

COMMITMENT PHASE

"I think it's really the only way to go in the future. I think anyone that wants to be cost-effective, efficient, and have a healthy organization, needs to go to this type of process"

— Carlos Rowland, Division Director, SORTA

Activities in this third phase help change the organization's formal structures, systems, and accountabilities. For example, an organization might change the way it maintains vehicles by implementing self-managed teams of mechanics responsible for a particular group of vehicles. Activities in this phase will provide the greatest payoff for an organization in terms of increased ridership, improved productivity, and reduced costs. These activities will also help ensure ongoing organizational improvement.

Remember, however, that these changes are potentially deep and broad in their reach. Although some organizations gain by implementing these bolder activities early on, most of the more formal changes are often short-lived unless a solid foundation and culture change momentum has been established. Activities that represent a more formal commitment to the philosophy and practices TQM embodies include:

- Establishing process management
- Reengineering work processes and job responsibilities
- Implementing supplier management and partnerships
- Evaluating and improving the measurement system
- Evaluating and improving the management performance appraisal system
- Instituting a system of "organized abandonment"

Ideally, the preceding six activities would be conducted in conjunction with each other. Of course, reality dictates not biting off more than you can chew. To help resolve this dilemma, we recommend using experimental pilot projects that make use of the organization's most effective leaders at all levels. Through these pilot projects, you'll create the momentum for structural change and learn how best to approach change in your organization. You can, in turn, leverage this learning into total organizational commitment for the large-scale changes required to achieve breakthrough performance.

ESTABLISH PROCESS MANAGEMENT

"An organization chart has two purposes — it shows which people have been grouped together for operating efficiency and it shows reporting relationships. For these purposes, the organization chart is a valuable administrative convenience. However, it should not be confused with the 'what', 'why', and 'how' of the business; all too often it's the organization chart, not the business, that's being managed"

— Geary Rummler and Alan Brache

Within the quality movement, the word "process" refers to how work activities are performed. Typically, a process that creates value for a customer crosses several boundaries in an organization. For example, meeting customer expectations for on-time performance may require the joint efforts of those in scheduling, maintenance, and operations. The term "process management" means that an organization manages work across functional or departmental boundaries, whereas traditional organizations manage within those boundaries.

In process management, the emphasis is on improving how we manage the workflow, including refining the measures we use, planning for better feedback from customers and better communication across departments, and establishing accountability for the things that matter most to customers.

Key process management concepts include:

- Process accountability — End-process results are typically those of most interest to customers. They are often the responsibility of a cross-functional team with ongoing responsibility for managing the process. The people on the team should be senior enough to assume full management responsibility for their piece of the process. A senior-level process sponsor is often helpful in removing roadblocks and mentoring the team and is where the buck stops if process issues need to be escalated for decision-making.
- Understanding the big picture — Process management efforts often begin by creating a high-level flowchart of the organization's cross-functional processes with the objective of identifying major process hand-offs and how various work groups interact.
- Customer requirements — This is what the customer requires of the process in terms of quality, cost, and schedule. Although end-process customer requirements are primary, agreements between internal customers and suppliers are often used to bring clarity to the requirements associated with interdepartmental work.
- Measures and feedback systems — Process measures, including measures of supplier quality, are used to manage key internal process points and to set performance targets. Normally, the process management team determines critical measures and performance targets to meet customer requirements. Feedback systems go beyond measurement to ensure regular proactive communication between customers, process members, suppliers, and other key stakeholders.
- Continuous process improvement — The process management team is also accountable for improving process performance. They often commission and sponsor QITs to make specific improvements. In some cases, they may determine that the entire process needs to be reengineered as described in the following section.

EXAMPLE

The matrix on Page 36 links generic transit quality attributes and organizational functions to identify cross-functional accountabilities for customer satisfaction.

EXAMPLE

The organizational process map on Page 37 provides a big-picture view useful in establishing process-oriented accountability, measures, and feedback.

RESOURCES

- AT&T Quality Library, *Process Quality Management & Improvement Guidelines*, Select Code 500-049, 1988.
- Rummler, G.A. and Brache, A.P., *Improving Performance: How to Manage the White Space on the Organization Chart*, 1990.

**REENGINEER WORK PROCESSES & JOB RESPONSIBILITIES**

"It is time to stop paving the cow paths"

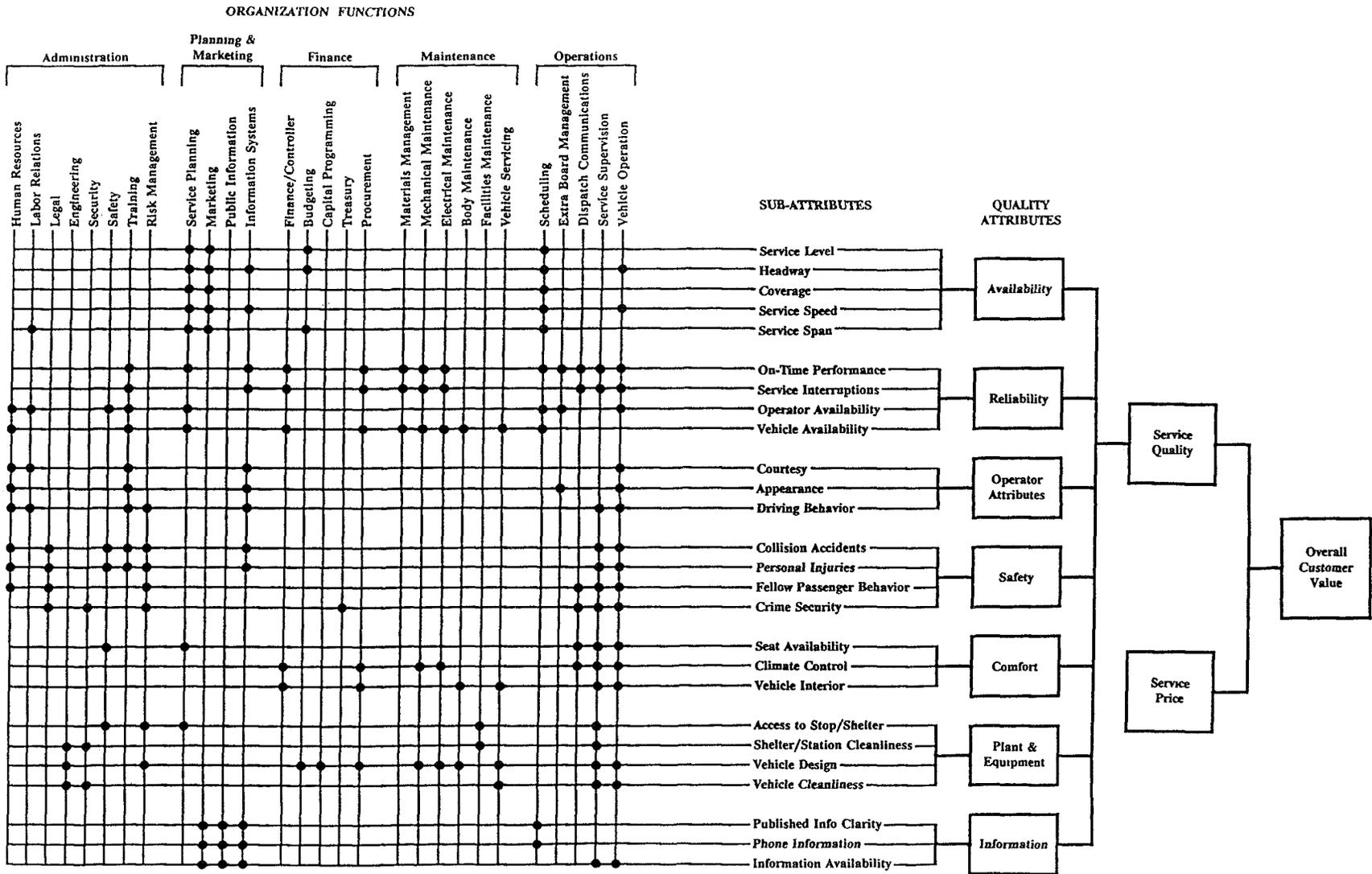
— Michael Hammer

Reengineering has been a popular concept in the private sector since the early 1990s. The essential idea is to redesign work according to cross-functional processes that can best meet the needs of customers. In reengineering a process, the design team is urged to "start with a clean slate" and to make the best use of modern information technology.

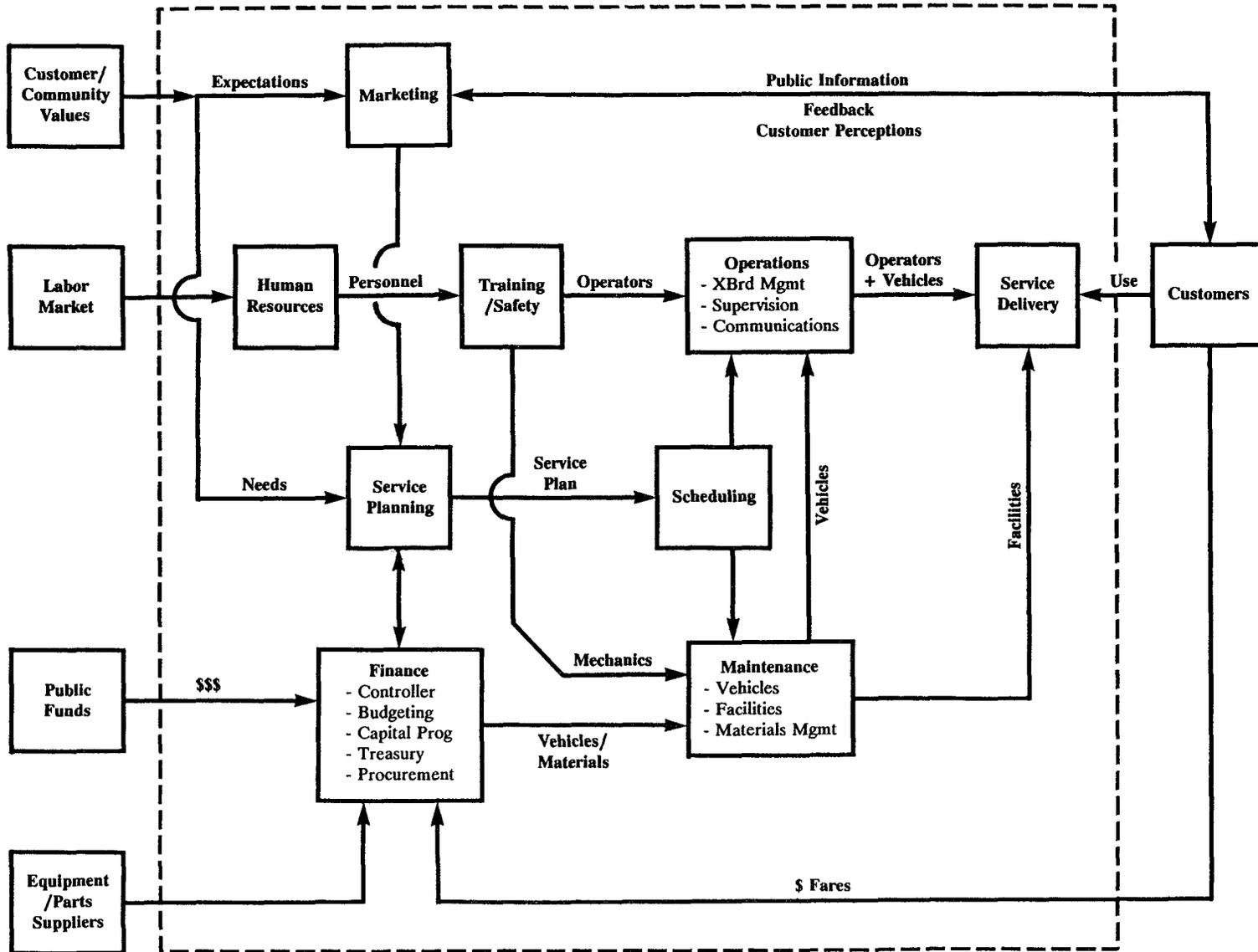
Some reengineering efforts have been very successful, but many more have failed. Too often, the designers underestimate the human factor or ignore the need to build a solid foundation and cultural momentum. A failure on management's part to integrate properly the human/cultural factor and to reengineer support systems (e.g., measurement, accountability, and rewards) along with the actual work processes has been a major stumbling block. However, for most transit systems, some reengineering will be necessary to produce better results. Without it, we have the same work process, same result — working harder will be an exercise in futility.

When you start to consider reengineering, consider as your first priorities developing more motivating jobs and teamwork for the front-line customer-facing employees. Next, consider those support processes, systems, and information technology that are needed to support the front-line employee. In reengineered processes, supervisors and middle managers often have new roles — such as supporting self-managing teams and managing cross-functional work processes. If they're not prepared for these roles well in advance of the actual change, they may find reengineering too threatening to support and contribute to it. If certain jobs will be eliminated as the result of reengineering, it's vital to redeploy the affected people responsibly. With represented employees, union consent is a must.

Linkage Between Quality Attributes and Organizational Functions



Typical Transit Relationship Map at the Organizational Level





Use the process management concepts and practices described in the previous section in conjunction with your reengineering efforts. A major pitfall is to reengineer with the primary emphasis on process and technology and only gathering "employee input" as an exercise. Avoid this pitfall by reengineering with strong employee involvement and an emphasis on designing jobs with the following characteristics:

- Ownership – The job-holder has ongoing responsibility for something, for example, for "my" bus, "my" route, "my" service area, or "my" accounts.
- Authority for thinking – The job-holder makes key decisions with respect to his or her responsibility.
- Accountability for results – The job-holder is accountable for meeting the goals associated with ownership, such as a reliable vehicle or a satisfied customer.
- Measures of success – The job-holder has a way of keeping score and receiving feedback from customers served.



To establish self-managing teams, senior leadership will need to plan a careful transition. Members of a self-managing team often must be equipped with new job skills (e.g., how to schedule preventive maintenance) as well as new skills in team dynamics. The same person who had acted as their supervisor may now be asked to act as a coach to teach new job skills and to help the team through difficult periods. Both the new teams and their coach will need support and training. Failure to provide that support is destructive.

EXAMPLE Self-Managing Teams.

A two-person mechanic team is given the responsibility for maintaining the same ten vehicles. They are responsible for preventive maintenance of these vehicles and for "contracting out" to other maintenance employees any repairs they cannot perform themselves. The same coach operators drive these vehicles every day during a particular period. In essence, the two mechanics and ten coach operators can become a team focused on delivering excellent customer service to a particular community or neighborhood.

RESOURCES

- AT&T Quality Library, *Reengineering Handbook*, Select Code 500-449, 1991.
- Champy, J., *Reengineering Management: The Mandate for New Leadership*, 1995.
- Hammer, M. and Champy, J., *Reengineering the Corporation: A Manifesto for Business Revolution*, 1993.

IMPLEMENT SUPPLIER MANAGEMENT & PARTNERSHIPS

"End the practice of awarding business on the basis of price tag alone"

— W. Edwards Deming

Companies recognized as quality leaders treat their suppliers as an extension of their own business, i.e., as partners. This is especially true in the case of their key suppliers, those having the most impact on the operation, e.g., parts suppliers, vehicle manufacturers, purchased transportation providers, and construction contractors. Good supplier management and partnerships require that you be clear about your requirements and that you provide suppliers with timely feedback.

The leadership team can introduce consistent and effective approaches to managing relationships with key suppliers by defining or endorsing a supplier policy. The policy outlines when and how the following items are to be addressed in dealing with suppliers:

- Certification of the supplier's quality system — When a supplier's quality system has been certified by independent auditors against well-defined criteria, you may be able to eliminate incoming inspections. Many companies have developed their own criteria and procedures for supplier certification. Others have adopted the Baldrige criteria or ISO 9000 standards.
- Qualification of the supplier's products and services — This ensures a supplier can consistently meet defined product or service requirements.
- Contracts — Trends favor fewer suppliers and longer-term contracts that detail explicit expectations of ongoing improvement in quality, delivery intervals, and/or price.
- Joint improvement activities — The main aspects of joint improvement activities are supplier education, joint planning for improvement, feedback on performance and problems, and recognition for improvement. It is not unusual to have key suppliers participate on your QITs in relevant areas.

RESOURCES

- AT&T Quality Library, *Supplier Quality Management: Foundations*, Select Code 500-496, 1994.



EVALUATE AND IMPROVE THE MEASUREMENT SYSTEM

"If you are not keeping score, you are only practicing"

— Tom Malone, President, Milliken

When you think about your measurement system, remember to evaluate how data are gathered, validated, distributed, and used. A good measurement system also indicates linkages, correlations, and potential cause-and-effect relationships among measures. If you collect data consistently and over reasonably long time periods, you'll be able to analyze trends and to see patterns over time. This will help you manage more effectively.

When an organization reaches this phase of the journey, it will likely have quite a bit of experience in establishing new measures. These measures may include customer satisfaction, employee satisfaction, process efficiency or effectiveness, and supplier quality. You may begin to see how certain measures are linked. For example, you may see how certain operational or process measures are leading indicators of customer satisfaction. That is, when you see improvement in a particular process measure (e.g., on-time performance), shortly afterward you should consistently see an improvement in a particular measure of customer satisfaction. Similarly, supplier quality may impact process cycle times. These linkages can help an organization manage by fact.

An effective measurement system will help every employee see more clearly how they contribute to overall company goals. An intelligent measurement system can also help you allocate resources to achieve the biggest bang for the buck in customer satisfaction.



Good measures are S.M.A.R.T.:

- Specific — focused on a well-defined outcome
- Meaningful — matters to the customer or our ability to perform a job
- Actionable — drives decision-making and improvement
- Reliable — based on good data and sound data gathering methods
- Timely — provides the information to people when they need it

RESOURCES



- AT&T Quality Library, *Analyzing Business Process Data: The Looking Glass*, Select Code 500-445, 1990.
- Davidow, W.H., and Uttal, B., *Total Customer Service: The Ultimate Weapon: A Six-Point Plan for Giving Your Business the Competitive Edge in the 1990s*, 1989.

EVALUATE AND IMPROVE THE MANAGEMENT PERFORMANCE APPRAISAL SYSTEM

*"Merit rating rewards people that do well in the system.
It does not reward attempts to improve the system"*

— W. Edwards Deming

Most transit employees work under labor agreements and are not subject to performance appraisals. Consequently, some transit organizations may be tempted to simply ignore management performance appraisals. This would be a mistake. Most management performance appraisal systems reinforce a patriarchal organizational culture and hinder teamwork. To develop commitment to TQM, they should be brought in line with its principles.

Performance appraisal systems under TQM should promote:

- A customer-focus over a boss-focus
- Employee support
- Team goals as much as individual goals
- Values and leadership behaviors as much as performance results

To bring performance appraisals more in line with the principles of TQM, develop a more balanced set of performance and leadership criteria and use evaluative feedback from several sources, not just the "boss' opinion." The balanced scorecard may include:

- Individual performance indicators
- Team-based performance indicators
- 360-degree feedback regarding leadership behaviors supporting desired values
- Team-based customer satisfaction results
- Skill acquisition and certification of both technical and leadership skills

The process of performance appraisal should also be evaluated and improved to put more emphasis on self, peer, and team evaluation. Individual ranking and rating systems should be replaced or at least modified, so that individuals are not directly compared to one another. In some cases, self-managing teams administer their own appraisals and financial compensation.

RESOURCES

- Knouse, S., *The Reward and Recognition Process in Total Quality Management*, 1995.



INSTITUTE A SYSTEM OF "ORGANIZED ABANDONMENT"

"Just as important as the decision on what new and different things to do, is planned, systematic abandonment of the old that no longer fits the purpose and mission of the business, conveys satisfaction to the customer, or makes a superior contribution"

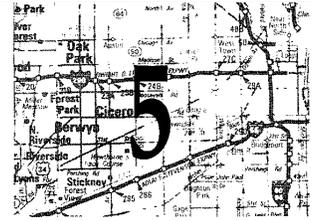
— Peter Drucker

Over time, organizations become a junk pile of outdated practices that clog the system. In a system of "organized abandonment," every product, service, policy, rule, and procedure is put on trial for its life at least once every three years.

Transit agencies typically have a ton of standard operating procedures (SOPs) that have grown over time. Many originated for good reasons like passenger safety, but others were developed because of problems with an individual employee. Many SOPs are in place simply because managers don't "trust" employees and employees get that message loud and clear. Ninety-eight percent of employees are working under many rules designed for two percent of the work force.

A system of regular planned abandonment along with annual quality process evaluations will help any organization update itself and keep pace with the future aspirations of its people, customers, and community.

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LEADERSHIP: THE TQM DRIVER

*"The first job of a leader is to define reality, the last is to say thank you.
In between, the leader is a servant"*

— Max DePree,
Chairman of the Board, Herman Miller

Leadership is people focused, management is task focused. Although we need both to succeed, leadership at all levels is generally in shorter supply. A major leadership imperative is to create an organization that is value-based rather than rule-based. People's work in a value-based organization is guided by direction, values, and accountability rather than relying on the rulebook, elaborate staff procedures, and compliance behavior.

KEY LEADERSHIP RESPONSIBILITIES

Leadership is the engine of transformation required throughout your quality journey. Leaders in a value-based organization are responsible for the following:

- Direction — Enlisting the organization in clarifying its vision, mission, and goals.
- Culture — Promoting desired organizational values and associated behaviors by example.
- System — Creating motivating jobs that provide employees with ownership, authority for thinking, and accountability for clearly defined results. Processes, systems, and structure should support the front-line employee.

Although, all efforts rely on leadership, the following responsibilities are particularly important and will help focus your attention at various points of your journey.

PHASE 1 — FOUNDATION

- Building the senior labor-management team to lead the quality journey — Promote quality awareness, build from common interests and a customer focus rather than "managing differences," and develop TQM goals and an action plan that underscores desired values such as customer focus, employee involvement, and continuous improvement.
- Enlisting support of additional managers, supervisors, and union leaders — Senior leaders should put much of their personal energy into working with those that demonstrate early leadership for quality, ensuring their early success and recognition. The next group to go after are the fence-sitters.
- Sponsoring early quality initiatives — The role of a sponsor is one of a supporting mentor. Acting as a sponsor is an opportunity to model the leadership behaviors you wish to develop in others.

PHASE 2 — MOMENTUM

- Clarifying leadership expectations and focusing on leadership development — Leaders create opportunities for other leaders to assert and develop themselves. To create sufficient critical mass for culture change, senior leaders must clarify expectations consistent with desired values and the future role of managers in the organization.
- Recognizing, rewarding, and celebrating contribution — Trailblazers must be visibly recognized, and processes need to be established to promote the new behaviors.
- Sponsoring high-priority improvements — Sponsorship of improvement projects during the Foundation Phase sets the tone for leadership and experimentation. Sponsorship of high-priority improvements in the Momentum Phase build on earlier experiences and are more strategic in nature.
- Evaluating and revising policies and practices to eliminate bureaucracy and empower employees — This establishes the early signals of fundamental structural change and commitment. Many changes, such as eliminating unnecessary approval processes, are not complex to implement but require trust and coaching.

PHASE 3 — COMMITMENT

- Sponsoring and integrating all commitment phase activities — All commitment activities require involved sponsorship by senior leaders to ensure cultural momentum translates into structural improvements that can produce breakthrough performance results. Integrated pilots that rely on the organization's best leaders at all levels are the senior leader's best tools for leveraging total organizational commitment.
- Continued leadership development — Leaders at all levels of the organization should be emerging through broad opportunities for learning and contribution. These individuals should be tapped on the shoulder for the pilots described above and be given more formal responsibility if they desire.
- Ensure systems for ongoing evaluation and improvement are established — Quality process assessments as well as organizational abandonment practices should be instituted to provide systems for organizational evolution.

LEADERSHIP DEVELOPMENT

*"A requirement of effective leadership is to earn trust.
Otherwise there won't be any followers...and the only definition
of a leader is someone who has followers"*

— Peter Drucker

The majority of us see the need for organizational transformation. Some of us see how our own group needs to be transformed to support and lead the overall cause. However, the building block of transformation is personal change and mastery. This is what leadership and organizational transformation boils down to. Making changes within ourselves to make differences in our workplace. Without this kind of personal leadership, we are only going through the motions of transformation, scratching the surface.

The concept of "situational leadership" implies that there is not one most effective leadership style — we must match the leadership style to the situation, group, and individual. Moving too fast from a directive style to a delegating style is a common mistake — solid enablement and coaching support is vital to creating employee empowerment.

A "senior leadership team" implies collective responsibility for the strategic goals of the organization as well as its culture. Clarifying key measures/goals and accountability for results brings a mission statement down to earth. In addition, the group should identify high-priority improvement areas that will have the biggest bang for the buck, tackle cross-departmental issues, and determine how the group will reinforce and reward the desired values of the organization. They should also take a hard look at all the rules and policies that may still be unempowering.

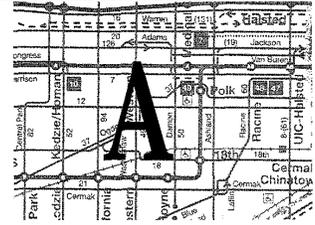
Finally, the goal of leaders must be to develop leadership at all levels of the organization. This begins by providing opportunities for people to better themselves and make meaningful contributions as stewards of the organization.

RESOURCES

- Belasco, J.A., *Teaching the Elephant to Dance: The Managers Guide to Empowering Change*, 1991.
- Block, P., *Stewardship*, 1993.
- Covey, S.R., *Principled-Centered Leadership*, 1990.
- DePree, M., *Leadership is an Art*, 1989.
- Lynch, R., *Lead!, How Public and Nonprofit Managers Can Bring Out the Best in Themselves and Their Organizations*, 1993.



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QUALITY RESOURCES

GENERAL

Deming, W. Edwards, *Out of the Crisis*, MIT Center for Advanced Engineering Study (1982).

Dr. Deming shows the way "out of the crisis" with his famous 14 Points. This book teaches the transformation that is required for survival — a transformation that can only be accomplished by man. Dr. Deming encourages long-term commitment to new learning and new philosophy. He stresses new principles of training and leadership, the need for clear operational definitions, and common and special causes of improvement. "A company cannot buy its way into quality," he writes, — "it must be led into quality by top management."

Imai, Masaki, *Kaizen: The Key to Japan's Competitive Success*, Random House, Inc. (1986).

Kaizen means gradual, unending improvement, doing "little things" better; setting — and achieving — ever-higher standards. In this classic book, Masaki Imai describes how a process-oriented, customer-driven strategy of involving everyone — both managers and workers — in the continuous improvement of products and services will lead to improved quality and productivity.

Juran, Joseph M., *Juran on Leadership for Quality: An Executive Handbook*, The Free Press (1989).

Juran lays out his famed "Juran Trilogy" on how to apply the familiar business concepts of "planning, controlling, and improving" to quality leadership. He gives criteria for selecting project-by-project improvements and for picking a team to carry them out. He also describes a realistic timetable for implementation and directs the formulation of an ongoing quality council.

Peters, Thomas J., *Thriving on Chaos: Handbook for a Management Revolution*, Alfred A. Knopf (1987).

Forty-five prescriptions specify what managers at every level must do — and do fast — if the organizations they lead are to survive, let alone flourish, in today's and tomorrow's chaotic economic environment. The prescriptions are divided into five richly informative sections: creating total customer responsiveness, pursuing fast-paced innovation, achieving flexibility by empowering people, learning to love change, and building systems for a world turned upside down.

LEADERSHIP AND ORGANIZATIONAL CULTURE

AT&T Quality Library, *Leading the Quality Initiative*, Select Code 500-441 (1990).

This book describes a leadership role that supports three fundamental business values: satisfied customers, effective and efficient processes, and empowered and enabled employees. The book draws on a number of key sources including best practices from a growing body of

quality management knowledge and experience of companies including AT&T, the Baldrige criteria, international quality standards, and books and papers by various management and quality experts.

Belasco, James A., *Teaching the Elephant to Dance: The Manager's Guide to Empowering Change*, Penguin Books (1991).

This book gives every manager a step-by-step guide to making the impossible happen and is filled with illuminating case histories of companies large and small that have maneuvered out of stagnation to get back into the competitive mainstream. It shows how to devise new corporate vision and strategies, how to overcome inertia and inbred adherence to "how it has always been done," and how to make both management and labor trail blazers rather than road blockers to new standards of excellence.

Block, Peter, *Stewardship*, Berrett-Koehler Publishers (1993).

Organizations that practice stewardship will succeed in their marketplace by choosing service over self-interest and by a far-reaching redistribution of power, purpose, and wealth. Without this, little real change will result. In place of the "managerial class system" the author says, we need to reintegrate the managing of work with the doing of work. Everybody manages and everybody does real work.

Cohen-Rosenthal, Edward and Burton, Cynthia E., *Mutual Gains: A Guide to Union-Management Cooperation*, 2nd ed, rev., ILR Press (1993).

While quality efforts can be an excellent way to showcase union-management cooperation, both parties should be vigilant about the real hazards, risks, and potential losses associated with such efforts. The key to success is to position quality efforts solidly within the collective bargaining relationship on a foundation of union-management cooperation. Management and unions can do almost anything that they set out to do, when they summon their imaginations and are dedicated to having the highest-quality cooperation in order to provide the highest quality service.

Covey, Stephen R., *Principle-Centered Leadership*, Summit Books (1990).

How do you transform the paradigms of people and organizations from reactive, control-centered management to proactive, empowerment-oriented leadership? While Deming's theory of total quality explains the "what" to do and gives a partial explanation of "why" it should be done, Stephen Covey supplies the missing "how-to-do-it." The Seven Habits are foundation principles that, when applied consistently in practice, become behaviors enabling fundamental transformations of individuals, relationships, and organizations.

DePree, Max, *Leadership is an Art*, Dell Publishing (1989).

Leadership isn't a science or a discipline. It is an art; as such it must be felt, experienced, created. Max DePree is chairman and CEO of Herman Miller, Inc., the furniture maker that was named one of Fortune magazine's ten "best managed" and "most innovative" companies. This is not a how-to manual but brings the reader back to the reality that human values form the basis for extraordinary leadership.

Lynch, Richard, *Lead!, How Public and Nonprofit Managers Can Bring Out the Best in Themselves and Their Organizations*, Jossey-Bass Publishers (1993).

Drawing on numerous real-life examples from government agencies and nonprofit organizations, Lynch explains how leaders can enhance their personal influence, establish a sense of collective purpose, design jobs that reward employees for meaningful results, create a streamlined organizational structure, foster and sustain meaningful values, keep employees hopeful in hard times, and create a positive organizational climate.

Schein, Edgar H., *Organizational Culture and Leadership*, Jossey-Bass Publishers (1992).

This second edition transforms the abstract concept of culture into a tool that managers and students have continually used to better understand the dynamics of organizations and change. The author presents critical new learnings and practices in the field. He defines culture — what it is, how it is created, how it evolves, and how it can be changed — and clearly demonstrates the crucial role leaders play in successfully applying the principles of culture to increase organizational effectiveness.

EMPLOYEE EMPOWERMENT AND TEAMS

Blanchard, Kenneth; Carew, Donald; and Parisi-Carew, Eunice, *The One-Minute Manager: Builds High Performance Teams*, William Morrow and Company, Inc. (1990).

Benefit from learning how to develop through the four stages of team development. This book is essential for anyone who works with groups and wants to improve group effectiveness. It also describes the concept of situational leadership.

Block, Peter, *The Empowered Manager: Positive Political Skills at Work*, Jossey-Bass Publishers (1987).

Empowerment is not a set of techniques — it is a choice. Is this a business strategy you believe in? The promise of empowerment is that it will dramatically increase the sense of responsibility and ownership at every level of the organization, especially at the bottom where products and services are delivered and customers are served. The goal of this book is to present a way of being political that balances the hope for transforming organizations with the risk in attempting change, in a realistic and helpful way.

Byham, William C. with Cox, Jeff, *Zapp! The Lightning of Empowerment: How to Improve Quality, Productivity, and Employee Satisfaction*, Fawcett Columbia (1988).

This book is written in the style of a fable providing light reading while dealing with the basic principles of empowering people — helping employees take ownership of their jobs so that they take personal interest in improving the performance of the organization. This book can help you understand on a fundamental, practical level what empowerment really is, why it is important, and how to start using its key principles on the job.

Zenger, John H.; Musselwhite, Ed; Hurson, Kathleen; and Perrin, Craig, *Leading Teams: Mastering the New Role*, Business One Irwin (1994).

Implementing successful teams presents the challenge of training team members to take more responsibility for their work. But the greater challenge for managers and supervisors is preparing for their new role. The book is a comprehensive guide to the art of shared leadership — helping the team to perform activities that managers once performed alone.

METHODS AND TOOLS

American Society for Quality Control, *Malcolm Baldrige National Quality Award Criteria*, 1-800-248-1946.

The award criteria are published each year and are the basis for making awards and for giving feedback to applicants. In addition, the criteria have three important roles in strengthening U.S. competitiveness: to help improve performance practices and capabilities; to facilitate communication and sharing of best practices information based upon a common set of key performance requirements; and to serve as a working tool for managing performance, planning, training, and assessment.

AT&T Customer Information Center, *AT&T Quality Library*, 1-800-432-6600.

Over 30 quality volumes providing practical advice and examples on a variety of methods and tools. Volumes suggested in this guidebook have included:

- *Analyzing Business Process Data: The Looking Glass*, Select Code 500-445 (1990).
- *Great Performances! The Best in Customer Satisfaction and Customer Service*, Select Code 500-450 (1991).
- *Policy Deployment Handbook*, Select Code 500-453 (1992).
- *Process Quality Management and Improvement Guidelines*, Select Code 500-049 (1988).
- *Reengineering Handbook*, Select Code 500-449 (1991).
- *Supplier Quality Management: Foundations*, Select Code 500-496 (1994).

Brassard, Michael and Ritter, Diane, *The Memory Jogger II*, GOAL/QPC (1994).

The Memory Jogger II is the successor book to *The Memory Jogger* first written and produced in 1985. It is an outstanding reference and guide to basic tools and techniques used by individuals and teams in identifying and solving problems. The book contains the basic Seven Quality Control Tools and the Seven Management and Planning Tools with excellent graphics and examples. The book also contains a complete case study that details Stop'N Go Pizza's using the Improvement Storyboard model.

Camp, Robert C., *Benchmarking: The Search for Industry Best Practices that Lead to Superior Performance*, American Society for Quality Control, Quality Press (1989).

Find answers to the questions: What is benchmarking? How do I perform benchmarking? What are the results of successful applications? Case histories provide examples of actual benchmarking investigations from beginning to end.

Champy, James, *Reengineering Management: The Mandate for New Leadership*, Harper Business (1995).

Now that companies have taken pains to reengineer their operational processes, the management processes must change in accordance. In *Reengineering Management*, Champy reveals that these processes must focus on mobilizing, enabling, defining, measuring, and communicating in order to achieve a business culture that enables a continuous process of improvement.

Davidow, William H. and Uttal, Bro, *Total Customer Service: The Ultimate Weapon: A Six-Point Plan for Giving Your Business the Competitive Edge in the 1990s*, Harper & Row Publishers (1989).

Drawing on in-depth case histories of service leaders who have triumphed and of laggards who have lost, Davidow and Uttal have devised a six-point plan that any company — regardless of what business it is in — can utilize to secure a decisive competitive edge: devise a service strategy; get managers to behave like customer service fanatics; concentrate on motivating and training employees; design products and services that make good customer service possible; invest in service infrastructure; and constantly monitor achievement of customer service goals.

Hammer, Michael and Champy, James, *Re-engineering the Corporation: A Manifesto for Business Revolution*, Harper Business (1993).

This book describes the principles behind a new and systematic approach to structuring and managing work. Written in clear, readable prose, the book describes the what, the why, and the how of business reengineering.

Hart, Christopher W. L. and Bogan, Christopher E., *The Baldrige: What it Is, How it's Won, How to Use it to Improve Quality in Your Company*, McGraw-Hill, Inc. (1992).

In the short span of years since Congress created the Malcolm Baldrige National Quality Award, it has become the most widely sought-after symbol of commitment to excellence and achievement of the highest quality standards. Much more than just a how-to manual for describing what it takes to capture the nation's most prestigious award, *The Baldrige* provides the guidance, discipline, and focus to move your company from the here of current quality to the there of its true competitive potential.

King, Bob, *Hoshin Planning — The Developmental Approach*, GOAL/QPC (1989).

Hoshin Planning creates an organization-wide system for generating and achieving breakthroughs that lead to improved levels of customer satisfaction. The three-part Hoshin Planning process integrates an organization's vertical and cross-functional teams and helps organizations develop a vision understood by every employee as well as one-, three-, and five-year strategic plans.

Knouse, S., *The Reward and Recognition Process in Total Quality Management*, American Society for Quality Control, Quality Press (1995).

This is the first book to specifically examine the reward and recognition process that is vitally important in the implementation of total quality management. Reward and recognition is a central process that links individual and team efforts to TQM and customer satisfaction, in any company. Many organizational examples of reward and recognition are presented.

Rummler, Geary A. and Brache, Alan P., *Improving Performance: How to Manage the White Space on the Organization Chart*, Jossey-Bass Publishers (1990).

Rummler and Brache provide a practical framework for understanding how various departments and functions in an organization interrelate and show how to manage this interaction to enhance the organization's effectiveness. Three avenues of approach for dealing with performance issues are explored: through organizational strategies, structures and management practices; through the processes used to get work done; and through individual jobs and employees.

Scholtes, Peter R. and other contributors, *The Team Handbook*, Joiner Associates (1988).

This book takes sound principles of adult learning and group dynamics and translates them into clear, practical, easy-to-apply strategies and techniques for enabling project teams to do their work effectively and smoothly. It is a valuable resource for any project team, providing detailed guidance and tools helpful at all stages of their work.

Zeithaml, Valarie A.; Parasuraman, A.; and Berry, Leonard L., *Delivering Quality Service: Balancing Customer Perceptions and Expectations*, The Free Press (1990).

The authors' grounding model, which tracks the five attributes of quality service — reliability, empathy, assurance, responsiveness, and tangibles — goes right to the heart of the tendency to overpromise. By comparing customer perceptions with expectations, the model provides planning and marketing managers with a two-part measure of received quality that, for the first time, enables them to segment a market into groups with different service expectations.

PROFESSIONAL SOCIETIES

American Management Association (AMA)

135 West 50th Street
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(518) 891-4048

Conferences, seminars, publications, videos, and a membership of over 70,000 organizations and individuals.

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Conferences, educational courses, seminars, *Quality Review* magazine, and *Quality Progress* journal, book service, professional certification, technical divisions, committees, and local chapters.

Quality and Productivity Management Association (QPMA)

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Network of North American quality and productivity coordinators, operating managers and staff managers, conferences, workshops, *Commitment Plus* newsletter, resources guide, and local chapters.

JOURNALS, PERIODICALS, AND NEWSLETTERS

Commitment Plus

Newsletter, monthly
Quality and Productivity Management Association (QPMA)
300 Martingale Road, Suite 230
Schaumburg, IL 60173
(708) 619-2909

Journal for Quality and Participation

Journal, six times/year
Association for Quality and Participation (AQP)
801-B West 8th Street, Suite 501
Cincinnati, OH 45203-1601
(513) 381-1959

Quality

Magazine, monthly
Hitchcock Publishing Co.
191 S. Gary Avenue
Carol Stream, IL 60188
(312) 655-1000

Quality Digest

Magazine, monthly
QCI International
1425 Vista Way
Red Bluff, CA 96080
(916) 527-8875

Quality Progress

Magazine, monthly
American Society for Quality Control (ASQC)
310 West Wisconsin Avenue
Milwaukee, WI 53203
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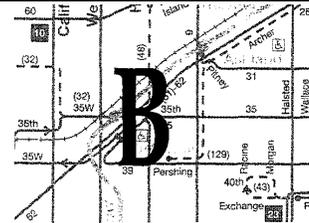
Productivity Press

Productivity, Inc.
P.O. Box 3007
Cambridge, MA 02140
(800) 274-9911

Quality Press

American Society for Quality Control (ASQC)
310 West Wisconsin Avenue
Milwaukee, WI 53203
(800) 952-6587

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QUALITY GLOSSARY

appraisal costs

The costs associated with inspecting the product to ensure that it meets the customer's (either internal or external) needs and requirements.

approach

One of the three evaluative dimensions used in Baldrige scoring, "approach" refers to the methods a company uses to achieve the purpose stated in the criteria. Some specific components of the approach concept are the degree to which it is systematic, integrated, consistently applied, and prevention-based.

acceptable quality level (AQL)

A concept used with sampling procedures applied to arms-and-ammunition suppliers during World War II, AQL is the poorest quality that a supplier can provide and still be considered "acceptable" or satisfactory. The concept—that some errors or defects are normal—is the antithesis of "zero defects," which holds that the only allowable standard for quality is error-free work.

audit

An assessment to determine the extent to which certain standards or requirements have been met, usually conducted independently of personnel responsible for implementing the standards or requirements.

Baldrige Award

See Malcolm Baldrige National Quality Award.

benchmarking

The practice of setting operating targets for a particular function by selecting the top performance levels, either within or outside a company's own industry. In a broader sense, benchmarking involves searching around the world for new ideas and best practices for the improvement of processes, products, and services.

best of class

When overall performance, in terms of effectiveness, efficiency, and adaptability, is superior to all comparables.

brainstorming

A technique used by a group of people for thought generation. The aim is to elicit as many ideas as possible within a given timeframe.

catchball

In policy deployment, extensive communication across management levels when setting annual objectives. The analogy to tossing a ball back and forth emphasizes the nature of the interaction.

cause

An established reason for the existence of a defect.

common cause

A source of variation in the process output that is inherent to the process and will affect all the individual results or values of process output.

companywide quality control (CWQC)

An expression used widely in Japan, CWQC means the application of quality principles to all processes in a company and the involvement of all employees at all levels in the quality-improvement process. The concepts of continuous improvement and customer satisfaction are also embedded in the approach. CWQC is the equivalent of "total quality management (TQM)" in the United States, where the term "management" has roughly the same meaning as the word "control" in Japan.

conjoint analysis

Also called "tradeoff analysis," conjoint analysis is a method for providing a quantitative measure of the relative importance of one product or service over another. In performing this type of analysis, customers are asked to make tradeoff judgments: Is one feature desirable enough to sacrifice another? Conjoint analysis is particularly useful in situations where customer preferences are in conflict and where the problem is to develop a compromise set of attributes.

control

A term applied to the management of processes indicating that quality requirements, standards, or goals are being met and that the output of the process is predictable.

correction

The totality of actions to minimize or remove variations and their causes.

corrective action

The implementation of effective solutions that result in the elimination of identified product, service, and process problems.

cost of poor quality

The overall financial loss to the business due to quality problems; the cost of poor quality includes all costs of rework, lost value, and other forms of waste that might be prevented through quality methods.

cost of quality

The sum of the cost of prevention, appraisal, and failure. The key financial measurement tool that ties process control and process optimization into a total process-management effort. It can be used both as an indicator and a signal for variation (more often, for patterns of variation), as well as a measure of productivity and efficiency.

cross-functional process

A process spanning organizational boundaries and involving work groups and people who do not normally interact.

cross-functional teams

Teams similar to quality teams but whose members are from several work units that interface with one another. These teams are particularly useful when work units are dependent upon one another for materials, information, etc.

culture

A prevailing pattern of activities, interactions, norms, sentiments, beliefs, attitudes, values, and products in an organization.

customer

The recipient or beneficiary of the outputs of your work efforts or the purchaser of your products and services. May be either internal or external to the organization, and must be satisfied with the outputs of your work efforts.

customer expectations

Customer perceptions of the value they will receive from the purchase of a product or service. Customers form expectations by analyzing available information, which may include experience, word-of-mouth, and advertising and sales promises.

customer, external

The purchaser of a product or service.

customer, internal

A downstream internal operation that depends on outputs or results of a given process, or an employee of the business who depends on these outputs or results.

customer satisfaction

The degree to which a customer's experience with a product or service meets customer expectations for that product or service.

customer service process

A business process related to selling, delivering, or otherwise supporting primary products and services.

customer/supplier model

A representation of tasks and work flows in terms of a process, its customers, and its suppliers, linked through information flows in the form of requirements and feedback.

cycle time

The amount of time it takes to complete a particular task. Shortening the cycle times of critical functions within a company is usually a source of competitive advantage and a key quality-improvement objective.

data

Information or a set of facts presented in descriptive form. There are two basic kinds of data: measured (also known as variable data) and counted (also known as attribute data).

defect

Any state of nonconformance to requirements.

Deming Prize

In 1950, W. Edwards Deming was invited to Japan by the Union of Japanese Scientists and Engineers (JUSE) to lecture on the applicability of using quality control in manufacturing companies. The impact of Deming's teaching was widespread and swift to take root. In 1951, JUSE instituted the Deming Prize to honor Deming for his friendship and achievements in industrial quality control. Today, Japanese companies wishing to improve the level of quality within their organization compete for the Deming Prize, not only to achieve the honor and prestige of winning, but to make the improvements that come from implementing his quality principles.

deployment

One of the evaluative dimensions used in Baldrige scoring, "deployment" refers to the extent to which a company's approaches are applied in all relevant areas and activities. For example, reward-and-recognition programs need to be applied to all categories of employees, from hourly workers to top managers.

descriptors

Descriptors are relatively specific methods, organizational features, or system/process characteristics.

differentiation

The unique value of a product or service that distinguishes it from competing products or services.

effectiveness

How closely an organization's output meets its goal and/or meets the customer's requirements.

efficiency

Production of required output at perceived minimum cost. It is measured by the ratio of the quantity of resources expected or planned to be consumed in meeting customer requirements to the resources actually consumed.

employee involvement/quality of work life

Program for employee participation aimed at improving customer satisfaction, productivity, and employee satisfaction. Union and management work together to foster this program.

empowerment

Investment in employees of authority and responsibility for making decisions and taking actions, particularly to satisfy customers and improve processes. Empowerment requires that employees be enabled through training, information, resources, and advice.

external failure costs

The costs incurred when an external customer receives a defective product.

failure mode and effect analysis (FMEA)

A technique for systematically reviewing the ways in which a process, product, or service can fail and the impact such failures could have on customers, employees, or other processes. Using this analysis, quality engineers can predict field-failure rates, design recovery systems, and estimate the need for additional parts or personnel.

feedback

Information from a customer about how process output meets the needs of process customers.

feedback loop

A system for communicating information about the performance of processes, products, or services. Feedback loops are essential for continuous improvement.

firefighting

Remedial approach to process problems, focusing on "fixing" rather than prevention.

fishbone diagrams

A diagram that depicts the characteristics of a problem or process and the factors or root causes that contribute to them.

force field analysis

A technique involving the identification of forces "for" and "against" a certain course of action. The nominal group technique could be used in conjunction with force field analysis. The group might prioritize the forces for and against by assessing their magnitude and probability of occurrence. The group might then develop an action plan to minimize the forces against and maximize the forces for.

frequency distribution

Of a discrete variable, this is the count of the number of occurrences of individual values over a given range. Of a continuous variable, this is the count of cases that lie between certain predetermined limits over the range of values the variable may assume.

functional administrative control technique

A tool designed to improve performance through a process combining time management and value engineering. The process involves breaking activities down into functions and establishing action teams to target and solve problems in each function.

functional organization

An organization responsible for one of the major organizational functions such as marketing, sales, design, manufacturing, and distribution.

gainsharing

A reward system that shares productivity gains between owners and employees. Gainsharing is generally used to provide incentive for group efforts toward improvement.

goal

A statement of attainment/achievement that one proposes to accomplish or attain with an implication of sustained effort and energy directed to it over the long term.

guideline

A suggested practice that is not mandatory in programs intended to comply with a standard.

Hoshin Planning

See policy deployment.

hypothesis

An assertion made about the value of some parameter of a population.

indicators

Measurable characteristics of products, services, and processes that best represent quality and customer satisfaction.

input

Materials, energy, or information required to complete the activities necessary to produce a specified output (work product).

ISO 9000

International Organization for Standardization 9000 series standards. Supplier quality system standards representing a consensus within the international quality community.

internal failure costs

The costs generated by defects found within the enterprise prior to the product reaching the external customer.

just-in-time (JIT) inventory management

Approach to achieving and maintaining minimal in-process inventory. The approach includes application of total quality control to eliminate quality problems as in-process inventory is being reduced.

kaizen

A Japanese expression referring to continuous improvement in all phases of business.

key business process

Process designated by management as critical to customer satisfaction, competitive effectiveness, or the achievement of strategic goals. Key business processes are generally cross-functional, spanning major functional organizations such as marketing, design, manufacturing, and distribution.

leadership

Communicating a clear purpose and vision and enabling and inspiring people to develop commitment to help in achieving that purpose. Leaders provide a strategy, clear expectations of others, support, personal involvement and resolve, and reinforcement of values needed to achieve the purpose.

lessons learned

A phrase coined by Joseph Juran to describe a structured approach to analyzing past experience in an endeavor and applying the results of that analysis to improving the quality of future efforts.

linkages

Interactions among the tasks in a process that determine how effectively the tasks coordinate, share information, and provide mutual support toward meeting common process objectives.

Malcolm Baldrige National Quality Award

United States national quality award recognizing companies for leadership in quality. The award is managed by the National Institute of Standards and Technology, U.S. Department of Commerce. Award criteria also serve as the standard for the AT&T Chairman's Quality Award and as a basis for self-evaluation of quality systems.

management by objective (MBO)

A business planning approach in which each employee works with his or her manager to set annual objectives. Employee performance is evaluated based on the extent to which objectives are met.

mean time between failures (MTBF)

The average time between successive failures of a given product.

measurement

The act or process of measuring to compare results to requirements. A quantitative estimate of performance.

natural work team

A group of people who work together on a regular basis, such as a manager and the people who report to him or her.

need

A lack of something requisite, desired, or useful; a condition requiring provision or relief. Usually expressed by users or customers.

nominal group technique

A tool for idea generation, problem-solving, and defines mission, key result areas, performance measures, and goals/objectives.

normative performance measurement technique

Incorporates structured group processes so that work groups can design measurement systems suited for their own needs. This approach considers behavioral consequences of measurement to foster acceptance of measurement effort.

objective

A statement of the desired result to be achieved within a specified time. By definition, an objective always has an associated schedule.

objectives

Verifiable improvement targets for processes, suppliers, organizations, and people.

output

The specified end result. Required by the recipient.

outputs

Materials or information provided to others (internal or external customers).

perceived quality

A firm's market reputation for continuing excellence of products and services and for customer satisfaction; the firm's good will among customers.

pareto analysis

A system of analysis based on the principle that, in any phenomenon, relatively few factors account for the majority of effects. Juran uses the phrase "vital few" to suggest that it is more efficient and less costly to concentrate on the most important sources or types of failures, customers, and so on.

performance

A term used both as an attribute of the work product itself and as a general process characteristic. The broad performance characteristics that are of interest to management are quality (effectiveness), cost (efficiency), and schedule. Performance is the highly effective common measurement that links the quality of the work product to efficiency and productivity.

plan

A specified course of action designed to attain a stated objective.

policy

A statement of principles and beliefs, or a settled course, adopted to guide the overall management of affairs in support of a stated aim or goal. It is mostly related to fundamental conduct and usually defines a general framework within which other business and management actions are carried out.

policy deployment

A discipline approach to business-wide planning and implementation; involves setting long-term goals and annual priorities, deploying priorities through the management structure for refinement into detailed objectives, developing implementation plans, and tracking regular progress and annual results.

population

A large collection of items (e.g., product observations, data) about certain characteristics of interest.

prevention

Activities and practices aimed at anticipating and removing sources of potential problems; for example, training or supplier qualification.

problem

A question or situation proposed for solution. The result of not conforming to requirements, which can create a potential task resulting from the existence of defects.

process

The system of tasks, work flows, information flows, and other interdependencies that produce some specific outputs or results. How work is done, how outputs or results are achieved, and how value is provided to the business or customer.

process capability

The ability of a process to meet operating goals or internal- or external-customer requirements. "Capability" may differ from actual performance due to "special causes" — conditions or events resulting purely from chance and not the production system itself.

process control

Activities undertaken to acquire and use information during process execution to ensure — with a reasonable degree of confidence — that the process will meet its requirements and that these requirements will continue to reflect the needs of process customers.

process flow analysis

A technique for identification and analysis of key processes and for areas and methods of possible improvement. It is particularly useful for roadblock removal.

process flow diagramming

A visual, systematic way of examining a process by diagramming all its inputs, outputs, and activities.

process improvement

The set of activities employed to detect and remove common causes of variation in order to improve process capability. Process improvement leads to quality improvement.

process management

Activities aimed at process planning, process control, identifying improvement opportunities, and initiating improvement. Planning involves setting process requirements, characterizing the process, establishing in-process and supplier requirements, and planning for control.

process optimization

The major aspect of process management that concerns itself with the efficiency and productivity of the process, that is, with economic factors.

process owner

A designated person within the process who has the authority to manage the process and responsibility for its overall performance.

process performance

A measure of how effectively and efficiently a process satisfies customer requirements

process review

An objective assessment of how well the methodology has been applied to your process. Emphasizes the potential for long-term process results rather than the actual results achieved.

productivity

Refers both to the efficiency of tasks or operations and to their effectiveness in meeting the needs of other internal operations; some productivity-related measures include cost of poor quality and unit output costs.

project

A process executed over time, rather than repeatedly.

quality

The extent to which products and services produced meet or exceed customer requirements. Customers can be internal as well as external to the organizational system (e.g., products or services may flow to the person at the next desk or work area rather than to people outside of the immediate organization). The Federal Quality Institute defines quality as meeting the customer requirements the first time, every time. The Department of Defense (DoD) defines quality as conformance to a set of customer requirements that, if met, result in a product that is fit for its intended use.

quality approach

Overall strategy for managing quality in an organization.

quality assurance (QA)

A phase in the evolution of the quality discipline, QA differed from statistical quality control, its predecessor, in that all functional groups, not just engineers and workers on the shop floor, were involved in the quality effort. However, QA is more narrowly focused than its successor, total quality management (TQM), which emphasizes senior-executive involvement, the management of quality for competitive advantage, and a strong customer orientation.

quality circles

A group of workers and their supervisors who voluntarily meet to identify and solve job-related problems. Structured processes are used by the group to accomplish the task.

quality consultant

A person with expertise in quality-related methods and tools who advises both individuals and teams.

quality council

Leadership team normally composed of senior labor and management that provides direction and support for continuous organizational improvement.

quality function deployment (QFD)

A disciplined approach to solving quality problems before the design phase of a product. The foundation of QFD is the belief that products should be designed to reflect customer desires; therefore, marketers, design engineers, and manufacturing personnel must work closely together from the beginning to ensure a successful product. The approach involves finding out what features are important to customers, ranking them in importance, identifying conflicts, and translating them into engineering specifications.

quality manager

Individual appointed to assist the quality council in managing for quality and also to coordinate overall quality support for the organization.

quality of working life

The extent to which the organizational culture provides employees with information, knowledge, authority, and rewards to enable them to perform safely and effectively, be compensated equitably, and maintain a sense of human dignity.

quality professionals

Part- or full-time quality experts on quality methods and tools who provide quality consulting and training for an organization.

quality system

Everything associated with implementation of the quality approach, including responsibilities, plans, activities, behaviors, and incentives.

quality system audit

Systematic assessment of the quality system against a standard such as the Baldrige Award criteria or ISO 9000 series of standards.

quality teams

Also referred to as Performance Action Teams or Quality Improvement Teams. They might be composed of volunteers who meet regularly to review progress toward goal attainment, plan for changes, decide upon corrective actions, etc. Members are usually from the same work unit.

range

The difference between the maximum and the minimum value of data in a sample.

recognition

Public or private acknowledgment — other than compensation or promotion — of significant achievement or effort.

recovery

The actions taken by an organization, particularly its front-line employees, in response to unexpected customer problems such as an unusual request or the inconvenience caused by a canceled airplane flight. Less severe than a crisis, recovery situations can result from an error committed by the company or the customer or from an uncontrollable event like the weather.

reengineering

A method for systematically overhauling or revamping an entire process, organization, or function.

reliability

The probability that a product entity will perform its specified function under specified conditions, without failure, for a specified period of time.

reliability engineering

A broad-based discipline for ensuring better product performance by predicting more accurately when and under what conditions a product can fail. Based on the results of such an analysis, engineers can improve designs, set operating limits for equipment, and create backups in case of system failure. Reliability programs also incorporate feedback loops for analyzing product performance in the field and, in particular, product failures.

requirement

A formal statement of need and the expected manner in which it is met.

requirements

What a process should achieve in terms of output characteristics, costs, timeliness; determined based on customer needs, competitor performance, and overall business direction or strategy.

reward

Salary increases, bonuses, and promotions given on the basis of performance.

roadblock identification analysis

A tool that focuses upon identifying roadblocks to performance improvement and/or problems that are causing the group to be less productive than it could be. This tool utilizes the nominal group technique to identify and prioritize performance roadblocks. Action teams are formed to analyze barriers and develop proposals to remove roadblocks. The proposals are implemented, tracked, and evaluated.

root cause (cause-and-effect) analysis

A deductive approach to analyzing problems by working backward from the "effect" to the cause or causes. One of so-called "Seven Quality Tools," root-cause analysis is often facilitated using a "fishbone diagram" in which all the inputs to the process are arrayed in visual format like the bones of a fish.

sample

A finite number of items taken from a population.

Scanlon committees

Committees composed of managers, supervisors, and employees who work together to implement a philosophy of management/labor cooperation that is believed to enhance productivity. There are a number of principles and techniques involved, with employee participation being a major component.

service

A process or operation directed at fulfilling a need or demand, rather than delivering a physical product. Examples of service processes include maintenance, purchasing, market research, and training.

simulation

The technique of observing and manipulating an artificial mechanism (model) that represents a real-world process that, for technical or economical reasons, is not suitable or available for direct experimentation.

simultaneous engineering (SE)

Also known as concurrent engineering, SE is a general approach to production in which concept development, design, manufacturing, and marketing are carried out in unison. In contrast to a linear, sequential approach in which communication between functions is poor and the production process is marred by rework, scrap, poor quality, and frustration, simultaneous engineering maximizes communication, reduces errors, and shortens cycle times.

six-sigma

A statistical way of measuring quality, six-sigma is equivalent to 3.4 defects per million units of output — a virtually defect-free level of performance. The ambitious, companywide goal of "six-sigma quality" has been adopted, most notably, by Motorola, a 1988 Baldrige Award winner.

special cause

An "abnormal" source of variation that does not arise from the production process itself and is extraneous and unpredictable.

specification

A document containing a detailed description or enumeration of particulars. Formal description of a work product and the intended manner of providing it (the provider's view of the work product).

standard deviation

A parameter describing the spread of the process output, denoted by the Greek letter sigma. The positive square root of the variance.

statistic

Any parameter that can be determined on the basis of the quantitative characteristics of a sample. A descriptive statistic is a computed measure of some property of a set of values, making possible a definitive statement about the meaning of the collected data. An inferential statistic indicates the confidence that can be placed in any statement regarding its expected accuracy, the range of its applicability, and the probability of its being true. Consequently, decisions can be based on inferential statistics.

statistical process control (SPC)

Based on the principle that no two units of output of a process are likely to have the exact same specifications, SPC involves the mathematical determination of acceptable limits of variation. Graphs are used by workers to plot output variables and visually determine when a process is "in" or "out of" control.

statistical control

The status of a process from which all special causes of variation have been removed and only common causes remain. Such a process is also said to be stable.

statistical estimation

The analysis of a sample parameter in order to predict the values of the corresponding population parameter.

statistical methods

The application of the theory of probability to problems of variation. There are two groups of statistical methods. Basic statistical methods are relatively simple problem-solving tools and techniques, such as control charts, capability analysis, data summarization and analysis, and statistical inference. Advanced statistical methods are more sophisticated specialized techniques of statistical analysis, such as the design of experiments, regression and correlation analysis, and the analyses of variance.

statistical quality control (SQC)

A relatively early development in the evolution of the quality discipline, SQC relies on statistical concepts and tools (e.g., sampling techniques) to control production quality. SQC techniques are used in total quality management, although the emphasis in TQM is on "building quality in," rather than error detection.

statistics

The branch of applied mathematics that describes and analyzes empirical observations for the purpose of predicting certain events in order to make decisions in the face of uncertainty. Statistics, in turn, are based on the theory of probability. The two together provide the abstraction for the mathematical model underlying the study of problems involving uncertainty.

strategy

A broad course of action, chosen from a number of alternatives, to accomplish a goal.

stretch goal

An ambitious, usually long-term quality goal that requires extraordinary effort, innovation, and planning to achieve.

subprocesses

The internal processes that make up a process.

supplier

Source of material and/or information input to a process, which may be internal or external to the company, organization, or group.

team building

A process of developing and maintaining a group of people who are working toward a common goal. Team building usually focuses on one or more of the following objectives: (1) clarifying role expectations and obligations of team members, (2) improving superior-subordinate or peer relationships, (3) improving problem solving, decision making, resource utilization, or planning activities, (4) reducing conflict, and (5) improving organizational climate.

timeliness

The promptness with which quality products and services are delivered, relative to customer expectations.

total quality control (TQC)

An expression coined by Armand Feigenbaum, TQC involves the application of quality principles in all processes and at all levels of a company.

total quality management (TQM)

TQM, as embodied in the Baldrige criteria, represents the latest phase in the evolution of the quality discipline. Distinctive features are a strong and pervasive customer orientation and a view toward managing quality for competitive advantage. The term "TQM" is roughly equivalent to TQC and CWQC in Japan, where the word "control" has the same connotations as "management" in this country.

transactional analysis

A process that helps people change to be more effective on the job and can also help organizations to change. The process involves several exercises that help identify organizational scripts and games that people may be playing. The results help point the way toward change.

transfer to operations

An activity or series of activities in which operating personnel are trained in the performance of a new manufacturing or service-delivery process.

value

The extent to which a product or service meets a customer's needs or wants, which can be measured (though not easily) in willingness to pay. Also, the benefit, or utility, a customer receives from a product or service.

variable

A data item that takes on values within some range with a certain frequency or pattern. Variables may be discrete, that is, limited in value to integer quantities (for example, the number of bolts produced in a manufacturing process). Discrete variables relate to attribute data. Variables may also be continuous, that is, measured to any desired degree of accuracy (for example, the diameter of a shaft). Continuous variables relate to variables data.

variance

In quality management terminology, any nonconformance to specifications. In statistics, it is the square of the standard deviation.

vision

The desired future state of business.

world-class

Ranking among the best across all comparable products, services, or processes (not just direct competitors) in terms of critical performance or features.

zero defects

An approach to quality improvement, based primarily upon increasing worker motivation and attentiveness, in which the only acceptable quality standard is defect-free output or service execution.

THE TRANSPORTATION RESEARCH BOARD is a unit of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. It evolved in 1974 from the Highway Research Board which was established in 1920. The TRB incorporates all former HRB activities and also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 270 committees, task forces, and panels composed of more than 3,300 administrators, engineers, social scientists, attorneys, educators, and others concerned with transportation; they serve without compensation. The program is supported by state transportation and highway departments, the modal administrations of the U.S. Department of Transportation, the Association of American Railroads, the National Highway Traffic Safety Administration, and other organizations and individuals interested in the development of transportation.

The National Academy of Sciences is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Bruce M. Alberts is president of the National Academy of Sciences.

The National Academy of Engineering was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research and recognizes the superior achievements of engineers. Dr. Harold Liebowitz is president of the National Academy of Engineering.

The Institute of Medicine was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, upon its own initiative, to identify issues of medical care, research, and education. Dr. Kenneth I. Shine is president of the Institute of Medicine.

The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purpose of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce M. Alberts and Dr. Harold Liebowitz are chairman and vice chairman, respectively, of the National Research Council.