New Quality Management Paradigm

By Greg Hutchins and Dick Gould

The
password
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only section on
the ASQ-QMD
Web site is:
sum4frm

The quality profession has been very successful over the last 15 years. The American Society for Quality (ASQ) surged in membership, national prominence and public policy influence. Quality and Six Sigma became synonymous with competitiveness and flawless execution.

All of this success came at a significant cost and now begs the question: What's the role of a quality professional, when everyone is responsible for the quality of his or her efforts? Today, there is much soul-searching about what it means to be a quality professional and where quality management is going.

In this article, we look at the state of quality today, illustrate how management makes key decisions, describe a new definition of quality and offer a future direction for quality management and the quality professional.

State of Quality

The quality profession and ASQ have had a profound and lasting effect on U.S. competitiveness, quality of life and organizational competitiveness. The ASQ almost single-handedly took the lead on this and has done a remarkable job. And we have been more successful than our fondest wishes. Quality has been institutionalized in most organizations, as most process owners are responsible for their own work and for their quality. This calls into question the role of the quality professional and in a larger sense, the future of quality.

Quality has evolved through the following distinct stages:

- Conformance-focused
- Market-focused
- Excellence-focused
- Value-focused

A brief explanation of various stages and definitions of quality can be seen in the Stages of Quality sidebar (page 4).

What's the New, New Thing?

The challenge is that quality movement and engagement seem to have stalled. Quality doesn't seem to be part of national competitive or business strategic discussions any more. ASQ has lost membership. ISO 9000:2000 transition numbers are low. Energy level at many ASQ local section meetings is low and we've seen a significant reduction in ISO and consulting business.

The question becomes: What's the next step in the evolution of quality as a discipline and as an improvement methodology in the new millennium? We saw these trends several years ago and massively reinvented ourselves. We believe that the next major movement in the evolution of quality and quality management is risk and risk management. Risk, and its mitigation, is the one topic that keeps senior management awake at night — both in the private and public sectors.

The bottom line for quality professionals is that they should reframe their definition of quality around risk, develop career core competencies in this area and add value to their employers and clients by offering risk management solutions. Let's look at today's business model.

Changes in Management Decision Making

As recently as ten years ago, quality was the primary filter for much management decision-making. It probably started in the mid 1980s when quality interest reached its apex. Malcolm Baldrige National Quality Award, Six Sigma,

Fellow Quality Management Division Members

By John Bauer

I've just returned from ASQ's 58th Annual Quality Congress (AQC) in Toronto. I was delighted to visit with so many quality professionals, many of them members of the Quality Management Division (QMD). I am also proud to report that during AQC, our Division was honored with a number of awards:

• Past Chair Dr. Roger W. Berger was awarded the ASQ Distinguished Service Medal. Dr. Berger is a fine gentleman and has been a mentor to many of QMD's current and past officers.

• A number of QMD members were recently elected Fellow by the ASQ Board of Directors, including Richard E. Aubuchon, Grace L. Duffy (Past QMD Division Chair), Howard S. Gitlow, and Arthur Trepanier (QMD Vice-Chair of Face-to-Face Initiatives).

On behalf of the QMD, I accepted the:

• ASQ McDermond Award. This is the 11th year in a row the QMD has won the highest award available to Divisions.

• Testimonial Award for "contributing to achievement of book sales in excess of $1,000,000 as an ASQ Quality Press author."

• Certification Board Division Leadership Award "In recognition of your support for the Certified Quality Manager Exam."

The ASQ 58th Annual Quality Congress was our last. Beginning in 2005, the ASQ's annual event will be called the World Conference on Quality and Improvement and will have the theme, "Teaming with Energy, Leading with Purpose."

The Ultimate Quality Management System: Part 4

In the previous three issues of the *Forum*, I talked about my experiences with the Baldrige National Quality Program Criteria for Performance Excellence. In this issue, I'd like to talk about Criteria 7 — Business Results (Organizational Performance Results in the Health Care and Education Criteria). In the context of the Baldrige Award, results include:

• Customer-Focused Results

• Product and Service Results

• Financial and Market Results

• Human Resource Results

• Organizational Effectiveness Results

• Governance and Social Responsibility Results

Those in many organizations today understand that the results senior managers are most concerned with are those that affect the bottom line. And as quality professionals, you also understand that quality dramatically affects the economic well-being of most organizations. Good quality adds to customer satisfaction and improves market results. Seems simple enough, but we quality professionals have not done a very good job in selling the benefits of high quality. Too many senior executives still see quality as a cost center rather than a potential profit center.

The new ASQ Economic Case for Quality initiative is being developed to help us make the case for quality to senior management. The following information has been excerpted from the May 2004 *Quality Progress* article, "What Do CEOs Think About Quality?" by Greg Weiler:

In today's highly competitive global marketplace, quality practitioners must justify the cost of quality. Making the economic case for quality by creating materials quality professionals can use to specifically demonstrate that quality pays rather than costs has accordingly become a priority for ASQ.

The effort calls for three primary activities:

1. Conduct a survey to identify the current level of thinking about the economics of quality among CEOs and other top executives in four markets: manufacturing, service, healthcare and education. This will allow ASQ to create and focus materials to prove the economic case.

2. Engage volunteers in two target markets to contact top executives and deliver the economic case for quality message.

3. Provide members and other quality professionals with information and materials they can use in their own organizations.

The survey was conducted in January and February, and its results provided valuable information in the following areas:

• Awareness and use of specific quality techniques

• Definition of the word "quality"

• Quality's contribution to the bottom line

• Quality as a management technique or product attribute

• Measuring the economic impact of quality improvements

• The perceptions of quality as a profession

• The attributes associated with people who practice quality

As part of step two above, ASQ Headquarters is currently working with two Sections (Milwaukee and Pittsburgh) to pilot test the materials developed in response to the survey. This could be one of the most significant initiatives that ASQ has undertaken in many years. If we as quality professionals can show senior management the true value of quality, our professional lives will become much less difficult and much more meaningful.

Meet a Fellow QMD Member

Bob Austenfeld is a professor on the faculty of Commercial Sciences at Hiroshima Shudo University, a private coed university on the outskirts of Hiroshima with about 5,000 students.

He began teaching at Shudo in October 1993, and currently teaches:

• Business Management

• Total Quality Management (based on Deming)

• Business Strategy

He also teaches the graduate courses (masters program) Strategic Management and International Communications.

Bob was a U.S. Marine Corps communications officer for 25 years, received his doctorate in education from the University of Southern California in 1988, then completed his MBA from Pepperdine University in 1993 — all added to his undergraduate degrees in electrical and electronics engineering and a master's in systems management.

Although having served in the Marine Corps for 25 years and being well versed in the importance of standards and inspections, Bob had not heard of TQM until he joined Douglas Aircraft Co. (DAC) in 1989. At that time, DAC was trying to implement a major TQM program called TQMS (the "S" was System). During his time with DAC, Bob saw firsthand what it was like for a large, tradition-bound company to try to implement what it thought was TQM. Drawing on that experience, he wrote a paper called, "Total Quality Management and Its Implementation at a Large Aerospace Company" (September 1994). Since then he has written a number of papers mostly dealing with quality. Here are some of the more recent ones (all published in the journal his faculty, Commercial Sciences, publishes twice a year):

• "The New ISO 9000 Standard: Evolution or Revolution?" (February 2002)

• "The Making of a Certified Quality Manager (CQM)" (September 2002)

• "The Balanced Scorecard Strategic Management System and the Complementary Role of Total Quality Management" (TQM) (February 2003)

• "A Primer on Lean Enterprise" (September 2003)

• "Examples of Lean Enterprise Techniques" (February 2004)

Bob Austenfeld can be contacted via e-mail at **austen@shudo-u.ac.jp.**

It's Time: Certified Quality Manager Exam

This summer, we will once again begin what is a regular analysis of the Body of Knowledge (BoK) of the Certified Quality Manager exam.

As with all certification exams, the purpose is to determine if anything new is relevant to the profession and if the exam should be changed.

Over the last year, a team from the Management Division (Bill Denney, JD Marhevko and Traci Margraff) worked with the ASQ Certification Department to survey both internal (ASQ) and external (business community) stakeholders. We received valuable input on how the exam could be improved and made more relevant to both quality professionals and the business managers as a whole. We found that quality has been integrated into many areas of companies and everyone interested in performance excellence looks to the tools of Quality Management to help them improve performance.

All of this input will be considered as a revision to the BoK is considered.

As you may know, while a regular review of the Body of Knowledge is required, changes to the exam go through a rigorous job analysis to determine what is appropriate in the coming years. By August, we will have a better idea of what changes to the test specifications are needed.

Beginning in July, JD Marhevko will be the new QMD Exam Chair, assisted by Traci Margraff as the Exam Liaison. This team will lead the ASQ and the Certified Quality Manager exam into the future as we work to better serve our current customers and spread the knowledge and tools of quality to a broader customer base.

Stages of Quality

Conformance Definitions:

• Quality means conformance to requirements. Source: Crosby, P., *Quality is Free*, NY: New American Library, 1979, p. 15.

• Quality is the degree to which a specific product conforms to a design or specification. Source: Gilmore, H. L., "Product Conformance Costs," *Quality Progress*, June, 1974, p. 16.

Market Definitions:

• Quality is the degree to which a specific product satisfies the wants of a specific consumer. Source: Gilmore, H. L., "Product Conformance Costs," *Quality Progress*, June, 1974, p. 16.

• To practice quality control is to develop, design, produce and service a quality product, which is most economical, most useful and always satisfactory to the consumer. Source: Ishikawa, K., *What is Total Quality Control?*, Englewood Cliffs, NJ: Prentice Hall, 1985, p. 44.

• Product integrity consists of a predetermined optimum balance of performance; aesthetic appeal; reliability; ease, economy, and safety of operation; ease, economy, and safety of maintenance; and consistency — all at a given cost, of course. Source: Carruba, E.; Gordon, R.; Spann, A., *Assuring Product Integrity*, Lexington, MA: Lexington Books, 1975, p. 9.

• Quality is fitness for use. Source: Juran, J.ed., *Quality Control Handbook*, NY: McGraw-Hill, 1979, p. 2-2.

Excellence Definitions:

• Quality is achieving or reaching for the highest standard as against being satisfied with the sloppy or fraudulent. Source: Tuchman, B. W., "The Decline of Quality," *New York Times Magazine*, November 2, 1980, p. 38.

• Quality is commitment made real. It is not perfection. But rather, the dedication to perfection. Source: Copy in advertisement for Shearson Lehman Brothers, *Wall Street Journal*, November, 1987, p. 26.

• (Quality) are traits that most people call measurable intangibles ... on the perceptual attributes, technical and nontechnical traits that go from design conception through service and the development of customer relations. Source: Peters, T., "It's Time to Get Back to Basics," *Quality*, May, 1986, p. 15.

Value Definitions:

• Quality is the degree of excellence at an acceptable price and the control of variability at an acceptable cost. Source: Broh, R. A., *Managing Quality for Higher Profits*, NY: McGraw-Hill, 1982, p. 3.

• Quality is the relative excellence of the composite of all product attributes in fulfilling the needs and reasonable expectations of those whom the product serves, as they perceive such fulfillment from time of offering throughout product life. Source: Utzig, L. J., "Quality Reputation — A Precious Asset," 34 Annual Quality Congress Transactions, Milwaukee, WI: ASQC, 1980.

ISO 9000, and many other quality initiatives were launched with tremendous international success. But, things changed over the last 10 years. When quality was in its apex, most companies still made products and only the insignificant products and services were outsourced. Quality was considered the KEY ingredient to competitive success. Well, times and business models change.

About five years ago, the primary decision-making filter for senior management became low price, so companies started outsourcing more non-core activities. Management focused on price in making capital budget, acquisitions, make/buy or other critical decisions. As management became smarter, they focused on the total cost of ownership of a product. In other words they looked at the total lifecycle cost of a product, acquisition, supplier or product development. Companies started developing new business models.

Changing Business Models

Today's Original Equipment Manufacturers (OEMs), regardless of the industry, have adopted a new business model involving the following:

• Manage the brand

• Design products

• Source noncore products and services

• Assemble and test products

• Sell products

The model is Darwinian in its focus on intellectual property and outsourcing. Today's business model has certain key implications:

• Companies stick to their knitting, focus on what they do best, and outsource all other activities, including services and products. Highly standardized internal processes, often called "build to order" or "mass customization," are adopted.

• Companies focus on their intellectual property, which is often design based. Generating new intellectual property is what creates new business opportunities and generates continuing returns.

• Companies focus on core, differentiated processes/products, and value adding processes. Jack Welch, the former CEO of GE, said its business units will be #1 or #2 in each market segment, otherwise GE would merge or sell its business unit. Tough words for tough economic times.

• Outsourcing is the key execution strategy to ensure that non-core products and services can be integrated seamlessly into product development. Many OEMs commonly outsource up to 85% of their manufacturing dollar. Outsourcing with multiple suppliers has created additional uncertainty.

More Uncertainty

September 11, 2001, was epochal in how it changed society as well as business decision-making. There has been a sustained recession. The Internet bubble burst. The NASDAQ lost trillions of dollars in market capitalization. Major companies went into massive tailspins because of financial fraud. There is now massive uncertainty.

Uncertainty exists because of globalization, technology, mergers, acquisitions, saturated markets and global competition. Uncertainty and risk arise from an inability to plan, execute and, ultimately, control events. Also, the likelihood and consequences that potential events may occur are now part of every management discussion in companies as well as government.

Post 9/11, there has been a major shift in boards of directors and senior management decision-making both in the private and public sectors. Most senior management decision-making today is filtered through a risk filter. In the government arena, all Federal, state and local agencies are focusing on risk and homeland security. In publicly held companies, board level and senior management decisions are based on a risk analysis because of a rise in personal accountability for the financials, lack of financial reporting transparency, lack of due diligence, the Sarbanes/Oxley Act, SEC/NYSE regulations and a number of other reasons.

Bottom line: Quality as it has been traditionally defined is no longer on the radar screen of many boards and senior executives. What can be done about the uncertainty?

Uncertainty and Risk

In *Against the Gods: The Remarkable Story of Risk*, the author says the mastery of risk is the foundation of modern life and is what divides modern from ancient times. By consciously or unconsciously calculating probabilities, auditors make intelligent decisions about business processes. First let's look at a few definitions of risk:

- Risk — The possibility that an event will occur and adversely affect the achievement of objectives.

- Risk — A situation or circumstance, which creates uncertainties about achieving program objectives.

- Risk — Uncertainty of outcome, whether a positive opportunity or negative threat, of actions and events. It is the combination of likelihood and impact, including perceived importance of a positive and negative event, which may involve a hazard, improvement or new opportunity.

There are several critical points to remember regarding these risk definitions:

- Risk represents an upside of capitalizing on an opportunity and a downside of an unwanted event.

- Risk has two critical elements, magnitude and likelihood.

- Risk is all about uncertainty, chaos, instability, out of control and unusual.

- Risk is tied to not meeting business objectives.

Risk and Quality

As you read the above elements of most definitions of risk, you'll start seeing there are common elements with conformance and value-based definitions of quality. In other words, the essence of risk is variation, variance, or variability away from an objective, target, specification or standard.

Let's look at some risk and quality parallels:

Quality professionals understand variation. Variation is a state of nature, whether in business or economic behavior. Variation at the business objective, specification target or process objective is the general condition of all systems. Variation outside of specification, business or process control limits represents a risk event waiting to occur. In fact, variations outside of control limits or specification limits are risks or nonconformances already occurring. This is illustrated in Fig. 1.

Statistical Process Control (SPC) is an example of risk and how it can be detected, measured and controlled. Risk can be defined as a variance or distance from a business objective, metric or standard, all of which indicate risk waiting to occur or already occurring. For example, quality that can be specified in terms of a dimensional tolerance or a surface finish is a variable that can be controlled and ensured. If a target product dimension can be kept in the middle of the specification spread and the variation of measurements are distributed inside the specification limits and process control limits, then the risk of a hazardous event or a nonconforming product can be controlled.

Reliability has always been considered a critical product quality attribute. Look at

reliability metrics, such as mean time between failures and mean time to first failure. These are essentially probabilistic risk concepts.

Figure 1 — Higher Risk —
On Target with More Variation
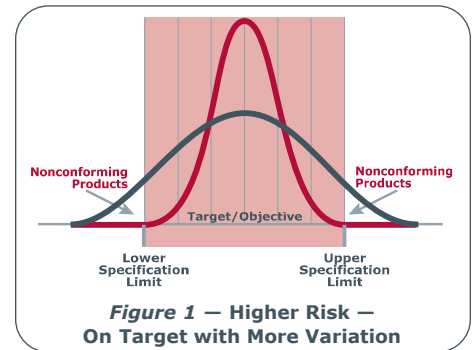
Also, the Six Sigma methodology to define, measure, analyze, improve and control (DMAIC) is fundamentally a risk management methodology.

What is Risk Management?

Risk, like quality, can be managed. Let's look at the following definitions of risk management:

- Risk management — An organized, systematic, decision-support process that identifies risk, assesses or analyzes risks, and effectively mitigates or eliminates risks to achieving the program objectives.

- Risk management — All the processes involved in identifying, assessing and judging risks, assigning ownership, taking actions to mitigate or anticipate them, and monitoring and reviewing progress.

As risk decision-making has increased, there is now a sense of realization that activity, process or project-based risk mitigation does not work — much like fixing or correcting the symptom of a quality problem results in recurring problems. Many managers realize that the root cause solution to a chronic or systemic quality problem is through enterprise risk management (ERM). ERM in many ways is analogous to Total Quality Management (TQM).

ERM and TQM Similarities

Enterprise risk management and total quality management share some similarities.

A Strategy To Meet Your Customer's Quality Expectations

By Ram Krishnan

Business managers are aware that quality is defined by their customer's expectations. This paper defines customer expectations, proposes a strategy and tools to meet these expectations and illustrates the strategy with two case studies. The strategy is to minimize the chances of a defective part getting to a customer. To this end, a quality metric that mimics in production potential defects that the customer might encounter is proposed as a filter to screen out the defective products before they reach the customer. Further, the metric is used as a feedback device to continuously improve quality. A modified Failure Modes and Effects Analysis method is proposed to ensure that the potential failure modes most critical to a customer's application are addressed first.

What does quality mean to a customer?

For product-based businesses, the customer's quality expectations can be captured in three categories:

Out-of-box experience

- Appearance — the product must look new and blemish-free

- Accuracy of shipment — the product must be shipped exactly as ordered

- Ease of setting up — all required accessories must be easily available to the customer

Operational experience

- The product must perform as required for the application

- The product must perform as specified in the Data Sheet

Field Reliability

- The product must operate trouble-free at installation (Infant Mortality)

- The product must operate trouble-free for a long time (Long-term Reliability)

A strategy to meet the customer's quality expectations

The process to meet the customer's quality expectations can be modeled as a feedback system (Fig. 1). The manager's task then, is to define the Quality Performance Metrics (Box 1) and the Production and Quality Process (Box 3) in such a way that the Customer Feedback on Quality and Responsiveness (Box 5) are met over some reasonable period of time. Clearly, if a Business Manager waited to hear from a customer about bad quality and depended only on the Customer Feedback on Quality and Responsiveness, the vendor's quality image may be ruined. Further, the delay in the feedback could result in serious quality defects becoming entrenched in the products and process. Similarly, the Rate of Product Returns (Box 4) has a long time lag (often a quarter) and exposes the quality flaws to the customer.

Thus, a production-level quality measure, the Production Quality Metric (Box 6) is required in the manufacturing process that accomplishes the following:

- Accurately represents the customer's perception of quality

- Measures quality before the product leaves the factory

While it would be difficult to define a single measure to cover all products and processes, one can be defined for each specific case. The rest of this paper is devoted to presenting two case studies where the feedback system approach was used with good results.

Case Study 1: Optical Networking Modules

The Production Quality Metric used for this case was the total number of defects (including cosmetic and functional) per system found at the final quality checkpoint. The idea was that each defect represented a potential customer dissatisfaction factor and the defect
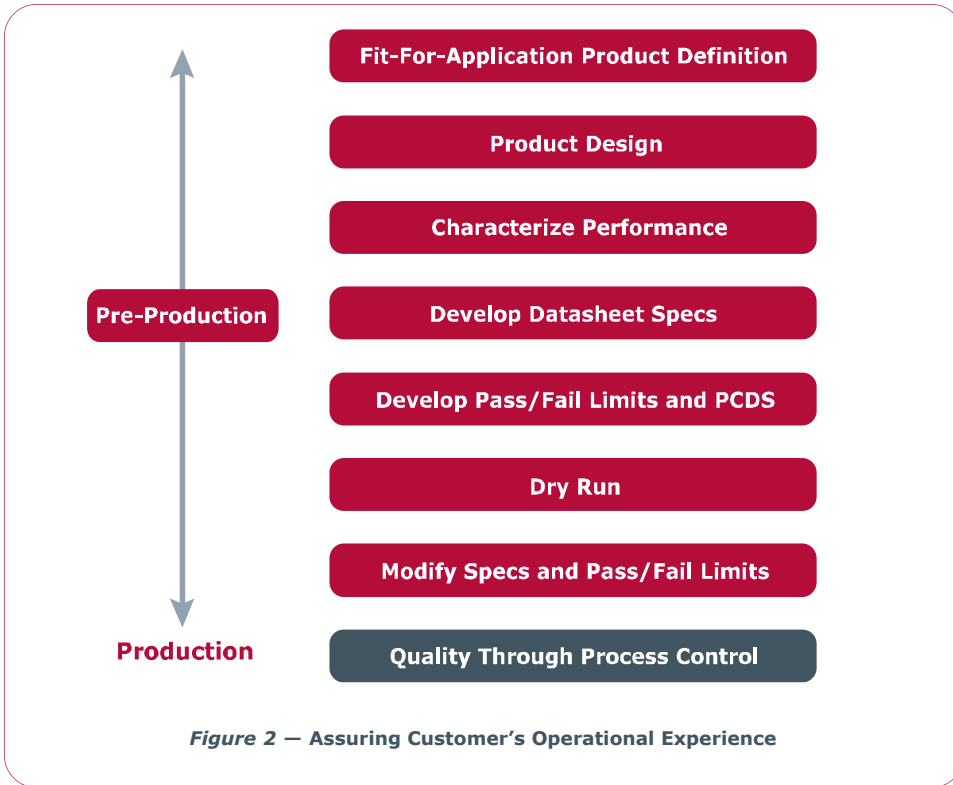

Figure 1 — Modeling the Quality Process as a Feedback System
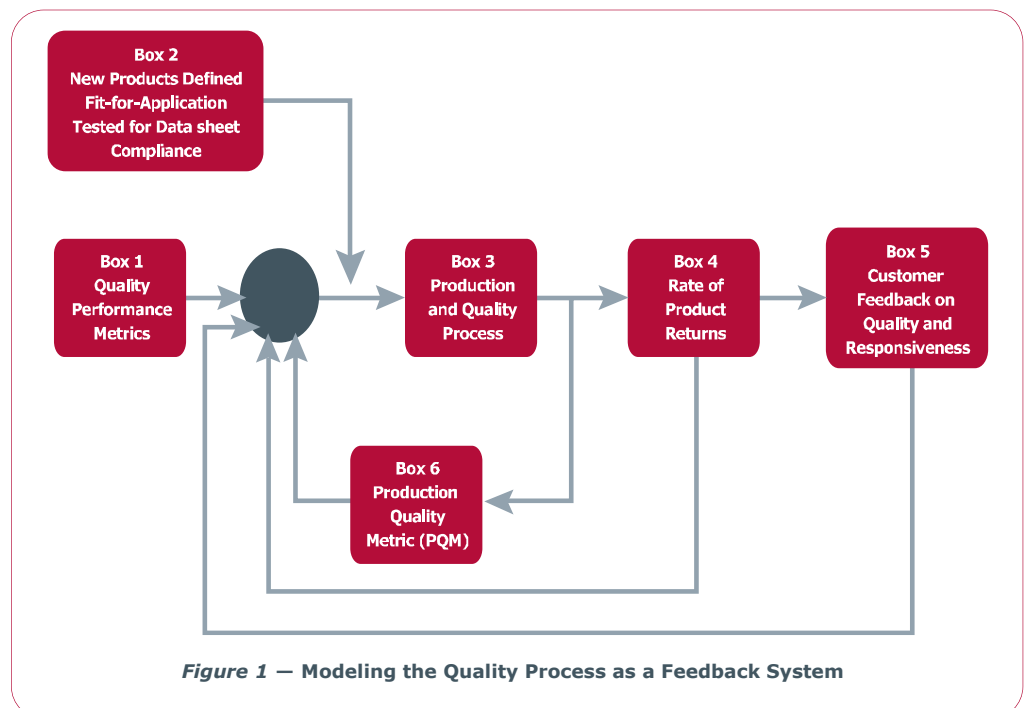
Figure 2 — Assuring Customer's Operational Experience

total could be monitored with no delay and before the product left the factory.

The role of ISO in quality

ISO-9001/2000 is invaluable for implementing a quality process, but by itself does not ensure a high quality product. It provides a framework of procedures and documentation that are absolutely essential for implementing a quality system. The following sections were implemented within the framework of ISO 9001.

- **Assuring Out-of-Box Experience**
  An exhaustive quality checklist that included cosmetic and functional items, as well as miscellaneous items such as serial number labels, was developed. Quality Circles were used to improve the list and to get all factory-floor employees involved in the process.

- **Assuring the Customer's Operational Experience**
  Ensuring the customer's operational experience is best implemented during product definition and development (Box 2 of Fig. 1) and maintained through process control during production. The methodology used is shown in Fig. 2.

- **Ensuring Product Fit-for-Application**
  For this case study, fit-for-application development was ensured during product definition by involving major customers, see Fig. 2.

- **Ensuring Product Performance to Datasheet Specification**
  The key step to ensuring that the product performs as specified is to characterize a small lot built using production processes and staff. This lot represented the performance of the product in production and met the following criteria:

  - The size of the lot was statistically significant, i.e., greater than 11 units

  - The units were built using production processes, i.e., they were not "golden" units built by the designer.

  The units were tested over the entire range of environmental and other conditions specified in the datasheet. See Ref. 3 for details on design of experiments. Critical parameters were graphed as a histogram and the mean and variance of the distribution were determined. The

mean plus 2 standard deviation determines what performance can be guaranteed on the datasheet for a yield of 95%. The production pass/fail specification is determined by adding the projected measurement variation between production and the customer's measuring tools. Manufacturing engineers were participants in the development and sign-off of datasheets, since they are eventual guarantors of it in production.

- **Product Compliance to Datasheet Process (PCDS)**
  In the PCDS process, every specification in the datasheet is reviewed and the test by which the performance is guaranteed is listed. If an untested parameter is found, tests are developed and implemented for it.

- **Dry Run and Specification Modification**
  A small lot was run through the entire production process. For such "dry-runs," if a 95% yield is not achieved, the pass/fail and datasheet limits are adjusted appropriately. This step completes the pre-production part of the process to ensure product performance to the datasheet.

- **Quality Maintenance in Production Through Process Control**
  Computer-based process control was implemented at each critical process to ensure that the performance of the production population fell within the expected mean and variance determined in the "dry-run" phase described in the previous section. The process control programs did automated testing of the network module product and recorded critical parameters for each module. The critical performance parameters for each lot were then charted (Fig. 3) to ensure that the product was staying within the pass/fail and datasheet limits
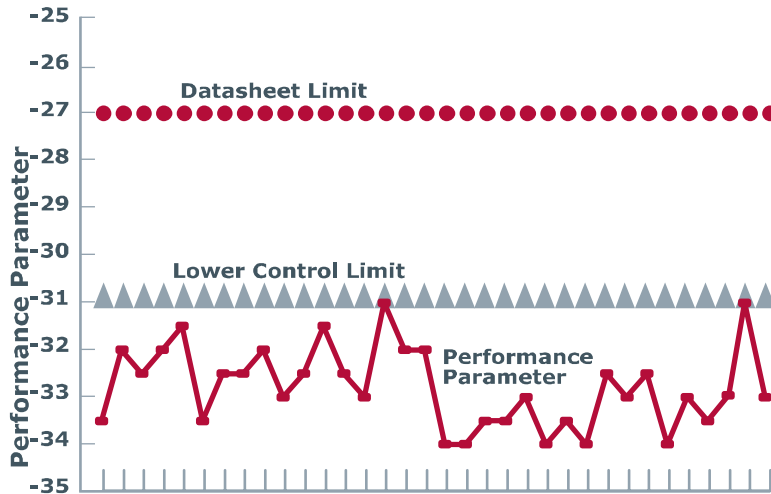
Figure 3 — Assuring Operational Experience Through Process Control

established during the "dry-runs." The charts are also used to continuously reduce the performance spread.

• **Assuring Field Reliability**
Two processes ensured field reliability:

• Infant mortality was screened out by functionally testing each network module over several cycles of temperature variation during production. The number of temperature cycles

required was determined experimentally. This screen is part of the quality process depicted in Box 3 of Fig. 1.

• Long-term field reliability was assured by running randomly selected production samples at elevated temperatures for an extended period of time. This screen was called the Ongoing Reliability Testing (ORT). The ORT screen is also included in Box 3 of Fig. 1.
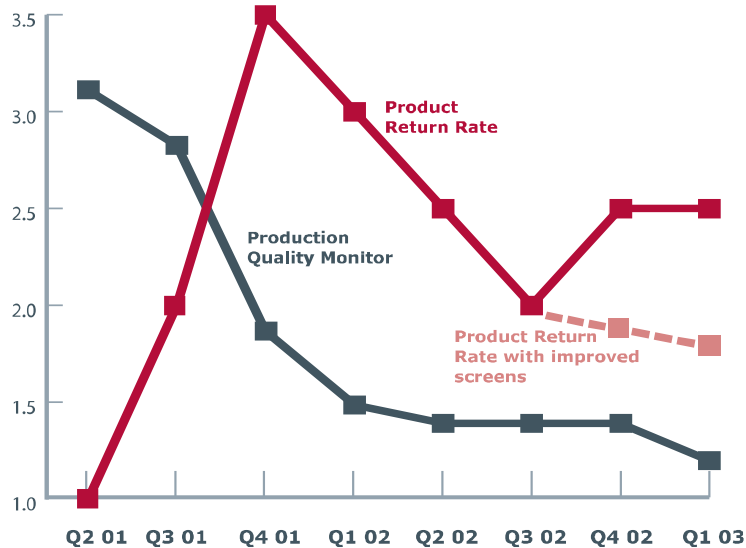
Results: Network Module Quality Improvement

The results of deploying this Quality system are shown in Fig. 4.

In general, it can be seen that:

• The Production Quality Monitor improved continuously

• The Product Return Rate tracks the Production Quality Monitor until Q4 '02

• In Q4 '02 new failure modes were found to have escaped the production screens

The production screens were modified to filter out similar failures and are expected to result in a continuously reduced Product Return Rate.

Case Study 2: Fiber-optic transceivers

During the boom-years preceding 2000, a leading fiber-optic transceiver manufacturer who had been experiencing product return rates of ten units per quarter began experiencing return rates of 100 units per quarter, leading to customer complaints and threats of lost business. A team was chartered to improve the product quality and the approach taken was as shown in Fig. 1. The team modified the production screens using a modified FMEA process and used the total defect count from the screens as a PQM. As a result of this strategy, the product returns shrank immediately and continuously (Fig. 6) until they had reached pre-crisis levels and continued to drop further.

A modified-FMEA process

FMEA (Ref. 5) uses the "frequency-of-failure" as a prioritizing criterion and the failures that occur most frequently are addressed first. The flaw in this approach is that rare failures could cause a customer's network to fail catastrophically. As an example, a transceiver failure caused by a

Figure 4 — Network Module Quality Improvement

rare condition called dark-line defect (a crystalline structure defect in the transmitter) could bring down a storage network with potentially disastrous consequences (lost data). The modified process ignores the frequency of failure and adds two new criteria: Severity (of the failure in the customer's application) and Detectability (of the failure mechanism in the production process). Severity is a measure of how disastrous the failure could be in the customer's application and ranges from a score of 10 for a fatal failure mechanism
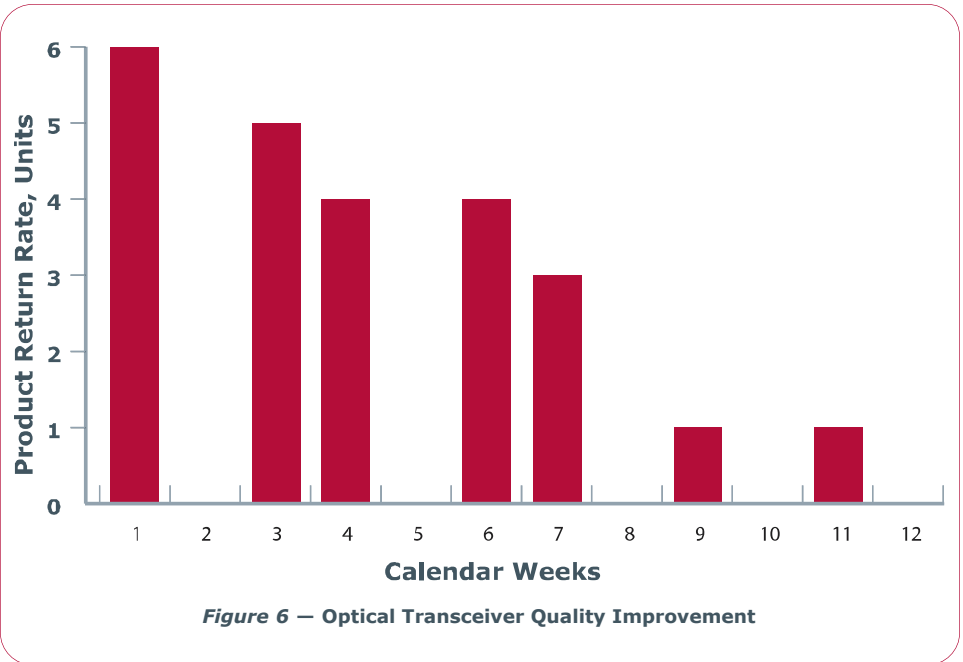

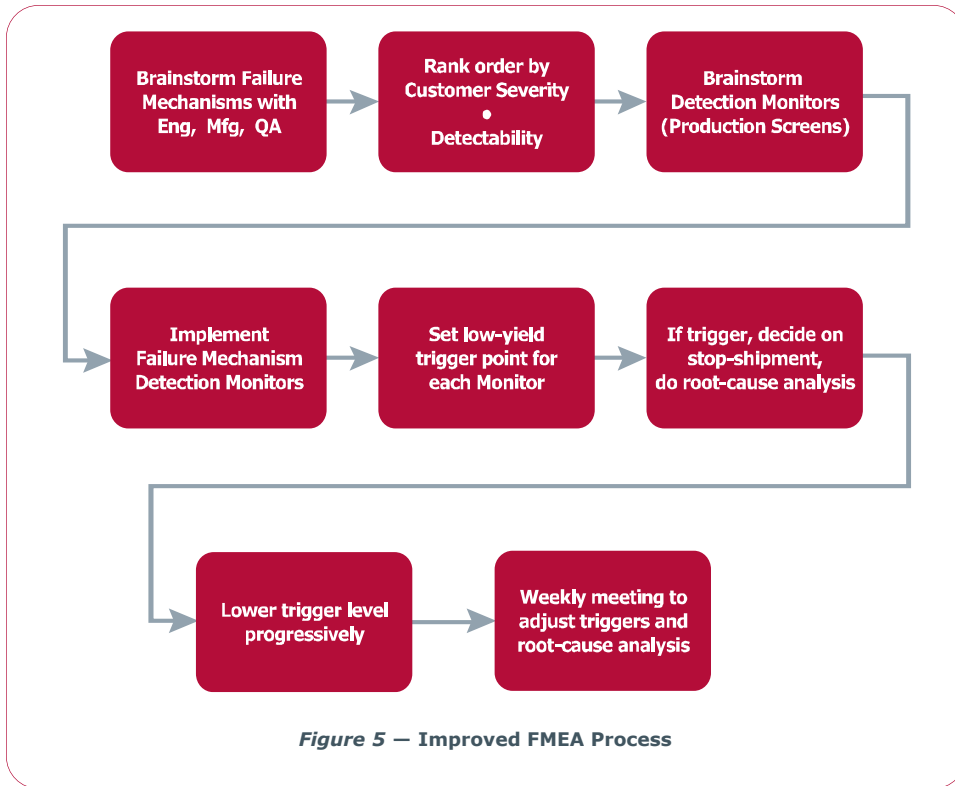*Figure 6* — **Optical Transceiver Quality Improvement**

Figure 5 — **Improved FMEA Process**

process were effective, an improving PQM would reflect that fewer potentially defective products were reaching the customer and finally would result in lower product returns and a high quality rating from the customer. The result of this strategy is shown in Fig. 6.

Conclusions

A feedback system approach is proposed for meeting customer's quality expectations. A Production Quality Metric is devised as a feedback measure to initiate corrective action before defective products reach the customer. Additionally, a modified FMEA process is proposed which takes the impact of failures on customers into account.

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2. "House of Quality," (www.qfdi.org/who%20we%20are/ newsletter_archive/ house_of_quality.htm)

3. Box, Hunter and Hunter, *Statistics For Experimenters*, Wiley-Interscience, 1978

4. "Gage Repeatability and Reproducibility," (www.engineeredsoftware.com/papers/msa_rr.pdf)

5. FMEA Information (www.fmeainfocentre.com)

(customer's system completely disabled) to a 1 for an annoying, but tolerable failure. Detectability was rated a 10 if the failure mechanism was undetectable by the production process and a 1 if it was completely detectable. Thus, the undetectable failure mechanism that impacted the customer the most severely was dealt with first. A process

flow for the improved FMEA process is shown in Fig. 5.

Using the process depicted in Fig. 5, the cumulative yield loss from the Failure Detection monitors was used as a Production Quality Metric. Thus, if the root-cause analysis and corrective action

Leadership in Quality: A Behavioral Approach

By Jim Spigener

Some people advocate attacking improvement in quality performance from the top-down — working with management and supervisors to improve accountability and support. Others advocate working from the bottom-up — working with front line workers to build engagement. Both of these approaches, given the right setting, can help an organization meet its objectives. However, the most effective quality processes integrate elements of each with strong leadership and engaged workers.

The role of leadership is especially important. Savvy leaders find ways to foster quality improvement throughout the day, not limiting their efforts to discrete periods of the day, week or month. They make quality an integral part of the work world. These leaders continually relate quality objectives to the company's objectives.

Effective leaders are very good at connecting employees and managers to the organization through quality. These leaders are good at aligning key practices, behaviors and activities at every level, as well as across the organization. This is the key to achieving a quality culture that facilitates the accomplishment of milestones and objectives.

This article focuses on the leadership role in quality improvement. Organizations that leverage the influence of leadership in their quality performance improvement efforts often realize benefits in areas far beyond those intended.

Some people advocate attacking deficiencies in quality performance from the top-down — working with management and supervisors to improve accountability and support. Others advocate for a bottom-up approach — working with front line workers to build engagement. Both of these approaches, given the right setting, can help an organization meets its objectives. However, effective quality processes combine elements of both along with strong leadership. This leadership is the necessary ingredient for success.

Managers seeking to increase employee involvement in quality sometimes find themselves on the horns of a dilemma. On one hand they very appropriately believe that managers and supervisors must be accountable for quality. On the other hand managers understand the production pressures that

> **Organizations that leverage the influence of leadership in their quality performance improvement efforts often realize benefits in areas far beyond those intended.**

supervisors are faced with. When managers make a course correction from traditional top-down approaches to working with front line workers, they sometimes overcorrect. Instead of actively delegating responsibilities to well-defined roles, they adopt a hands-off approach that amounts to an abdication of their leadership responsibilities.

When this happens, managers not only fail to increase employee engagement and improve results, they often experience faltering quality performance. By the time they are in the trap, if they reassert their authority they undermine employee engagement, but if they do nothing they see results spiral downward.

Employee engagement is often a goal for managers, to the point that this term has become cliché. It is perhaps more meaningful to think about this concept as engagement of employees. Meaningful engagement involves more than just token participation. We would like to see site personnel connected to their work in various ways. We want employees to be knowledgeable about quality efforts that are in progress at the site. We want employees to realize that what they think does matter. We want their ideas and innovations. Achieving engagement involves more than just delegating

tasks. It requires creating an environment in which employees at all levels understand the meaningful role they play in achieving broader organizational objectives. Managers need to understand that creating meaningful roles for frontline workers is not in conflict with the concept of supervisor/management accountability.

A key to reconciling the engagement/accountability dilemma lies in understanding the difference between managing and leading. Managing means directing or regulating the activities of another person or entity. Leadership, on the other hand, means guiding the activities of groups that give themselves extensive self-direction. Where a manager directs, a leader coaches. Leaders establish criteria and provide ongoing training and coaching, fostering employee ownership and engagement in the process. Further, they connect employee activities and participation to the larger organizational objective. This engagement across and between levels is the key to initiating culture change and to sustaining improved quality performance. While leadership can be a more difficult challenge, it provides more "space" for subordinates to exhibit their creativity and delivers the reward of having greater control.

To progress from management to leadership, it is important to understand the difference between delegation and abdication. Effective leaders delegate functions but not ultimate responsibility. They entrust specific roles and responsibilities to others only in ways that are consistent with leadership responsibility for overall success. In contrast, leaders abdicate their responsibility when they act as though the quality function at their companies can be assigned away so completely that they don't have to play an ongoing role.

When leaders abdicate their role, the group assigned to take on the initiative is often set up for failure. This group is required to take on new tasks and see things from a new perspective, but they have

not been prepared to do so. The ensuing period of predictable trial and error is sometimes heralded as a "good learning experience," but the consequences can be severe. The individuals whose efforts fail to bear fruit can become frustrated and disenchanted.

Providing leadership while encouraging engagement is readily achievable provided that roles and responsibilities are well understood and properly executed. It is important for leaders to understand the three critical components that make engagement successful: criteria, training and participation.

Defining the Criteria for Success

When a group that is composed primarily of front line employees is asked to take ownership of an initiative, it is leadership's role to clearly communicate the established criteria for both short-term and long-term success. Good leaders do not assume their team members are mind-readers who understand the objectives and needs of the leaders.

Good leaders understand that when they define the criteria for success, the group's feeling of ownership in their work is enhanced. Leadership input reinforces the alignment of thinking between the leader and the group and builds the feeling that the initiative is a joint effort.

Training for success. The second key component provided by leadership is training. Often the groups commissioned to undertake an initiative do not at the outset possess all of the skills needed to make the initiative successful. These teams need to receive the training required for success in their tasks. Sometimes this will be training in concepts and principles, but often that level of competency is not enough; employees may need training in more specific skills to help them in planning and executing the new initiatives.

Leadership participation. Finally, effective leaders recognize that completely distancing themselves from an initiative is not the best

way to create engagement. When a team is commissioned and the leadership backs away, what are the messages that may be inadvertently sent? Some teams will see this as evidence that the initiative is really not a priority. Others will see this as management dumping its responsibility on them. Still others will suspect they are being set up to be scapegoats.

Effective leaders understand that there is an important coaching role to play for the team of frontline workers. Making the transition from management to leadership involves transitioning from directing to coaching. This can be difficult. Coaching is a special skill and it is often not taught. One result is that outstanding managers are assumed to have good coaching skills although this may not be the case. To provide effective coaching and to help assure increased employee engagement, an effective leader stays involved in the initiative. The leader establishes criteria, provides for skills training, and continues to provide guidance and advice throughout the initiative.

A comprehensive quality system works from the top-down by using strong leadership, and from the bottom-up by engaging workers. In addition, effective leaders look for ways to foster quality continually. Effective leaders are very good at connecting the employees and managers to the behaviors and activities across the organization, as well as up and down the organization. This is the key to achieving the overall quality culture that will facilitate reaching your objectives.

Jim Spigener is with Behaviorial Science Technology, Inc. Jim can be reached at **(805) 646-0166** *or* **jbspigener@bstsolutions.com***.*

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On Becoming a Leader

Being a true leader is a journey, not a destination. Here are ways to keep yourself on the right path.

Steps to Establishing Credibility

- Admits mistakes to self and others
- "Goes to bat" for direct reports; represents and supports the interests of the group with higher management
- Gives honest information about quality performance, even if it is not well received
- Asks for ideas on how to improve his/her own performance
- Acts consistently in setting and applying quality standards
- Is willing to make quality-related decisions that are unpopular or involve some personal risks
- Demonstrates personal concern for employee well-being
- Follows through on commitments made
- Treats others with dignity and respect

Areas for Improving Leadership Performance

- Aligning to objectives
- Setting expectations
- Building commitment
- Dealing with resistance
- Removing barriers
- Supporting improvement
- Monitoring
- Using data
- Coaching
- Giving Feedback
- Being consistent
- Being fair

- Both grew to prominence as a result of policy circumstances: Quality as a result of Japanese competitiveness, and risk as a result of financial excesses in corporate America and homeland security

- Both share common concepts and techniques, but use different words for them

- Both have similar methodologies

- Both follow a similar deployment mechanism

- Both follow a capability maturity model (CMM) curve

- Both rely on the board of directors and senior management to set the example and lead the initiatives

- Both focus on variance from targets or objectives

- Both emphasize that ultimate responsibility for quality and risk rest with process owners

- Both are company-wide initiatives

- Both focus on achieving business objectives

- Both are process based

- Both have a hard technical side and soft people side.

ERM and TQM Differences

The differences between the two are also compelling.

- Risk management is relatively in its infancy, while quality is a mature technology

- Quality, even Six Sigma, has tactical focus, largely emphasizing execution and metrics

- Risk management is a board level, CEO and CFO concern

- Risk management is largely driven by financial regulatory and statutory compliance concerns

As you can see, the similarities between ERM and TQM are more pronounced than the differences.

Level of Risk and Assurance

The trend for good corporate governance is to focus on enterprise risk management. Internal controls and documentation will have to support the ERM system. The rationale for ERM is straightforward, which is to provide value for all stakeholders. The question then becomes, "how much risk can or should an organizational assume?"

The underlying premise of enterprise risk management is that every entity, whether for-profit, not-for-profit or a governmental body, exists to provide value for its stakeholders. All entities face uncertainty, and the challenge for management is to determine how much uncertainty the entity is prepared to accept as it strives to grow stakeholder value. Uncertainty presents both risk and opportunity, with the potential to erode or enhance value. Enterprise risk management provides a framework for management to effectively deal with uncertainty and associated risk and opportunity, and thereby enhance its capacity to build value.

What Do Quality Professionals Need to Do and Know?

Benefits of ERM include:

- Develops integrated and aligned internal control structure

- Provides a rational template for determining which opportunities should be seized

- Aligns risk sensitivity with enterprise strategy

- Controls processes and projects

- Results in fewer surprises and less uncertainty

Quality has fundamentally changed. Therefore, quality professionals must take a hard look at their role in this new business environment, assess their current skill set, determine what they need to learn to be relevant contributors of value, and make a decision of where they will be in the near future. Here are but a few suggestions of what we need to do:

- Become career resilient and learn enterprise risk management

- Understand the Sarbanes/Oxley Act, which incorporates new accounting and reporting requirements

- Understand enterprise risk management methodologies

- Understand how to conduct risk assessments or audits

- Lean how to establish a risk control structure or system

We all need to be career resilient and know how to add value. Quality has been very adaptable over the years. The body of knowledge has grown and the quality discipline has evolved from basic inspection to six sigma. The applications have expanded far beyond the manufacturing floor to providing quality in healthcare, education, and now homeland security. The contemporary business environment has morphed into one of greater expectations in the quality of corporate governance along with senior management personal accountability.

Risk and risk management are the next evolution in quality.

Greg Hutchins is a principal with Quality Plus Engineering in Portland, Oregon. Greg is the author of numerous books in process and supply management. This material is excerpted from Value Added Auditing, *see www.ValueAddedAuditing.com for more information. Greg can be reached at* **(503) 233-1012** *or* **gregh@europa.com**.

Dick Gould is a risk management and supply management program manager with Quality Plus Engineering. He is an ASQ Fellow and past chair of the Customer-Supplier Division of ASQ. Dick consults and conducts training on Quality Management Systems, Supply Chain Management, and Value Added Auditing. He has published articles and presented seminars related to these subjects at local, national and international events. Dick can be reached at **(949) 278-6896** *or* **ragvmg@aol.com**.

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Work Overload — Redesign the Jobs

Adapted from "Work Overload — Redesigning Jobs to Minimize Stress and Burnout" by Frank M. Gryna, ASQ Quality Press 2004.

You know the tyranny of work overload:

- Long workdays, often with eyes at half mast
- Unwanted overtime, paid or unpaid
- Difficulty in taking vacation time
- Taking work home

My own and other research confirms that companies are drenched in this work overload. What should we do? We must analyze the work to identify areas of waste, eliminate the waste, and then use the saved resources to eliminate and prevent it. Further, we need to recognize the strong interaction between jobs and family life when we tackle an overload problem.

10 Key Causes of Work Overload

- Insufficient resources
- Firefighting
- Lack of control of the work process
- Work process not capable
- Unclear goals and responsibilities
- Inputs from suppliers
- Inadequate selection and training of employees
- Information overload
- Computer problems
- Other

All these causes stem from the work itself and thus we need to study work as a process.

Studying Waste in a Process

Work overload means primarily a failure of the work system design, not a failure of the people doing the work. To correct current work overload — and prevent future overload — we must change the work design or add resources, rather than teach employees how to handle the stress from work overload.

We must identify and eliminate waste in processes and use the saved resources to add resources to reduce the overload.

Waste takes several forms:

- Firefighting
- Rework to correct errors
- Steps of marginal importance to a customer
- Unnecessary steps in a process
- Excessive inspection to find errors

Redesign at the Process Level

Redesign at the process level can be assisted by five categories of guidelines:

- Work content. This makes use of the flow diagram to identify non value-added steps, steps of low priority, combining individual jobs, and applying information technology.
- Process planning. This addresses matters such as linking process goals to customer and organization requirements and watching the handoffs between departments.
- Process inefficiencies. This concerns identifying bottlenecks that cause poor performance and work overload, and removing causes of errors to reduce rework and minimize checking and controls.
- Time and resources. This means identifying overworked personnel and allowing sufficient time for "knowledge processes" that involve acquiring, monitoring, processing, and analyzing complex information.
- Outside actions. This involves benchmarking with other organizations to see how they perform activities. It may also involve transferring some activities to suppliers or even customers.

Redesign at the Job Level

Processes consist of individual jobs that must also be redesigned. The primary culprit in work overload is the lack of time and resources to meet job goals, but another dimension adds to the work overload problem — the mental demands of many jobs. Mental demands on jobs are caused by (1) job content and (2) poor management practices.

The issues of mental demands and job content are:

- Mental intensity of the job (e.g., meeting productivity goals, frequent interruptions, firefighting)
- Time spent on the job (e.g., total hours, overtime, accessibility during nonwork hours)
- Job content (e.g., boring jobs, meaningfulness of jobs, working conditions)
- Control in doing the job (e.g., setting priorities, deciding work methods, using resources)
- Social interaction on the job (e.g., social environment, cooperation among employees)

Now add to this poor management practice issues as they relate to mental demands:

- Management support (e.g., trust and respect, feedback)
- Career planning (e.g., job security, financial compensation)
- Family-friendly practices (e.g., demands of work and home, flexibility of schedules)

All of these matters contribute to work overload.

How do we redesign at the job level? We:

1. Do an analysis of job characteristics (skill variety, task identity, task significance, autonomy, feedback).

2. Do an analysis for mental demands using the elements above for mental demands as they relate to job content, and mental demands as they relate to poor management practices.

3. Do an analysis for self-control. Highly detailed checklists (containing dozens of elements) are available for both manufacturing and service sector jobs. These are not theoretical but are based on research that collected best practices from people doing jobs.

Thus, we do have methodologies for redesigning jobs to eliminate work overload.

Operations Managers and Work Overload

The operations function is the heart of any manufacturing or service organization. Operations managers direct the activities that generate sales revenue through the product or service provided to external customers. They are responsible for meeting performance goals (with or without adequate resources). Downsizing and mergers often lead to a reduction in middle managers. Running lean can also result in fewer layers of middle managers. These and other factors lead to work overload for middle managers. For many operations managers, a typical day is this: manage fires, attend high priority meetings, and read e-mails in the time that remains.

Middle managers told me that they spend most of their time on six activities:

- Departmental planning and administration, including issues of time management, setting priorities, focus, delegation, fun on the job, and having a plan of palliative actions.

- Firefighting, including issues of adding temporary help, training additional firefighters, and facing the reality that some problems will not be solved. Of course, the real answer is to prevent the fires by thoroughly planning the work processes — but there's never time to do that.

- Personnel issues, including issues of recognizing the symptoms of work overload within themselves and the workforce, automatic follow-up on the status of open personnel requisitions, matching job requirements with the skills, aptitudes and interests of the person (but doing this right), and many other matters.

- Meetings, including issues of finding alternatives to meeting, preparing thoroughly for the meeting, conducting the meeting efficiently, and follow-up after the meeting.

- Managing information, including issues of reviewing internal material received, dropping subscriptions to some business journals, and reviewing how to handle e-mails.

- Business travel, including issues of considering alternatives such as videoconferencing, web conferencing, satellite broadcasting, teleconference calls, and e-mail.

What is the role of upper management in work overload?

Middle managers often say, "The overload problem should be obvious to upper management, but they don't care about overload and therefore take no action." The realities are: (1) upper management loses touch with employees two or more levels below, and (2) upper management accepts work overload as part of their job and is complacent about the feeling of the rest of the organization. We cannot expect upper management to act on work overload unless we present them with a compelling case to change the status quo. It is the responsibility of middle management to make that compelling case.

Frankly, nothing will happen on work overload until upper management is convinced of the seriousness of the problem. How? We need to assemble data that shows, in dollars, how much money the organization is losing each year due to work overload. No surprise — isn't that how we convince them to act on poor quality?

Costs on work overload are both tangible and intangible. The tangible include mandatory and voluntary overtime, cost of scrap due to work overload, worker compensation costs and extra insurance costs due to work overload, and other costs. The intangible costs include resignations of key employees, and recruiting and retraining costs due to resignations. Of course, some of these costs will be estimates. To retain credibility, obtain the estimates from sources responsible for the data, e.g., Accounting, Marketing, Human Resources, Quality.

Analysis and discussion of the data can proceed in several ways:

- Have the upper management team discuss the data at a regular top management meeting.

- Set up a task force of several members of the leadership team to analyze the data and present recommendations to the full team.

- If the overload problem is concentrated in one or several departments, the department heads can analyze the data and present recommendations to upper management.

It may be necessary to break up the problem into parts and use a project team for each part. Upper management could define the parts and define a mission statement for each project team. In complex situations, it may even be necessary to go through the steps to create a formal strategy on work overload.

Whatever approach is taken, upper management must lead the way to emphasize a priority on reducing overload, give approvals for action, and follow through to assure that the problem is solved and steps taken to prevent future work overload.

Frank M. Gryna is a Distinguished Professor of Industrial Engineering Emeritus at Bradley University and former Senior Vice-President of the Juran Institute. He is a Fellow of ASQ and recipient of several awards including and the Distinguished Service Medal and the E. L. Grant award. He has written extensively in the quality area. Contact him at **FrankGryna@aol.com**.

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Chair Elect
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Home Phone: (905) 648-2146
Office Fax: (905) 304-4075
E-Mail: Dennis@g-dennis-beecroft.ca

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Home Phone: (412) 269-0779
E-Mail: dean.bottorff@prodigy.net or
DLB@ethicsquality.com

Vice Chair, People
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Ron Bane Consulting
2372 Marina Glen Way, Sacramento, CA 95833
Office Phone: (916) 920-2678
Home Phone: (916) 359-2372
Office Fax: (916) 920-3058
E-Mail: ronbane@yahoo.com

Vice Chair, Print Initiatives
H. Fred Walker
Department of Technology
University of Southern Maine
Office Phone: (207) 780-5425
Office Fax: (207) 780-5129
E-Mail: hfwalker@usm.maine.edu

Vice Chair, Face-To-Face Initiatives
Art Trepanier
Lockheed Martin Missles and Fire Control
P.O. Box 650003, M/S SP96
Dallas, TX 75265-0003
Office Phone: (972) 603-2925
Home Phone: (972) 618-3887
Office Fax: (972) 603-3751
E-Mail: art.d.trepanier@lmco.com

Vice Chair, Operations
Heather McCain
Hallmark Cards, Inc.
11830 S. Pine, Olathe, KS 66061
Office Phone: (816) 274-8337
E-Mail: HeatherMcC@aol.com

Vice Chair, Technical Committees
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Examination Management Services, Inc.
9809 Champa Drive, Dallas, TX 75218
Office Phone: (214) 689-3603
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Email: bdenney@emsinet.com

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H. Fred Walker, Ph.D.
Department of Technology
100 Mitchell Center
University of Southern Maine
Gorham, ME 04038
Office: (207) 780-5425
Fax: (207) 780-5129
E-Mail: hfwalker@usm.maine.edu

Address all communications regarding the Quality Management Division of ASQ to:

John Bauer
QC/QA Pittsburgh
PO Box 13192, Pittsburgh, PA 15243
Office: (412) 276-2492
Home: (412) 276-2492
Fax: (412) 429-1702
E-Mail: qcqapgh@adelphia.net

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