtedly this is one of the reasons why I have had so much reluctance from people to try using some of these MBC tools after a mere one bad experience with it. There was one project where, to do the needed analysis, I pulled together a number of the people who were working on that project, none of whom would be known around here for ever putting anything down on a piece of paper, much less take part in any structured problem solving process. So I took this wild group of people and I forced them through the process. From beginning to end it was a lot of work for me because not one of them ever thought anything of it other than, "This is Joe's thing he's making us do." It makes a big difference when you've got some people who are already halfway there.

**SG:** So we still have some challenges in terms of totally useful deployment.

*Q: You made a statement that you and Joe are people who are trying to move the company to someplace where it isn't. If these skills, or some of these skills, could be diffused more broadly across Bose, would it be easier to move the company to someplace where it isn't?*

**JV:** I don't know. These are only tools. Most tools you can use any way you want. If you put the tool in the hands of someone who is trying to move you somewhere, I suspect it will make you more powerful. If you put the tools in the hands of someone who is trying to keep you in place, it probably makes him more powerful too. The tool is only a tool. It's what you make of it. That's not an indictment of tools.

*Q: I'm thinking about using the CQM's seven infrastructures for mobilizing change and Shoji Shiba's 2-6-2 principle, that is, concentrating on and nurturing the leading 20% of employees who can move you forward and give you the kind of success stories that will bring along the 60% of the people in the middle, while avoiding confronting the 20% of the people who are trying to hold you back.*

**SG:** That's probably what is happening in our successful use of these tools. We are finding the people who want to lead us, and it gives them direction and encouragement. That part is working.

**JV:** My guess is that these are orthogonal things. There are the people who are trying to move you forward and those are who trying to hold you back, and there are the natural tool users and the people who are not natural tool users. So what you're hoping to do is find the intersec-

tion of that group who are the natural tool users and those people who are trying to move you forward — those you want to get going and that's what you've got to do.

*Q: I've never thought about them as orthogonal. Although I certainly have thought about, that the intersection, the two groups intersect at some level. Any other comments on this subject before finish?*

**SG:** Our fan-out point nowadays is the organizational development group. They are the ones who bring tools in and fan them out to the company. They're not negative about these MBC tools, but from their point of view they're just one of many. So, the MBC tools don't necessarily get picked up by these folks. It's more the operating managers that say, "I want to use these particular tools." I see that as a weakness in our MBC tool deployment. We need to get those people to say, "These are the tools that should be used. We will teach them," or, "We will help you to learn about them," or something like that.

*Q: So you're not really strong on getting the operating managers to ask, or getting the organizational development people to ask the operations people?*

**SG:** The organizational development folks do pick up and move forward with these tools. From their point of view, they think Joe and I are into these tools. But, you know, there are other managers that bring something else in through their own professional development. So, from what I can see, there is this plethora of things that they can do, and they don't have a mechanism for sorting those out or deciding what's best for the company. They're not really proactive. They're willing to react, to support their managers, but they are not saying these are the tools that we should be using in a given area.

**JV:** There is still a ferocious deployment challenge, and I think somehow or other it seems as though we get these things nucleated at a pretty small level and then hope that we can grow them from the nucleus. And my experience has been that's real tough — most of them don't. Therefore, one of the things that I would say is paramount, if you're looking for success: I think you need to worry about whether you can get a critical mass of usage in the company.

In these things, if one or two people from a company goes to a CQM class and takes it, my guess is the likelihood of long-term impact is very low — unless maybe it's the CEO, for instance, and he is a very active hands-on manager, and then you've got a chance. But otherwise, critical mass is probably important. And my perspective is that we have a lot better shot at it when CQM comes into the company to show us how to do something. Then we can take five or six people all at once and we expose them all to the same problem. We can actually use the tool, and we do much better than if we go to an open class at CQM. With an open class, we don't get the five or six, we only get three or four, and those three or four may or may not all share the same problem because we didn't understand enough about the tool. I think overall — for the CQM and for these tools — that this issue of getting critical in an organization is really important.



# Some Notes About MBC Skill Delivery

By Eric Bergemann

Eric Bergemann is Director of Business Operations for CQM. He joined CQM in 1996 as Manager of Information Systems and later served as Director of Information Systems and Publications. He also is publisher of this journal. Previously, he was an information systems consultant with CHBS, Inc. He is a graduate of Tufts University.

## 1. Workshop Formats

CQM provides two primary delivery vehicles for Mastering Business Complexity (MBC) methods: first, our traditional organizational development (OD) programs; second, our solve-the-problem (STP) workshops. In both formats people from member companies bring their own problems to the workshop.

OD programs are usually, although not exclusively, given in public course formats. Individuals from several different companies attend a course taught in an off-site location. Because we have learned through experience that complex problems usually require participation from numerous individuals, we encourage intact teams to attend together. In OD workshops, the emphasis is on helping people understand the CQM's approach and tools by applying them to their companies' real-life organizational problems.

In STP workshops the emphasis is on helping participants to solve a problem while gaining some experience in using CQM methods. Therefore, these workshops usually consist of one team from one company working on one problem. They are usually, although not exclusively, held on-site.

## 2. MBC Module Names

CQM began delivering MBC workshops in 2000, under the names shown in the second column of Table 1 (next page). In 2001, the MBC workshops were renamed based on member response to reflect the business context in which each module is most usefully applied, as shown in the third column of Table 1.

The names in the middle column of Table 1 are consistent with how CQM originally thought about the problems relating to business complexity — see Figure 3 on page 8 of this issue. The names in the last column are consistent with Figure 5 on page 13 of this issue.

## 3. Workshop Length

Initially, in 2000, the MBC curriculum was presented over eight days — four 2-day workshops, each corresponding to one of the methods listed in the first column of Table 1. In 2001, along with the name changes, the MBC curriculum became available in two new formats: (1) individual 2-day workshops focused on one of the four methods (a typical STP delivery format); (2) as a consolidated 6-day course covering all four methods, divided into two 3-day segments (a typical OD delivery mode).

Table 1. MBC Methods and Workshop Names

MBC Method	Original Workshop Name	New Workshop Name
The Enterprise Model	Integrated Management Systems	Making Organizational Changes That Work
SCORE	Creating Business Alignment	Selecting the Right Opportunities
ARMED	Managing Problem Complexity	Managing Decision Risk
The Four Gears	Managing Organizational Complexity	Leading Without Authority



# Abbreviated Index of MBC Methods and Examples in This Issue

4W, 1H, 1C table. *See* Four Gears and *see* SCORE  
5P frame. *See* SCORE and *see* Enterprise Model  
example of use, 32-34  
use at APC, 91

## A

ARMED, 53-63  
causal loop diagrams, 59-61  
decision statement and scope, 56  
decision, make, 61-63  
examples/experiences of use  
at APC, 89, 91  
at Haemonetics, 80-82  
at Bose, 102-104  
interactions, understanding, 59-61  
lenses and frames, 56-58  
perspective, build a broad, 56-58  
perspective, ceate in depth, 58  
root cause factor analysis, 58-59  
Assumption clearance. *See* SCORE

## C

Cascading the enterprise model. *See* SCORE  
Causal loop diagrams. *See* ARMED; *see* Four Gears  
thoughts on future use at Bose, 104-105  
Check alignment. *See* SCORE  
Commitment, create. *See* Create commitment  
Competency gaps, identifying. *See* Enterprise Model  
Creating alignment. *See* Enterprise Model  
Create commitment. *See* Four Gears  
Critical assumption clearance. *See* SCORE  
Critical processes and functions, identifying. *See*  
Enterprise Model  
Customer value proposition. *See* Enterprise Model

## D

Decision statement and scope. *See* ARMED  
Decision, make. *See* ARMED  
Demonstrate integrity. *See* Four Gears

## E

Enterprise Model, 15-25  
competency gaps, identifying, 22-23  
critical processes and functions, identifying, 18-21  
customer value proposition, 16-18  
examples/experiences of use  
at Haemonetics, 78-80  
at APC, 89  
gap closing action plans, 24-25

process and skill misalignments, 23-24  
process gaps, identifying, 21-22

## F

Four Gears, 65-76  
causal loop diagram(s), 66-67, 68, 70, 73, 74  
create commitment, 74-75  
demonstrate integrity, 70-73  
example/experience of use at Bose, 93-94  
generate understanding, 73-74  
initiate collaboration, 68-70  
Four forces of increased complexity. *See* Four sources  
of increased complexity  
Four sources of increased complexity  
illustration of forces, method for dealing with each  
and its purpose, 2, 13  
illustration of four forces that can stop an  
organization, 10  
illustrations of four pairs of forces, 15, 27, 53, 65  
introductory description, 10-13  
tools and methods for mastering the forces, 12-13  
Frames. *See* Lenses and frames

## G

Gap closing action plans. *See* Enterprise Model  
Generate understanding. *See* Four Gears

## I

Information explosion force, 2, 10, 13, 15, 53  
Initiate collaboration. *See* Four Gears  
Interactions, understanding. *See* ARMED  
Investment profile. *See* SCORE

## L

Lenses and frames. *See* ARMED and *see* SCORE

## M

Mastering Business Complexity (MBC)  
description of the problem, 3, 7-9  
concept Engineering study of CQM member  
companies and CEOs, 5-8  
difficulties of use, 83-84  
establishment of MBC study groups and  
teams, 8-9, 13  
use of methods at APC, 87-92  
use of methods at Bose, 104-106  
MBC. *See* Mastering Business Complexity  
Misalignments of process and skill. *See* Process and  
skill misalignments

**O**

Operationalize the opportunity. *See* SCORE  
 Opportunities proliferation force, 2, 10, 13, 27, 65

**P**

Perspective, build a broad. *See* ARMED  
 Perspective, ceate in depth. *See* ARMED  
 Process and skill misalignments, identifying. *See*  
 Enterprise Model  
 Process gaps, identifying. *See* Enterprise Model  
 Project plan. *See* SCORE

**R**

Reason for being statement. *See* SCORE  
 Re-organization acceleration force, 2, 10, 13, 15, 65  
 Resource commitment decision. *See* SCORE  
 Reverse income statement. *See* SCORE  
 use at Bose, 98  
 Root cause factor analysis table. *See* SCORE

**S**

Scope, schedule, and recources trade-off table. *See*  
 SCORE  
 SCORE, 27-51  
 4W, 1H, 1C table, 48  
 5P frame, 32-34

use at Haemonetics, 82  
 assumption clearance, 47  
 cascading the enterprise model, 44-46  
 check alignment, 34-43  
 creating alignment, 48  
 critical assumption clearance, 47  
 examples /experiences of use  
 at Haemonetics, 82-83  
 at APC, 86, 91-92  
 at Bose, 94-102  
 investment profile, 47  
 lenses and frames, 41-42  
 operationalize the opportunity  
 project plan, 46  
 reason for being statement, 34-36  
 use at APC, 86, 88-89  
 use at Haemonetics, 79, 82-83  
 resource commitment decision, 46-50  
 reverse income statement, 37-41  
 scope, schedule, and resources trade-off table, 49  
 sensing opportunities, 31-34  
 top-down flow chart, 44  
 Sensing opportunities. *See* SCORE

**T**

Time compression force, 2, 10, 13, 27, 53  
 Top-down flow chart. *See* SCORE



### Production Team

**Eric Bergemann**  
Publisher

**David Walden**  
Editor

**Kevin M. Young**  
Design & Production

**Janice Hall**  
Production

### CQM Officers

**Ray Stata**  
Chairman

**Gary Burchill**  
President

**Paul van der Wansem**  
Treasurer

**William Wise**  
Clerk

The Center for Quality of Management Journal is a forum for disseminating the experience of organizations learning to implement modern management practices. It seeks to capture experiences and ideas that may be useful to others working to create customer-driven, continuously improving organizations.

The CQM Journal is refereed. However, it is not an academic publication. Experiences and ideas will be published if they seem likely to be useful to others seeking to improve their organizations.

#### Send to:

The Center for Quality of Management Journal  
Editorial Department  
One Alewife Center, Suite 450  
Cambridge, MA 02140  
Tel. 617-873-8950 Fax 617-873-8980  
E-mail: [publications@cqm.org](mailto:publications@cqm.org)

If you have thoughts for a paper and you would like to discuss it with us, please write, call or submit an outline. We welcome your ideas.

#### Final Manuscript Requirements:

Entire manuscript should be double-spaced, including footnotes, references, etc. Text should include all the elements listed below. Generally, The CQM Journal follows the editorial principles of The Chicago Manual of Style. We strongly prefer submissions in electronic format for all text and as many of the figures as possible. IBM-based software (particularly Microsoft Word for Windows) is preferable to Macintosh-based software if you have a choice, but is by no means a requirement.

#### Please include:

1. Title page, stating the type of article (e.g., 7-Step case study, research paper, short communication, letter to the editor, etc.), main title, subtitle, and authors' full name(s), affiliation(s), and the address/phone/fax of the submitting author;
2. All needed figures, tables, and photographs (see below);
3. Footnotes (if appropriate), numbered consecutively from the beginning to the end of the article;
4. Reference list, if appropriate.

#### Figures, Tables and Photographs:

If you can, insert each figure or table into the text where you would like it to fall. Figures should be composed to conform to one of two widths: 3 1/8 or 6 1/2 inches. The maximum height for any figure is 9 3/8 inches. Text within figures should not be smaller than 5 points and lines not less than 1/4 point at the figure's final size. Figures should be labeled with the figure number underneath and title on top. Be sure that the text mentions each figure or table.

Please retain separate PICT or TIFF files of figures generated in drawing programs and a file with the text only for final submission.