Improving the way organizations run through participative planning and management.
ADAC Laboratories: Malcolm Baldrige National Quality Award Winner, 1996

Introduction

ADAC has three main businesses, all related to healthcare technology and improving patient care.

1. Our largest business develops products and services for the nuclear medicine industry. Nuclear medicine is an imaging modality, just like X-ray, MRI, or ultrasound. We produce the scanners, computers, and software that allows physicians to diagnose and treat patients with heart disease and cancer.

2. Our second business is radiation therapy planning. This business produces software products that allows doctors to plan appropriate radiation treatment for cancer patients through the use of sophisticated three-dimensional computer modeling.

3. Our third business is healthcare information systems. In this business we develop software systems for administrative management of hospital departments, such as radiology and laboratory. These information systems are designed to help healthcare providers improve patient care and reduce the cost of healthcare delivery.

Leadership

David Lowe, Chairman and CEO — Is the company you work for today the place you’d like to work for the next ten years? As the new president of ADAC in 1992, I posed that question to my senior managers. And to a person, their answer was: “Frankly Dave, no! ADAC is not.”

At that time ADAC was just another business in need of a long-term direction.
The company had successfully emerged from near-bankruptcy in the mid 1980s and we were doing relatively well financially. But we lacked a sense of purpose. Our commitment focused on producing short-term results, not on building an enduring, great company! We were making a reasonable profit but we really didn’t know what we were all about. We agreed that change was clearly necessary in our operations, business objectives, and culture.

With this in mind, our leadership set about developing a set of core values, a purpose, and a mission for ADAC. These statements defined how we wanted to run our company and what we were trying to accomplish. Our mission has evolved since we originally defined it. Now it is: To be the most respected and admired company in the worldwide healthcare market by 2000.

This is an audacious goal that we use to guide our actions. We often ask ourselves, when faced with difficult problems, what would the most respected and admired company do in this situation? But after articulating our mission, it was obvious to all of us that we had to redesign our entire company in order to make progress towards our bold goal.

We set our sights high, choosing the Baldrige Criteria as a road map to help us redesign ADAC. We didn’t want to compare ourselves with just competitors, but rather many of the finest corporations in America. From a standing start we set an 18-month deadline to apply for the Baldrige Award, knowing that this deadline would create a sense of urgency necessary for rapid and positive change. That proved to be an important decision. Encouraging our company to respond to the Baldrige Criteria made us a much better company.

Our first step was to compare our existing management system to the Baldrige Criteria. In that initial assessment we realized that in many areas we were at a loss to find absolutely anything we did that met the criteria. We then aggressively benchmarked, and began closing the numerous gaps we’d found. One of the most important things we did, as a result of this early benchmarking, was to adopt a new business approach represented by the triangle shown in Figure 1.

Figure 1. The ADAC Laboratories Business Approach
Leadership, continued

Our approach is grounded in four fundamental principles:
1. Total and intense focus on customers.
2. Systematic continuous improvement.
3. Total participation by all employees.
4. Mutual learning or benchmarking.

These four principles are communicated, promoted and practiced daily by ADAC’s leadership, as well as all of our employees.

Our first principle is to focus intensely on customers. We believe that understanding and fulfilling the expectations of customers is the best and only lasting means of producing business success. Our philosophy for achieving customer satisfaction is called market-in (See Figure 2).

Figure 2. Market-In Philosophy of Work

The traditional business concept implies that a job is well done if a product is produced according to standards, and works according to specifications. In contrast, market-in philosophy focuses on customer input, and says that a job is well done only when the customer is satisfied. Understanding and fulfilling the needs of customers better and more consistently than other companies enhances our competitive position. Practicing this market-in philosophy throughout ADAC has allowed us to achieve a customer retention rate of 94 percent versus an industry average of about 50 percent.

Our second principle is systematic continuous improvement deployed across all segments of our business. We face our problems directly and openly. In fact, our company gathers together every Wednesday morning at 7:30 a.m. for our Customer Quality Meeting. In these meetings, we monitor customer satisfaction metrics and systematically address sources of customer dissatisfaction from around the world. Everyone is encouraged to attend these meetings including employees, customers, suppliers, and even potential customers. Sixty minutes of customer data and analysis
Leadership, continued

each week is directed to improving what we do. This discipline has produced not only good results but also some memorable experiences.

One of my favorite stories is of a new ADAC salesperson who brought a perspective customer to one of these meetings. I will never forget the look on his face, and how he squirmed in his seat, when we began talking about our worst customer problems. When he later talked to this perspective customer he learned how much they appreciated our honesty and openness, and the fact that if they were to have a problem with us they now know how it would be handled. We’re very proud of the fact that we have never lost an order to the over 100 perspective customers that have attended this customer quality meeting.

The main tool we use for continuous improvement is the WV Model, shown in Figure 3. While it may not be terribly important which problem solving methodology a company uses, we believe it is critical that the methodology be universally understood and used by all employees. The job of our leadership is to ensure that our employees understand our selected approach and systematically apply it to the daily operations of our company. The result has been an overall improvement in the productivity and efficiency of our organization.

Figure 3. The WV Model

One of the measures that captures the breadth of our improvements is revenue per employee, which has grown dramatically since the implementation of our current management system. The improvement in our overall efficiency, combined with achievements in customer satisfaction and retention, have benefited our investors as well. In
Our third principle is total participation by our employees. You can have an intense focus on customers and systematic continuous improvement as a business approach; but if nobody does it, all you have is a business theory. In order to put this theory into action, we espouse a philosophy called the dual nature of work. There is the daily work that we all must accomplish, and there is improvement work that allows us to do what we do better. A requirement for working at ADAC is that we do both, daily work and improvement work.

To reinforce this, our leadership sponsors teams, sets improvement goals, and actively encourages participation by all employees. The key for leadership here is that actions speak louder than words. Leaders must be personally and actively involved in improvement activities throughout the organization. One of the hardest things we had to deal with as leaders in our effort to redesign ADAC was the fact that it was difficult to get all employees aligned with our efforts. In fact, after almost two years of striving to make our new business approach a reality, our leadership was frustrated that we did not yet have buy-in from some employees and some managers. At this point, we learned about the rule of 2-6-2.

In the very best companies, with the most mature and best deployed TQM approaches, researchers estimate that two out of every ten employees are active champions of the approach. Six of ten go along relatively willingly but are not advocates, and two of ten remain cynical and may even work against change and improvement. That's in the very best companies! This means that leadership should not be frustrated by the cynics, but rather recognize and give their champions the resources and support they need to make your efforts successful.

Our fourth principle is mutual learning, or benchmarking. We believe wholeheartedly in learning from other organizations so that we can reduce the cycle-time of our own improvement activities. The first step in making use of mutual learning is to accept, at the leadership level, that we can all learn from others. We believe that just about everything a company does can and should be benchmarked. Our leadership encourages all employees and teams to benchmark whenever setting goals, whenever initiating new processes, or implementing improvements. Finally, we found the Baldrige process itself to be a wonderful mutual learning opportunity. The feedback from examiners provided a rare opportunity to learn from others, from an external perspective, what our company's strengths are and what are the areas for improvement. The Baldrige Award is good for American business. The criteria comprehensively lays out a set of ideals that most companies agree they should practice, but in fact most do not. Those companies that adhere to the criteria and those who put further pressure on themselves by applying for the award have a sustainable competitive advantage over those who do not. Our results—in terms of happy customers, motivated employees, and highly rewarded investors—attest to what this process has done for ADAC over the past five years. And I sincerely hope that you will be equally rewarded by your own Quest for Excellence!
Strategic Planning and Information Analysis

Mel Deane, COO, HCIS—The most valuable data that we collect and analyze always relates in some way to existing customers, perspective customers and, sometimes, a lost customer. We systematically review and analyze data on satisfaction, installation defects, response and resolution times, as well as customer call frequency. Call frequency is used to proactively escalate a customer situation before they express dissatisfaction. It is a very typical example of how we use data to manage our business. This data is collected in four primary data bases. These are on-line data bases and are available to all of our people at the point of customer service delivery. This enables them to make the rapid decisions necessary to resolve problems quickly and also collect valuable data on a real-time basis. This data is used not only in our daily work but in proactive improvement activities throughout our company. For example, our A-priori data base is used to measure response and resolution time in our customer support organization. It is also used to collect and organize customer suggestions on how we might improve our products.

In addition to external customer input, we collect and analyze internal operational information throughout our company. We have found, for instance, that employee satisfaction is essential in evaluating whether each operation continues to meet or exceed the needs of their respective customers. We measure a broad range of metrics including employee suggestions, satisfaction, training time, training effectiveness, promotions, and recognition events. In short, everything that should be measured is measured because we truly believe that things will not improve unless they are being measured.

Customer and operational information is monitored frequently in a number of regularly scheduled meetings—from our weekly quality and staff meeting, where we review extensive customer and operating data, to our quarterly and strategic planning. Why so many reviews, and why so frequent? We’ve found that the diagnosis and monitoring of key business metrics is the most effective means to assure that the company meets its operational goals and objectives.

At ADAC our approach is weakness-based and fact driven. We identify and acknowledge our weaknesses. One of our core values is open communications. This encourages our people to expose areas for improvement. This weakness-based approach along with management by fact allow us to always face our problems head on even if addressing them is difficult and uncomfortable. We apply a set of standard tools in the identification improvement of these deficiencies. Everyone at ADAC is fully trained in the use of these tools providing a common methodology to accelerate understanding and decision making throughout our entire company. These tools include such standard analysis as Pareto, Ishikawa, and Control Charts, to the more advanced such as the KJ method and language processing principles. Finally, benchmarking is a tool that has given us perhaps the most radical improvements in our business. Benchmarking is integrated into our WVV 7-step problem solving model in a number of ways. It’s used for goal setting, competitive or best-in-class comparisons, process ideas, implementation
Strategic planning & information and analysis

plans. It's also used in determining what to measure. We want to ensure that we are not reinventing the wheel, that we are not going to fall into the same traps that other companies have fallen into. In fact, much of what we do at ADAC, including our key business approach and our key processes, are the results of our benchmarking activities.

How do we know if we are measuring the right things? We use measurement summits to evaluate and improve our process for selecting and analyzing information. These summits help focus our measurements to ensure we are still focusing on the right things in our changing environment. We evaluate the appropriateness of metrics, the frequency with which we collect the data, and also their use, to ensure that they are all linked to our key business drivers.

In summary, we use a common methodology to improve all of our processes at ADAC. Weakness-based, managed by fact, with frequent diagnosis in monitoring, are the keys to which we attribute our success thus far. To quote Winston Churchill: “Victory is not a vague or intangible thing, it is represented by solid facts.” The key to information analysis at ADAC is encouraging everyone to get the facts so that we can then determine our actions.

Mark Lamp President, HCIS—The key to business is doing the right things right. Carefully choosing the right things to do is what planning is all about (see Figure 4).

Figure 4. Strategic Planning

Our planning process begins with the development of a strategic plan, a plan that yields a mid-term road map or a strategic vision. These strategies are then executed through quarterly operating plans that detail the who, what, when tasks that are neces-
Strategic planning & information and analysis, continued

We refer to our quarterly operating plans as DASH plans. The strategic plan is focused on the means to create growth over a three to five-year time horizon. In these plans we consider the markets and the products that are necessary to support our growth objectives. The primary output of our strategic plan is a product road map, along with the organizational requirements that are necessary to follow that road map. The critical element of our strategic planning process is the analysis of customer requirements (see Figure 5).

![Figure 5. Phases of Analyzing Customer Requirements](image)

Identifying the right things is the result of a systematic fact-based process to discover our customers latent needs. In discovery we use focus groups, and interviews to gather language data, what we call voice of the customer. Our goal here is to create an image of our customers’ environment—an image that identifies the unstated or the latent needs. From this image, teams of employees develop solutions that create value by satisfying those customer needs. We validate the solutions and develop quantitative models. Quantitative models help us predict which things we should work on first. The models are built on trend data from our internal information systems and are supplemented by internal and external market research.

You may be wondering why we refer to planning as DASH? DASH is not an acronym. There’s no specific name for it. It simply represents the quarterly nature of our planning process. For example, the first operating plan of our 1997 year was called the 97(DASH)-1 plan. This nomenclature is useful in conducting audits and refers back to prior planning periods. Our DASH is a vehicle for ensuring that all employees are working on the right things. We call it the “vital few” (see Figure 6). We develop our plans by auditing our past, considering changes in our external environment, and evaluating our progress against our strategic goals. In the weeks leading up to DASH, executive management sets the quality objectives and cross-functional teams develop operating plans to support those objectives. This cross-functional participation ensures that the entire organization is aligned with the business’s stated objectives. Management participates and reviews the plans, providing the necessary opportunity for diagnosis and monitoring. In addition to developing the who, what, when tasks associated with the
operating plan, DASH is also a communications vehicle. Our DASH meetings are open to all employees and virtually everyone attends. This ensures that our plans are well understood and that all departments are aligned with our business objectives.

Figure 6. DASH Planning

All business units—nuclear medicine, radiation therapy planning, and health care information systems—prepare and present their plans. The plans encompass all function areas from R&D, to customer support, to business support services. Planning is not just a management activity. All employees are involved both in planning and in improving the planning process. Your planning process helps us choose the right things to work on. We’ve learned that when we don’t focus on the vital few, we don’t execute our operating plans. The information analysis and tools mentioned earlier help us to prioritize. Moreover, if focusing on the vital few is necessary for an organization it’s also necessary for an individual. Each employee has MITs or most important tasks that cascade down from the objectives of the company, thereby aligning all employees with our stated goals. Most employees have one or two MITs for a given quarter. No one has more than five. These MITs are also used to drive our bonus and variable pay programs. Following each planning cycle our strategic and operational planning processes are evaluated. An example of an improvement that was recently introduced to our planning processes is Hoshin. It’s a new process to reach significant business breakthroughs. Last year we developed a hoshin for our nuclear medicine organization to improve its gross margins. The entire organization focused on the means that are necessary to achieve that goal. From configurations in pricing and sales, to cost reductions in manufacturing, to partnerships with our suppliers, everyone had a part in our success.
Human Resources Development and Management

Robert Starr, Vice President of Human Resources—Our company, with 750 employees, has 75 human resource managers? Too much overhead? It isn’t if your human resource managers are also members of your management team.

ADAC’s core values, purpose and mission, along with extensive training and teamwork, allow our managers to take responsibility for managing the human resources of the company. In this way, we insure that human resource management and planning are fully integrated into the company’s business process.

Our human resources strategy starts with our core values, a set of principles that guide our conduct as representatives of the company. We hire, develop, and promote employees who deliver results and exhibit the types of behaviors that we believe in and espouse. We train and reinforce these values in our employees so they have a clear understanding of what we expect of them and what they can expect from the company.

Our “purpose” defines the fundamental reason for our company’s existence, and plays a key role in attracting and motivating our employees. We believe there’s something special in working for a company who’s purpose is to improve people’s health. Our “core values” define our behavior. Our “mission” links the two by setting an audacious goal for all of us to achieve. It presents a challenge that sparks a motivation to continually achieve. It is a focal point for our actions that employees can be enthusiastic about.

Our people are the key to achieving our mission. They execute the strategies and implement change. This makes the dual nature of work fundamental to human resource management at ADAC. Because of rapid change in the markets we serve, everyone at ADAC has responsibility for improvement activities. By adhering to the dual nature of work, we can react faster to our ever-changing environment than we could if we subscribed to the older concept that some people do daily work while others do improvement work.

We encourage and promote the use of teams in much of our improvement work. Employees are empowered to form teams whenever they deem it necessary to work on improvement activities. We’ve thoroughly trained our employees on problem solving techniques and encourage managers to act as trainers and facilitators, helping people work on problems that may be particularly complex. Cross-functional, department, project, and process teams form and disband on virtually a daily basis if there is a problem or opportunity for improvement.

A significant component of improvement activities is the linkage between human
Human resources development and management, continued

resource planning and employee development. Employees identify their own training needs, work closely with their managers to develop the plan, and move rapidly to deploy those plans. This process is the IDP, or Individual Development Plan. Through this process, employees and managers insure that corporate and department goals are integrated with the individual’s goals (see Figure 7).

Figure 7. Individual Development Plans

Department plans and their human resources components are developed, aligned, and communicated through the company's DASH Process. Performance against the jointly developed goals is monitored during regular one-on-ones. The IDP empowers employees, while at the same time ensuring that their development is aligned with corporate goals. In response to both organizational and employee needs, the level of training and development at ADAC has been growing significantly. While it's not the only driver associated with increased productivity and other gains in operational efficiency, we believe that it is a key contributor.

Revenue per employee is a common metric of organizational efficiency, and as you can see from Figure 8, revenue per employee correlates positively with our investment in training. We’ve also learned that as training is increased, employee turnover decreased, accidents in the workplace decreased, and customer satisfaction increased.

Figure 8. Training Hours Versus Revenue Per Employee
While training gives employees the tools they need to be effective, incentives and rewards provide the motivation to use these tools and deliver results. An effective incentive and reward system is one that fosters alignment of activities, appropriately recognizes achievements, and motivates employees.

We utilize the DASH process to align employee efforts with corporate goals, and pay for performance to recognize achievement and results. Recognition events and rewards for teams and individuals complement our incentive and reward program. Our compensation programs for both managers and individual contributors have been designed to specifically reward employees for achieving quality in operational improvements. For example: 25 percent of our field service engineers' compensation is awarded based on customer satisfaction with the service he or she may provide.

In summary, the critical components of our human resources management system are:

• managers who ensure that human resource considerations are fully integrated into the business planning process
• a cultural foundation which encourages and rewards continuous improvement activities
• the extensive use of training
• teamwork.

How our human resources related processes were rapidly introduced into a newly acquired business

Sharon Womack, Human Resources Manager, HCIS—In 1995, ADAC acquired Community Health Computing or CHC, located in Houston, Texas. At that time, I was a member of CHC’s Human Resources organization. ADAC’s new leadership and management system was a dramatic change for us. We established bold goals, trained everyone, promoted the core values, mission, and management system, discussed success stories, established an incentive and reward system, and established weekly quality meetings for discussing and monitoring our progress.

As our employees learned this new system, changes resulted in a number of significant areas: how we thought about our customer; moving to a market-in instead of product-out mentality; how we communicated to get our jobs done by basing our actions on facts; how we worked together to keep improving through participation and cross-functional continuous improvement teams.

We saw some of the most dramatic change in communication. We implemented a number of communication vehicles to allow our employees to know what’s going on in all areas of the company. Let me give you an example. I had been with CHC for six years when we became a part of ADAC. I thought I knew what every department in that company did, but after attending one DASH meeting I was so surprised. I learned more about our company in that one meeting than I had in the previous six years.
Open communication is an essential part of success. Each and every employee is a part of our success. Another vital change for us was employee empowerment. Our management system values and encourages empowerment. We believe employees who feel unrestricted and free to take on new things, will show more initiative and more creativity. We believe that if an employee feels they can contribute freely to the company’s success, they’ll be more likely to be enthusiastic about that success.

And finally, we believe that employees should be given all the responsibility they want and can handle. This ties in with employee development and allows employees to achieve their goals as quickly as possible. Many companies don’t connect the value of empowerment with a company’s success. I have seen it both ways, and I can tell you that ADAC does.

Imagine the teamwork that is required to win a championship. That’s what teamwork is like at ADAC! We encourage and promote teamwork among all employees. We believe that teamwork leverages the skills of our employees. We also believe teamwork fosters learning among our employees by continually working together on teams to address our objectives and problems. Many employees work in areas where their contribution to the company’s objectives are not always evident. Participating on a problem solving team or a process team can allow employees to feel more connected to the goals of the company.

Finally, training is vital! To implement ADAC’s management system in Houston, we applied one of the lessons learned from our original deployment of this system. The lesson is: You can’t train soon enough! We immediately trained all managers and frontline employees in our methods. Training is so important because it promotes a common language and methodology that allows employees to communicate and work together.

**Process Management and Business Results**

Andy Eckert, President, Medical Systems—A $100 million company with the process maturity of a start-up! That’s how a very highly paid operations consultant described ADAC to me, his client, in 1991. That was pretty painful. Needless to say, since that time we’ve made some progress maturing, but we still have a long way to go. I’m going to share with you some of our experiences with process management, deployment and, most importantly, our business results.

ADAC’s improvement has been the net result of literally hundreds of steps, both large and small, all directly involved in the depth and discipline of processes. Understanding, documenting, and measuring processes are the obvious and necessary first steps before improvement efforts can begin. Is the process performing poorly? How do you know? Should it be improved now? Will the expected benefits justify the resources applied? To avoid working on goodness for goodness’ sake, or as we say on things that make us feel good, ADAC’s team, early on, identified the key business processes essential to consistent improvement in our competitive advantage and operational excellence.
Our business, although not large, is highly complex. ADAC conceives, engineers, sells, delivers, and ultimately services our equipment and information systems in over 4,000 end-user organizations world-wide. Each key business process is vital to delivering customer value consistently over the seven- to ten-year life expectancy of our products. The level of focus and resource deployment on each of these processes is determined at the highest level by our annual strategic planning process, and development of the company’s vital key objectives.

These objectives and their associate operating plans help us determine and prioritize which of the key processes need to be strengthened. The first two vital few objectives in 1997—capitalize on new market opportunities and improve profitability and asset management—have one common underlined process that stands out—new product development. That’s because at its heart ADAC is a technology company. As such, rapid time to market with the right products that meet our customers’ latent requirements is a core competitive advantage.

In the early 1990’s our product development process was probably best categorized by just two words. Brute force! Put the best people on development projects, meet with them every day, and try to estimate when the final product will pop out. I’m sure we’ve all been there. That’s all changed now. The 10-phase product development process, that we benchmarked from General Electric, is well understood, strictly adhered to, and continues to improve. In fact, looking back over the last two years, this process has gone through two major improvement cycles. The power here is strong cross-functional integration, starting from the new product proposal phase and going all the way to full production. Moreover, suppliers and customers are intimately involved throughout the 10-phases to develop our direction and our capabilities. An important result is that we successfully shortened the new product development cycle from 24 months to less than 18 months by refining essential and critical processes. And it works!

Our growth from approximately 10 percent of the nuclear medicine market in 1990 to over 50 percent today has been due, in large part, to repeated new product introductions that have outpaced the competition. For example, ADAC is delivering its fourth generation dual-head gamma camera product when each of our major competitors, all multi-national, multi-billion-dollar firms are still on their first version. Today our share in the nuclear medicine industry’s largest product segment, the dual-head segment, is over six times that of these companies. But it’s not just big things like new products that drive our business’ momentum. It’s the collective and coordinated effort of 750 employees driving continuous improvement in all that we do.

ADAC’s organization, I can tell you, simply does not accept the status quo, or the dreaded business as usual. Each employee understands the need to critically evaluate and improve the work that they do day to day. The managers’ responsibilities are to develop the tools and techniques to enable the pursuit of this continuous improvement.

As our improvement efforts intensified over the past several years, it became quite evident that a common problem-solving framework and a common language was...
Process management and business results, continued

necessary. We prefer to productively engage in developing the best plan to attack the weakness as opposed to wasting time trying to decipher what’s being said. Don’t dazzle me with fancy charts, try to dazzle me with clear articulation and presentation of data in a framework that our entire company now has internalized. The WV model (Figure 3) is our chosen template. The fact that it has seven steps or nine steps, or five steps, isn’t the point. Consistency is! Trust me—choose a problem solving model, diligently adhere to it, don’t accept analysis that doesn’t conform or skip sequential steps, and you’ll see improving cycles accelerate beyond your most lofty expectations.

Now, my favorite part—the results. In 1992, our manufacturing management adamantly demanded more production floorspace. We were growing from shipping about 30 gamma cameras a quarter to about 50 per quarter, and there simply wasn’t space. Today, we ship over 100 gamma cameras out of that same facility. Now, I’ll admit the facility looks a little different today than it did then, as we’ve eliminated over 50% of the space formerly used for inventory handling and storage. Work in process, or WIP inventory, as a percent of sales has decreased from six percent to less than two percent, saving space, paring costs, and preserving a most vital asset, cash.

Improvements in assembly and test processes, as well as material flow, have driven the direct labor content of our product cost down by 50 percent in three years. We didn’t automate or invest in capital equipment; rather we attacked the largest band on the pareto chart each and every month.

Perhaps the most important results have been where it counts the most, in the eyes of the customer. Our nuclear medicine scanners are an important diagnostic step in the overall treatment of typically very sick people. Excellence and direct on-site customer support is paramount to fulfilling the clinical objectives of our customers—the hospitals and clinics that treat their local communities. The medical equipment supplier average for on-time spare parts delivery is 72 percent, which means that 28 percent of all parts do not arrive on time, creating an additional day of cancelled or postponed patient care. ADAC has improved its ability to deliver the correct replacement parts on time from 93 percent to 100 percent. This translates directly to improved scanner availability for patient work. Given the complex electrical/mechanical nature of our equipment (over 4,000 individual components make up a system), and the fact that we support an installed base of systems spanning more than two decades, this has been no simple feat.

You might think we added a lot of inventory to reach this goal. I can tell you the opposite, in fact, is true. A complete and thorough WV analysis led us to stock only the appropriate spare parts based on factual use data and not a historical rule of thumb.

Our systems do experience failures. One of the first quality measurements initiated at ADAC was service cycle time, defined as the elapsed time, from the initial call indicating that they were experiencing a failure to the time we return the system to clinical operation. It’s an end of process measure that draws process improvement across several fronts including service engineer communication, parts delivery, and technical trouble shooting. Service cycle time has decreased from 52 hours to 17 hours over the
past seven years. This has not only delivered improved customer performance, but also greatly improved our support capacity and profitability. That’s exciting—customer satisfaction and profitability going up at the same time, a win-win in our business. The efficiency gains from process improvement throughout our company have reduced our operating expenses from 40 percent to nearly 25 percent of revenues. For all those managers of P&L you know that that has an obvious and positive impact on the financial result.

Benchmarking is an essential and required part of any process improvement effort at our company. Corning’s Fiber Optics Division’s supplier-manager process is one we benchmarked and now use. Alignment of our supplier quality and purchasing departments were goals in selecting the best suppliers as defined by our supplier rating formula or SRF. This allowed us to achieve both high quality and low price. The results have been dramatic. Our supplier base has declined from over 500 suppliers in 1991 to just over 200 today. We have formed stronger relationships with these important business partners which in turn has allowed these suppliers to increase their stake in ADAC. The clear benefit has been a marked improvement in the quality of our incoming material. So, I’m confident when I say that ADAC’s process management approach and deployment have generated meaningful results.

Efficiency improvements, rapid product time-to-market, customer support, and excellent supplier partnering are just some of the important results from intense focus on process management at our company. We have started to build a firm that exceeds our customers’ needs, provides excellent opportunity for our employees, is a better place to do business for our suppliers, and provides a superior return for our investors.

Figure 9. Results: Revenue Per Employee & Earnings Per Share

![Graph showing revenue per employee and earnings per share from 1990 to 1996.](image-url)
Customer Focus and Satisfaction

Yvonne Bachert, Director of Customer Support, HCIS— I have witnessed the incorporation of “customers come first” and “market-in” (Figure 2) principles at our Houston Health Care Information Systems’ business and know that they have a dramatic affect on the way employees interact with customers and deliver customer delight.

We make sure that our principles and goals are aligned with our customers by placing them first. Our people make decisions from the customer’s perspective, after considering what would the most respected and admired company do to satisfy the customer. And they are empowered to take the necessary steps to satisfy the customer. For example, unlike competitive practices, our field service engineers do not require authorization for overtime. They just do what it takes to delight the customer. Our whole approach is based on the market, and our philosophy of work. We believe that understanding and fulfilling customer requirements is the best and only lasting means to business success.

The purpose of our work is to satisfy the customer. We set all of our metrics from the customer’s perspective. We measure the things that they tell us are important to them. As an example of this, we changed our measurement of resolution time after we asked our customers what they expected. If you fail to listen to the customers in this rapidly changing business environment, we believe you will always be playing catch-up.

In order to learn about our customers, we divide them into segments with similar attributes. We segment our customers by application, geography, institution, and healthcare model. We use market segmentation as a tool to identify specific differentiating needs that can be applied to create value for different customers.

We take every opportunity to listen to the voice of the customer. These opportunities are presented in customer focus groups, user groups, trade shows, partnerships, and our advanced clinical research program. During each interaction, valuable “voice of the customer” data is gathered and used by cross-functional product development teams to determine what customers need, or desire, to meet their own business objectives.

By really listening and understanding their business, we’re able to discover a latent need, and this offers us an opportunity to provide the customer with a product or a service that they might not have recognized a need for yet. When we’re successful here, we get in front of our competition and, most importantly, we delight the customer.

We have numerous processes in which our employees interact with customers. These include sales situations, product demonstrations, installation or implementation of our products, post sales service and support, and customer training in the use of the product.

When it comes to customer satisfaction, we do not assume anything. We survey extensively. We determine how our processes affect the customers. And we validate with them what is important. We look at our sales delivery process, and determine the critical points of customer interaction. We measure our service cycle-times weekly. This is the time, from the initial customer call about a problem until their equipment is back.
Customer focus and satisfaction, continued
diagnosing patients. But most important we must hear their feedback on our performance, and then react to it. Our overall goal is to continually understand and fulfill the needs of the customer better today than we did yesterday. This is creating customer value.

Debbie Schultz, Vice President of our Customer Support, Nuclear Medicine—We relentlessly conduct surveys to obtain critical customer data for our improvement activities, from reactive event-based surveys which assess the support and service we have provided, to proactive, targeted surveys which directly feed into our planning process.

In addition, we closely monitor, using a scoreboard, our five-day installations in nuclear medicine as well as our four to six month implementations in our information systems business. This customer scoreboard is presented every Wednesday morning at our customer quality meetings where everyone, including senior management, participates. Any score below an 8 out of 10 requires a full root-cause analysis and corrective action plan by the appropriate manager at the next week’s meeting.

In our radiology information systems product line, we conduct focus groups to determine where our customers want to see improvements and we focus our efforts in those vital areas. In the laboratory information systems business, which we’ve only been in since the acquisition of CHC in 1995, we were able to deploy our business approach quickly, and have made good progress overall, as well as in key areas identified by our customers.

In our nuclear medicine business we utilize a third party to conduct a customer satisfaction survey every six months. We monitor trends, analyze the customer input, and develop our quarterly DASH plans to ensure that we are improving in all areas.

In addition to our semi-annual surveys, we receive comparative data from an external independent survey every year. We’re particularly proud to have achieved across-the-board leadership for the past four years. These results would not have been achieved without the relationships developed by employees with our customers. We believe that our market-in approach is a pre-requisite for improvement activities.

We support User’s Groups in all of our businesses where we spend a great deal of time listening to our customers. In addition, our Vice President of Support, executive management, and other employees meet with the customers who are in-house for training to obtain immediate feedback.

Our field service engineers and customer support personnel develop long term relationships with their customers so they can understand and fulfill expectations.

Finally, in order to provide employees with a better understanding of our customer environment, our engineering and manufacturing personnel visit our customers so they can see, first hand, how the products are used.

Not only do we continuously listen to our customers, but we have developed a
Customer focus and satisfaction, continued

process to pro-actively identify an area of dissatisfaction before it becomes apparent to the customer. We call this our escalation process (see Figure 10).

**Figure 10. Proactive Customer Escalation**

Each and every week we analyze the information from our field service and customer support databases. Using our common methodology, our customer support organization performs root cause analysis for those systems which have fallen outside of our reliability control limits. We report the corrective action plans, and their subsequent results in our weekly customer quality meetings.

By taking this proactive approach to data analysis we have made a significant improvement in reducing the number of customers that may become dissatisfied. As a matter of fact, we've been known to surprise our customers by telling them how many times they've called us when they didn't even realize their people had been calling. However, the ultimate measure of customer satisfaction is whether your customer will buy from you again. ADAC's approach to satisfying customer needs has led to—by far—the highest customer retention in our industry. This is also true in our information systems business, where we have achieved similar results. Our results of over four times the market share of our nearest competitor could not have been achieved without an intense focus on customers. Again, we've seen similar results as we expand our operations into new and emerging markets.

In conclusion, at ADAC Laboratories, customers truly come first. Our executive management has a firm policy that nothing is more important than a customer call. This leadership, with an intense focus on customers continues to be the driving force in our never ending quest for excellence.
Quality Journey and Lessons Learned

Doug Keare, Vice President of Quality—Hundreds of things must be done simultaneously to deploy performance excellence. Many of them can only be learned by seeing what works in your company, and then only after you’ve begun deployment.

Our formal journey began in 1991 when we started searching for a roadmap and direction for changing our company. We began benchmarking to look for ideas on how to change and formed a quality committee, which met monthly, so we’d have a forum to review these ideas. We also knew that we needed to strengthen our commitment to customer satisfaction. We invested over $3 million in the field service operation as tangible evidence of this commitment. The DASH process was already in existence. But we integrated our new goals into it, which improved it significantly.

In 1992 we started on a specific approach for our transformation and continued to benchmark to refine this direction. We then set out to clarify our vision with a set of bold goals. These declarations were a driving force in catalyzing change. The publishing of our core values lead to some immediate and significant changes in the way people behaved in our company.

In 1992, we also formalized the quality office as a driver of change, and increased the frequency of our quality meetings from monthly to weekly. This change reflected the importance we wished to place on our improvement activities. It also reflected a realization that monthly meetings just weren’t effective in terms of driving change.

This was also the year we discovered the Baldrige Criteria and decided to make it the roadmap which would guide the implementation of our new approach. We conducted our first assessment using an external consultant, who then served as a change agent to significantly accelerate our deployment. And finally, we strengthened the link between our new objectives and our incentive and reward system to ensure alignment. This was primarily a learning year.

In 1993 we faced the daunting task of deploying our approach and the Baldrige Criteria company-wide. We did this through teams, and encouraged all areas to use benchmarking to adapt ourselves to the criteria. We also trained all employees in problem-solving and teamwork, so we could engage everyone in these improvement activities. Most importantly, we increased the frequency of our quality meetings to twice per week. This action signaled to employees that their improvement efforts were important. It allowed the company’s leadership to stay intensely focused on the progress we were making.

In 1994 we were confident in our direction, and we were looking for ways to accelerate our progress. To do this, we became a founding member of the Center for Quality of Management West. This affiliation with a group of companies sharing a similar approach to business gave us valuable framework in tools such as the WV model, and KJ method which we rapidly deployed in our company.

During this year, we applied for the Baldrige Award for the first time, and received a site visit, which was a major milestone for us. It was the first external recognition for
our employees that their efforts were paying off. That year produced another milestone as well—we included “the development of our systems and culture” as one of our corporate few objectives for the first time. It has remained there ever since as a commitment to developing the capabilities of our company.

In 1994 we adopted the triangle as the clear articulation of our business approach. Since that time, we’ve used it to symbolize and communicate both internally and externally the way that we run our business.

In 1995 we received invaluable feedback from the Baldrige process, and used it to drive continued improvement in all areas. We also realized that we had progressed to the point that we had a number of practices that we could share with others. As we started sharing our practices we started to increase our own understanding of what we do and why. There’s no better way to make sure you understand your own approach than to prepare to teach it to others. We also benchmarked a Baldrige winner, AT&T, on their concept of people value added, and we increased our focus on this aspect of our business. We implemented Hoshin planning and management as an improvement to our planning process in the area of breakthroughs. The result of our first application of this method was a four-point gain in our gross margins.

In 1996 we rapidly and successfully deployed our management system into three companies that we acquired which had very different environments. We also received ISO 9000 certification as an additional validation of our process management.

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**Seven Infrastructures for deployment.**

We believe that the Seven Infrastructures model is an incredibly useful check on a company’s activities when you’re attempting to deploy a system based on performance excellence (Figure 11).

![Diagram of the Seven Infrastructures](image-url)
As your approach matures, all seven may not be necessary. But for getting started and making progress, we felt all seven were crucial.

#1. Goal Setting

In terms of goal setting we have three tiers of goals: noble goals, annual goals, and quarterly improvement goals. The noble goals are our purpose, mission and core values. Our annual goals are the MITs and vital few, driven from the strategic planning and DASH processes. The quarterly goals, generated and reviewed as part of our quarterly DASH process, drive our organization forward.

#2. Organization Setting for Deployment

This is my position, as leader and sole employee of our company quality office. The setting also encompasses our schedule of meetings, which are an integral part of our business structure. Within the balance of our organization, our deployment infrastructure rests on the use of teams for all types of work.

#3. Training and Education

This includes all of the responsibilities we have laid out for management to train, monitor, coach and lead by example, in the implementation of our business approach. Coaching doesn’t need a lot of discussion—it can take many forms in many companies.

Training was, and is indispensable in making our system work. We initially trained all of our employees in quality tools and methodologies so that they’d have a common understanding. This allows employees from all areas of the company to work together effectively on cross-functional teams.

We then integrated the new tools from the CQM into our training and began to use our managers as trainers. And finally, we implemented systems to develop the general capabilities of our employees so they could help us take advantage of the opportunities that have arisen as our company has grown.

#4. Promotion

This includes posters, business cards, quality rallies, quality meetings, and leadership by example. They are some of the things we do to keep our approach and practices visible, and interesting for our employees. We have posters of our tools and methodologies throughout our facilities. Our core values are on the back of our business cards. We hold semi-annual quality rallies, and weekly quality meetings to promote awareness.

Our leadership also promotes our approach through a daily interactions with employees, customers, and the world outside ADAC.

#5. Diffusion of Success Stories

In the early deployment stages, diffusion of success stories, plays a major role in getting buy-in from all employees. The realization that an approach is working in one area of the company often serves as a motivator to other areas that have not yet tasted success. We have a number of vehicles for getting our successes, in terms of approach, deployment, and results, in front of employees as quickly as possible in order to generate excitement, and inspire future improvements.
#6. Incentives and Rewards

The reward structure that is aligned with the company's goals and operating principles and is one of the best ways to insure that employees are focused on the right things. We have numerous compensation and recognition based programs which have been designed with this in mind. Our employees are extremely clear on what they should be doing, and how they should be doing it.

#7 Diagnosis and Monitoring

This may come as a surprise to you, but I've saved the best for last. Our experience is that diagnosis and monitoring is the most important of the seven infrastructures. Managers spend their time in what is important to them. If managers do not spend time monitoring progress against improvement goals and diagnosing how employees are implementing the chosen business approach, employees will not believe that all the goals, and training, and promotion are truly important and sincere. And they will act accordingly.

Lessons Learned

People generally do what they think is important to their manager. During the last five years there have been several things that stood out as key lessons. These have been reinforced for us by discussions with people from other companies that have had successes and failures trying to implement a system such as ours.

The first lesson is that real progress cannot be made if people cannot communicate. So, train early and often until all employees are speaking the same language.

The second lesson is the concept called 2-6-2, which was mentioned earlier, on page 7. This system represents change, and leaders must accept that there will always be the distribution of employees' buy-in to change. Accepting this, they can then work to take advantage of this distribution and not be frustrated by it.

The third lesson is, you can't stop bailing while you fix the boat. You'll sink! If you want to deploy this type of system you just have to do it while you continue to run your business. You can't stop your company to deploy a new system. For us, this meant hard work and intense focused effort during the deployment of our new system.

The fourth lesson is benchmarking. We believe that benchmarking is one of the easiest and fastest ways to make improvements and should be applied wherever there is the opportunity to accelerate progress by learning from others.

Closing

I'll close with a few thoughts regarding the Baldrige process itself. First is that the criteria is comprehensive. It has compelled us to address all areas of our business with an intense and systematic scrutiny that we would not have done had we not adhered to the
My second point is that the application process itself is an assessment of where you are, and where you’re going. It forces you to commit to ink and paper how you’re running your company at a given point in time. If you’re truly interested in continuous improvement, this honest assessment necessarily catalyzes action. How can you write down that you have no process for something you should, and then not take action to address it?

Finally, the Baldrige process has helped us immensely in accelerating our progress through the need to meet application deadlines, and through the value of the feedback provided by the examination teams.

From the time we set out to change our company, we estimate that the Baldrige process, and our participation in it, sped up our progress by about 100%. In other words, our journey to this point would have taken us years longer if it were not for this process.

David L. Lowe is Chairman and CEO of ADAC Laboratories. He joined ADAC in 1988 as General Manager of Radiology Information Systems. In 1990 he was promoted to VP and general manager of Nuclear Medicine. In 1992 he was named president and COO, and was elected to the Board of Directors. In 1994 he was appointed CEO. In 1996 he was elected chairman of the board as well. He has a bachelor’s degree in economics from the University of California at Davis, and an MBA from Stanford University.

Mel Deane is COO of ADAC Healthcare Information Systems. He began his career at ADAC in 1993 as VP of Nuclear Medicine Engineering. In 1994 his span of control was broadened to include responsibility for production operations. Later in 1994, he was named executive vice president, responsible for the daily operations of the newly formed Healthcare Information Systems business. He has a BS in computer science and electrical engineering from Southall College of High Technology in the UK.

Mark Lamp is President of ADAC Healthcare Information Systems. He joined ADAC in 1983 as an engineer working on the development of nuclear medicine systems. In 1986 he transitioned into marketing as a product manager, which led to his being named vice president of sales and marketing for nuclear medicine in 1991, and in 1994 he was appointed President of Healthcare Information Systems. He has a BS and MS in electrical engineering from Purdue University and an MBA from San Jose State University.

Robert Starr is Vice President of Human Resources. He joined ADAC in 1983 as senior human resources administrator, and was promoted to HR Manager in 1984. In 1987 he was named director of administration, responsible for human resources, investor relations, and facilities. In 1995 he was promoted to VP of Human Resources and Assistant Corporate Secretary. He has a BS in industrial relations from California Polytechnic State University at San Luis Obispo.
Sharon Womack is Human Resources Manager of ADAC Healthcare Information Systems. She began working for Community Health Computing (CHC) in 1989 as a HR administrator. When ADAC acquired CHC in 1995, she was named human resources manager. Sharon studied business administration at the University of Houston and is a certified professional in human resources.

Andrew Eckert is President of ADAC Medical Systems. He joined ADAC in 1990 as controller of the Customer Support division and in the same year was promoted to director of operations for Nuclear Medicine. In 1993 he was appointed VP and General Manager of Nuclear Medicine and in 1994 was promoted to president of ADAC Medical Systems, a new position which includes nuclear medicine, radiation therapy planning, and customer support. In 1996, he was elected to ADAC’s Board of Directors. He has a BS in industrial engineering and an MBA from Stanford University.

Yvonne Bachert is Director of Customer Support, ADAC Healthcare Information Systems. She joined CHC in 1988 as a customer support analyst, was promoted to team leader in 1991, and to manager in 1992. In 1996, following ADAC’s acquisition of CHC, she became the director of customer support. Yvonne has a bachelor’s degree in medical technology from St. Louis University and has over 30 years experience in the healthcare industry.

Debbie Schultz is Vice President of Customer Support–Nuclear Medicine. She joined ADAC in 1984 as a software engineer and in 1990 was promoted to software engineering manager. In 1991 her responsibilities were expanded to include technical support and field service documentation. In 1994 she was promoted to director of customer support, and in 1996 was appointed VP of clinical and technical support for nuclear medicine. She has a BS in electrical engineering and computer science from the University of California at Berkeley.

Doug Keare is Vice President of Quality for ADAC Laboratories. He joined ADAC in 1992 as a manager in the Field Service division. In 1993 he was promoted to director of quality to oversee the deployment of quality management throughout the company. In 1994 he was promoted to VP of Quality. He has a bachelor’s degree in economics from Dartmouth College and an MBA from Stanford University.
Xerox Corporation: Information Management in a Competitive, Global Environment

Patricia Wallington, V.P. and Chief Information Officer, Xerox Corporation, Stamford, Connecticut

Xerox is a $17 billion company, with about 85,000 employees. We provide solution services and products in the document space.

There are many market forces that apply to Xerox, since we are operating in a competitive global environment (see Figure 1). We pay attention to things that are forcing us to make change or giving us the opportunity to make change. We look at improving our time-to-market cycles. We look at adaptive and flexible technology-based solutions that enable us to do all kinds of things. And, as always, the customer is in charge.

Figure 1. Market Forces Operating in a Global Environment

Intense Competitive Environment
- Rightsizing
- One market segment
- Adaptive & flexible
- Time to market

Globalization
- Enterprise
- Customers

Dynamic Organizations
- Flatter
- Empowered
- Team-oriented

Technology
- Open
- Networked
- Distributed
- Affordable
CASE STUDY

A horizontal, customer-focused company

There are many competitors in our marketplace today, so customer focus is one of the most deeply held values at Xerox. In a global environment, both competitors and customers are organized in conducting business. This requires us to adapt to customers' new requirements at an extremely rapid pace in order to stay competitive. Our organization is dynamic, and therefore our structure is horizontal, team based and fast. The level of decision-making has shifted further down into the organization.

A high-paced marketplace

The pace of technology is so incredibly fast that it is almost impossible to keep up today. We need to think about generations of products, and pacing ourselves, rolling them out slowly enough so that people have the opportunity to adapt to what's already in place. There is an incredible demand for the kind of ubiquitous computing that is available to us today.

This dynamic business environment has created new requirements for us at Xerox. In this article, I want to focus on all the changes that our business has to respond to.

Xerox has evolved with a rapidly changing business environment

Over the last decade, Xerox has evolved from being a copier company to a document company. We are basically a very fundamental part of the way people do business today, in an ecosystem that is highly unpredictable. That change represents our transformation into the digital economies and network solutions. That has put a lot of pressure on the things that information technology needs to provide to a business.

We went from a few points of change to many points of change; from the U.S.-centric view of technology to a global view; from fewer products and services to many products and services. We moved toward multiple technologies, outsourcing service procurement, both as a provider and a user of those services. We now have multiple security risks in what used to be a relatively secure environment. We have distributed telecommunication operations away from the highly secure, central, easily managed central environment that we had.

The model for managing change

Now, how did we address all of that in the way we run our company? Figure 2 on the following page shows our management model, which encapsulates both our business processes and our management process.

There are six categories in our management model, and the customer is at the center. Each of these six categories has a number of sub-elements. This is actually automated—it is the way we run the company, it is the way the operations reviews are conducted, it is the way units are looked at. And it is something that provides a common language for us around the business. It is a part of our quality organization. It mirrors in many ways the components of the Malcolm Baldrige Award.

On the left hand side of the model is our business process management. Our goal is to have customer driven, cross-functional, value-based processes that allow our em-
The first is Time to Market, which is largely focused around finding and imbedding technology into products that reflect our customer requirements, and getting them to the marketplace as rapidly as we can.
The second is our Integrated Supply Chain, which covers all the logistics, manufacturing and distribution aspects of what we are doing.

Next is Market to Collection, which is the identification of the marketplace and all of the processes around helping identify our customer requirements and needs, determining which of our products they want, following through with that order and collecting the appropriate revenues.

Finally, we have Customer Service, which embodies not just those basic services that we offer, but also solutions and equipment we put into your environment, and the process to keep them at a high level of quality for our customers.

Reaching above these four core processes is our philosophy of management for results. Supporting it underneath are those other infrastructure services that are necessary in order for these core processes to be executed with excellence.

We have focused most of our reengineering efforts on these four core processes. From an infrastructure point of view, it is a tremendous challenge for the information management organization. Many of the things that we're trying to do from a reengineering perspective require a totally redesigned infrastructure. In our reengineering and continuous improvement focus we have named global process centers so that each of those core processes has a single senior level manager. They work in collaboration with other parts of the company to redesign these processes and to move us down a path of radical change.

Paul Allaire, CEO of Xerox, described the kind of change in the organization he is looking for. He said, “Our objective is to create natural work groups, organized around natural units of work, which develop as work communities—communities of practice, communities that have communities within them.”

How do you develop your people so that they have this orientation toward change? Prepare them for change, create this continuous learning environment and let them know what the expectations are for what needs to be in the environment.

We've identified eight cultural dimensions. Everybody at the management level is evaluated on those and they are focused on being team based, open to change. We are very clearly focused on identifying for our employees what it takes to be successful. We also have identified 23 leadership attributes. We have evaluated them to determine which ones are critical for certain jobs in the company, we then did a profile of people. We used that information as a mechanism for matching people to jobs, so they have the appropriate attributes to really succeed in the roles that they are playing. (The eight cultural dimensions and 23 leadership attributes are listed separately in the next article, on pages 44 and 45, Figures 6 and 7, respectively.)
Every employee at Xerox has to have leadership through quality training. New employees receive it within the first 90 days. I joined the company in 1989, just after Bill Glavin had left Xerox and just before we won the Malcolm Baldrige Award. In my second week I was told to go to quality training, and it was an absolute revelation for me. I believe that was why I have been able to be successful at Xerox. It’s very difficult to be successful in an environment when you don’t know the language and the culture. And at Xerox, this training is so deeply embedded that no matter where you go in the world, the language is the same. A customer means the same to all of us, and this customer value in the language of quality is a very strongly held value for us.

The Xerox Internal Learning Forum is something I have used to promote leadership in my own group. It is focused on different ways of learning so that we don’t always have to go to classes and courses to learn, but can find multiple vehicles that help us grow, develop, and receive information. It’s largely based on reading a whole range of books, not just from a business orientation, then having small group discussions. On occasion, we’ll bring the author of that book in and do some learning exercises around that. It’s about a 15-month program, and most of my organization has been through it. We are now extending it into other parts of Xerox to promote the learning focus.

Figure 4 shows a traditional organization that still exists in most companies, at least when you look at organization charts on paper. A person gets put into a job, the job is part of an organization, the organization has a mission, hopefully the mission is connected in some way to the customer. This is an up and down flow so that information is pushed down to the employee. They kind of just sit in their little box and things come to them.

This is my view of a hierarchical organization. It creates victims out of people, in that they feel that they are bound by the box, they’re stuck in that box, and reaching out beyond that box is not an accepted part of the culture. So hierarchical organizations
A hierarchical organization is a push environment, continued

Figure 6. The Connected Organization

When most people see this on paper they say it's chaos, but it's only chaos if you look at it through yesterday's lens of the hierarchical organization. You have to look at it in different ways, understanding how a connected organization can and must work.
Moving to a team based (still hierarchical) and then a totally connected organization, continued.

The outer ring is focused on customer account management. My customers are internal to Xerox, and I'm focused on customers as our primary responsibility. I have information officers in each of the business units that support that. They have a dual reporting relationship to me and to their presidents. In the next ring inside we have solution providers. We have our outsource provider, as well as some internal competen-
Any time you come from a plateau and make a critical change, there is a degradation of some type in morale or maybe productivity. As people have to go through the learning curve, they might not be as good at what they have to do as they were under the
The information strategy that we put in place in 1993 was in response to our organizational change when we broke the company up into business divisions. It was a pretty aggressive strategy including a total change out of a proprietary infrastructure for e-mail that enabled us to communicate around the world, but which we were not going to bring to the mobile level. Since we wanted to bring technology to our sales people and
our service force so that they could better serve our customers, we needed to find a way to move ourselves out of this environment.

This is a very critical activity that we are finishing up this year. We are still on this strategy, and we are making a complete change to the infrastructure. We have 700 sites around the world, 75,000 seats, and we are moving them out of an environment that everybody was comfortable with, knew and liked, and into the industry standard, an open PC environment. This has meant changing hardware, software, networks, and work processes, because we had a lot of work process embedded in propriety product. We have done this in a space of two years.

We've experienced a lot of change, starting with our outsourcing effort, moving into the changing of the infrastructure and then leveraging the things that we've put into place by rapid application development. Every segment of that is a change curve and affects a constituency. And in this continuous change environment that we are in, it looks like a roller coaster when you put that in place. Leadership's responsibility is to find a way to live in a continuous change environment ride the crest of the change curve, as opposed to getting stuck in the troughs, or the valley of despair. So when I began to focus on the amount of change that this particular strategy was bringing, I began to have discussions with our quality and human resources organization because those are your levers of change. If this is happening in just one function then it's happening all over the company. We need to develop the strategy that enables us to really be successful as leaders in helping the company achieve the benefits of all this change.

From my point of view, what we're doing at Xerox is enabling this loosely held together organization of people to put together the structures that they need to be successful. Therefore, we will really move into continuous change, allowing us to not just to keep up with our competition but to stay ahead of our competition. The challenges are great out there.

Patricia Wallington is responsible for providing leadership in the planning, integration, implementation and operation of information technologies. She is also responsible for the reengineering of business processes to support the achievement of Xerox business goals and priorities worldwide. Prior to joining Xerox, she was Senior Vice President and Chief Information Officer at Massachusetts Mutual Life Insurance Company. She also held a number of positions over a 10-year span at Sun Company in management, sales, systems management, and telecommunications. Patricia has been an officer of the Society for Information Management since 1988. She was the first female president of this international organization. Patricia has a bachelor's degree from the University of Pennsylvania, Wharton School, and a master's degree from Drexel University. She attended the program for Management Development at Harvard Business School.
The Basic Business Principle at Xerox: Achieving Quality

Authors

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Introduction

Our Quality journey at Xerox began in 1981. Throughout the past sixteen years, there have been many peaks and valleys, emotional highs and depression, and as always, constant change.

Many companies have moved toward a Total Quality Management system as a result of their customers thrusting it upon them. In the long run, customers define the business, and they determine whether you’re a success or a failure. If you want to be a supplier for Xerox it’s very simple—you will have a Quality system. If you don’t have a Quality system you have two choices: (1) get a Quality system, or (2) go find someone else to do business with.

Going on a rollercoaster ride

Xerox has been one of the fastest growing companies in American history. If you had purchased stock at a low in 1960, by mid 1970 that stock had appreciated 66 times. We have experienced phenomenal growth. The next decade was one of turbulence. Figure 1 shows the roller coaster ride we started in 1973, when we had a 25% return-on-assets. By 1984 we were down to 4%, and we began the implementation of what we call Leadership Through Quality. We’ve been able to grow return-on-assets, reaching 18.6% in 1995. This article will illustrate how we got to our low point, and how we got to where we are today.

We suffered a significant loss of market share in the late 1970s and early 1980s. Part of the decline was the result of the Federal Trade Commission’s antitrust suit against Xerox in the early 1970s. We had settled the suit by 1977 but were required to release our patents and provide technical assistance to our competitors. This resulted in giving away our technologies on plain paper copying. We hadn’t been treating our customers well, so when they had a choice in the marketplace, they left in droves. We weren’t truly customer focused, and our benchmarking revealed that we had a significant competitive disadvantage. Our return-on-assets declined and employees started to lose confidence in our senior management team.

David Kearns, the President and CEO at the time, faced the problem squarely, placing the blame on Xerox, and setting a strategic direction of survival. Paul Allaire, our
Going on a rollercoaster ride, continued
Rising stock performance
a testament to success
Implementing processes and models

Next, we began to establish a new organizational structure by leveraging the total quality foundation that we built in the 1980s. We implemented a new management model that really impacted how we run the business. We implemented company-wide quality assessments and (hoshin planning) policy deployment. From 1987 to date we've only had four goals, and they're the same, year after year: Customer satisfaction, employee satisfaction, return-on-assets, and market share. That's all we're about, and that's what we're always going to be about. Staying the course has really helped us to be the successful company we are today.

Changing the culture and behavior of the organization

If you want to change, you cannot rely on implementing processes and tools. Real change is about culture, beliefs, behaviors and norms. Therefore, in order to constantly reinvent yourself you must be thinking in behavioral and cultural terminology. Tools are wonderful, but if the only tool you have is a hammer, everything looks like a nail. You really need to have more than that—transition teams, processes and tools, reward and recognition systems, training and communication. Training is about helping people do the work that they must do. You can never communicate enough, because you need to make sure that everyone is connected. Senior management action and behavior is so important. Thoreau said, “What you do echoes so loudly I cannot hear what you say.” You will not be judged by your words, but by your actions.

Self-assessments in the late 1980s

We did some quality assessments in 1987 and 1989 to see how we were doing. By 1990, we had won the Baldrige National Quality Award, but we were still improving on some of the things we weren't doing well. We identified 506 areas that we needed to improve, and we had still won the award. So we went into business excellence certification. We have won 20 quality awards since 1987, and if there's a country that has a quality award, we have won it. While the awards are nice, the biggest value is in the process that forces us to look at ourselves through the eyes of our customers. The Japanese have a saying, “When first encountering a problem, look in the mirror.” These quality awards force you to look in that mirror, and what you see is often not pretty, but it helps you see what needs to be done.

Breaking out of old patterns

In 1990 we said we needed to update our 1983 strategy. We also needed to be designed for systemic change and then have some methodology for running the business. To do things differently we must see things differently. It is not only about getting rid of your mental models but also providing the space for you to be able to think freely. One of the biggest problems is that we are encumbered by the way we think, and therefore we must unlearn the old theories. You must sometimes empty yourself out in order to fill yourselves back up again. We can be our own worst enemy.
The Xerox Management Model

In order for us to reinvent ourselves every single day and be creative, we had to have a management system to support that—so we created the Xerox Management Model (Figure 4). It has 25 practices or nonfinancial measurements, and six business results. It starts with management leadership, because they are the people who set the strategic direction for the organization. This is a little different than the Baldrige criteria, which talks about drivers of change. Change is about language, and if you are truly talking about empowerment and enabling organizations to self-manage, you must change your language. Driving is a word straight out of the old management system. Leadership is about the new system. Joel Barker states that “a leader is someone you would follow to a place you would not go by yourself.” It is about creating a vision that endears people to it, who are then willing to invest time, effort and energy in achieving the vision. It’s what pulls you to the future, not pushing you from the past.

Figure 4. The Xerox Management Model

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<tbody>
<tr>
<td>1.1 Visions and Strategic Direction</td>
<td>2.1 Resource Planning &amp; Staffing</td>
<td>3.1 Business Process Management Principles</td>
<td>4.1 Customer First</td>
<td>5.1 Benchmarking</td>
<td>6.1 Customer Satisfaction &amp; Loyalty</td>
</tr>
<tr>
<td>1.2 Managing for Results</td>
<td>2.2 People Development</td>
<td>3.2 Management Processes</td>
<td>4.2 Customer &amp; Market Requirements</td>
<td>5.2 Quality Processes and Tools</td>
<td>6.2 Employee Motivation &amp; Satisfaction</td>
</tr>
<tr>
<td>1.3 Leadership Behavior</td>
<td>2.3 Empowering Work Environment</td>
<td>3.3 Operational Processes</td>
<td>4.3 Market Segmentation &amp; Coverage</td>
<td>5.3 Information Management</td>
<td>6.3 Market Share</td>
</tr>
<tr>
<td>1.4 Fact-Based Management</td>
<td>2.4 Total Compensation &amp; Recognition</td>
<td>3.4 Enabling Processes</td>
<td>4.4 Customer &amp; Market Communications</td>
<td></td>
<td>6.4 Financial Results</td>
</tr>
<tr>
<td>1.5 Communication</td>
<td></td>
<td></td>
<td>4.5 Customer Relationship Management</td>
<td></td>
<td>6.5 Productivity</td>
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<tr>
<td>1.6 Environmental &amp; Social Responsibility</td>
<td></td>
<td></td>
<td>4.6 Customer Query &amp; Problem Management</td>
<td></td>
<td>6.6 Profitable Revenue Growth</td>
</tr>
</tbody>
</table>

High

Behavior
(Cultural Dimensions and Leadership Attributes)

Low

High

Role Models
(Reward & Recognize Publicly)

Candidates for Replacement

Low

Performance
(Business Results in Xerox Management Model)
Highlights of the model

I will now highlight the six key elements of the Xerox Management Model:

1. Leaders set the vision and strategic direction. Any changes within the organization begin with leadership.

2. Human Resources Management, the act not the department, is an underpinning that takes strategic direction from leadership and makes it operational. H.R.M. is responsible for recruiting people, developing them and creating an empowering work environment of value and diversity. We are firm believers that it is in our diversity that our power comes from. Our unity is created through diversity, not through sameness. All sameness does is create the same mental models. Everyone thinks the same and therefore it must be true and that's the power of the diversity of thought. Diversity of backgrounds and thought culture really brings together an organization's capacity to be responsive. The power of Xerox is in its diversity.

3, 4, & 5. If you have good processes (category 3), utilize information and quality tools (category 4), and focus the entire system on the customer (category 5), you are managing the system, not managing results. The results are the outcome of the system, and you cannot manage results even if you are an accountant— you can manipulate the results, but you cannot manage them. In our system, leadership, human resource practices, the processes, information and quality tools are all focused on the customer in order to enable the system to perform. Customer and market focus are critical practices. Each element within the category has its desired state, that forces us to ask what we want to achieve. It helps us define our preferred future. Then we define the core measurements of processes associated with it.

6. We understand that employee satisfaction at Xerox has a strong correlation with customer satisfaction. If you don't satisfy your employees, they will be less likely to satisfy your customers. In extreme cases, they don't get mad, they get even, and they get even with all the wrong people.

We're building a robust management system where all our employees, 87,000 worldwide, understand where they're heading in each one of the elements, and when they'll be there because there is a measurement defined for each one.

Right behavior and performance

If you want the culture of your organization to change you have to reinforce the behavior you want. Behavior is just as important as performance (see Figure 5). This is part of our clear strategic direction that is behaviorally focused.

If an employee has the wrong behavior and the right performance, they're directive coached. If an employee has all the right behaviors and low performance, they're directive coached. If they have the wrong behaviors and low performance, they're a candidate for replacement. If an employee has the right behavior and the right performance, and they are both of the highest degree, they are a candidate for promotion. We will use empowering coaching methods for anyone who falls somewhere in between those extremes (job assignments, 360 degree feedback, etc.).
Behavior and performance, continued

We have defined eight cultural dimensions and 23 leadership attributes. We are all judged by the eight cultural dimensions (Figure 6) every year. The management replacement planning process is centered on this whole theory, so when one is considered for a promotion, he or she is assessed by their boss, peers and subordinates as to how well are doing inside the system.

Figure 6. The Eight Cultural Dimensions

Defining the culture and leadership

Our Focus

Market Connected

Action Oriented

Absolute Results Oriented

How We Work Together

Line Driven

Team Oriented

Empowered People

Enablers

Open, Honest Communication

Organization, Reflection, and Learning
The 23 leadership attributes that we are guided by (Figure 7) are job specific (there may be some jobs where they are not needed). We use them to profile the competencies that people need to have in order to be successful in the jobs that they're in.

**Figure 7. The 23 Leadership Attributes**

<table>
<thead>
<tr>
<th><strong>Strategic Leadership</strong></th>
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</thead>
<tbody>
<tr>
<td>1. Strategic thinking</td>
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<tr>
<td>2. Strategic implementation</td>
</tr>
<tr>
<td>3. Customer driven approach</td>
</tr>
<tr>
<td>4. Inspiring a shared vision</td>
</tr>
<tr>
<td>5. Decision making</td>
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<tr>
<td>6. Quick study</td>
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<table>
<thead>
<tr>
<th><strong>Organizational Leadership</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Managing operational performance</td>
</tr>
<tr>
<td>8. Staffing for high performance</td>
</tr>
<tr>
<td>9. Developing organizational talent</td>
</tr>
<tr>
<td>10. Delegation and empowerment</td>
</tr>
<tr>
<td>11. Managing teamwork</td>
</tr>
<tr>
<td>12. Cross functional teamwork</td>
</tr>
<tr>
<td>13. Leading innovation</td>
</tr>
<tr>
<td>14. Drive for business results</td>
</tr>
<tr>
<td>15. Use of Leadership through Quality</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Managing Self and Others</strong></th>
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</thead>
<tbody>
<tr>
<td>16. Openness to change</td>
</tr>
<tr>
<td>17. Interpersonal empathy</td>
</tr>
<tr>
<td>18. Personal drive</td>
</tr>
<tr>
<td>19. Personal strength and maturity</td>
</tr>
<tr>
<td>20. Personal consistency</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>Knowledge Base</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>21. Environmental and industrial perspective</td>
</tr>
<tr>
<td>22. Business financial perspective</td>
</tr>
<tr>
<td>23. Overall technical knowledge</td>
</tr>
</tbody>
</table>
Empowerment

Human Resource Management involves resource planning, staffing, people development and creating an empowering work environment, which consists of an empowered workplace, empowered leaders, empowered teams and empowered individuals. It is important to note that you cannot empower someone else. Anyone who tells you that you're empowered, doesn't have a clue. You can only empower yourself, and when you do that, you will continue until you are reprimanded. If no boundaries are set, punishment is a sure thing. Therefore, if you are working towards an empowered work force, you must set boundaries so that people understand how much freedom they have.

Our model of the empowered workplace (Figure 8) includes three key factors: 1) Direction and Communication, 2) Ownership, and 3) The Way We Work. This is a highly interactive system.

Figure 8. The Empowered WorkPlace Model
Managing the processes

Figure 9. The Business Process Management Model

When we have a concept, the first thing we do is find the customer who wants to use that concept in their business. Then the customer and our engineers work together all the way through the product development cycle to make sure that it’s a customer centric product or service.

Dr. W. Edwards Deming said that the purpose of theory is to generate questions, the purpose of questions is to create understanding, therefore without theory there is no understanding. The more you ask the more you learn. We look at the Xerox Management Model, and then use that information to lead a self assessment. We must constantly ask the same questions the Baldrige examiners asked us in 1989. We must constantly go back and ask “how are we doing?” Our self assessment has seven levels that are very similar to the ones used by the Baldrige (see Figure 10). We then analyze the results to really understand why we are where we are. We continue to do this worldwide to continue our learning. We had 250 senior managers train as examiners and 500 managers train in self assessment last year.

Listening to the customer

Self-assessment
CASE STUDY

The Basic Business Principle at Xerox: Achieving Quality

Self-assessment, continued

<table>
<thead>
<tr>
<th>Assessment</th>
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Figure 10. Seven Grades of a Quality Assessment

Looking at the organization as a system

If leadership sets the vision and strategic direction, using sound human resource practices, the organizational speed increases. If you take that increase in speed and apply it to your processes using information and quality tools, you increase the speed even faster. If you take that speed and apply it to your customers to increase their delight, the results are a given. Many organizations have not learned this lesson: “IT IS A SYSTEM.”

Russell Ackoff, Professor Emeritus at the University of Pennsylvania’s Wharton School of Business, has a great quote: “Every system is built perfectly to generate the results it generates.” If you don’t understand business processes, and you don’t understand inter-connectivity, you are destined to do what you have always done.

The benefits of Quality

Total Quality Management is extremely difficult, but it is possible and will lead you to be successful. What are the benefits? You are continuously learning, identifying the vital few, using process management, linking everything. It’s line driven, which means the people who do the work are involved in the planning process. You use a common language so that everyone has the same understanding and it generates better practices. The challenge is trying to get people totally committed to it. It’s a learning curve, because we don’t learn as fast as we think we do. You must have action following learning, you must follow up and have constancy of purpose. Those are some of the challenges.
Building the management model

It is most important when looking at the design of one's management model, to ask the following questions: How do we really use it in the field? How does it improve performance? How do we operationalize it?

In many organizations today, there is what I call a warped or skewed model. It looks good when it's designed, but people eventually go back to doing the things they are good at. For example, an organization may be very good at process, so all of a sudden people focus on that part of the model at the expense of other areas. Our management model is different because it allows us to maintain a balance between each of the elements so we don't stick to favorites and warp the model. We don't want to get stuck doing the same thing over and over, hoping for different results.

The business excellence process

We start by doing something we call a business excellence process. It is a self-assessment for each element—we have a rating and we assess where we are against each one. There are a lot of different elements and categories, so we need to decide which to focus on. We can't attack all of them. We want to make improvements in each area to become a world class organization, but in order to really focus on the things that will give us better performance in year one, we select the vital few, and then we make a diagnosis. We try to understand what our desired state is, where we are currently, identify that gap, do some root cause analysis, and then develop some action plans. We also have a validation or certification process, where we visit other locations to do a one-day site assessment. We will also have somebody come into my operation and do a validation on us based on how they did their self assessment, how they selected their vital few, and how they did their diagnosis. It's not an operational review, we simply coach and provide this mirror reflection back, we tell them just what we see and share some best practices.

Part of the implementation process includes communicating throughout the organization what our assessment is, what our vital few are, what our action items are, along with the regular reviews like our monthly operations reviews or quarterly reviews. Then we take this information and use it to create an annual plan.

The desired state

One of the most important factors is that each element has a desired state. If we don't know where we're going, any path will take us there. We have to understand what our desired state is, and where we are trying to go, so that we will understand how our actions will get us to that point.

To develop this, we will have a two or three day meeting. It will be a cross-functional team that will go through each of the elements making sure we thoroughly understand the desired state. Then we start doing our self assessment. There is a core measurement for each of the desired states that we want to focus on. Then we do what we call quad sheets, which are just one way to capture and document everything that we want to do about improving on that specific element (see Figure 11). It has our rating in 1995, our rating in 1993 and it has a date as to when we want to be world class. The
The desired state, continued

quad sheet has our current performance level and the root causes for that. We can identify the gap because we know the desired state and our performance level, so then we look for strengths within the organization. We can then build on that from an action planning standpoint. Quad sheets really tell us everything we want to know about analyzing that gap.

**Figure 11. A Sample Quad Sheet**

<table>
<thead>
<tr>
<th>SELF-ASSESSMENT SUMMARY &quot;QUADRANT&quot;</th>
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<tbody>
<tr>
<td>Item:</td>
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<tr>
<td>Desired Status:</td>
</tr>
<tr>
<td>Owner:</td>
</tr>
</tbody>
</table>

| PERFORMANCE                     | CONTRIBUTING FACTORS |

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>IMPROVEMENT AREAS</th>
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<table>
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<tr>
<th>ACTIONS</th>
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Rating the performance

After the two to three day meeting, we end up with a summary of all the different categories. It has every one of the elements and it lists how we've done on our self-assessment on a 1 to 7 scale. A rating of one is not very good. A rating of seven is outstanding. A one indicates that there's virtually no system or process to support it, and essentially no one knows much about it. A seven indicates that you have good sustained results over two to five years, with a year to year kind of improvement. There would be a pervasiveness throughout the organization that if you asked any person, they would know the vital few of this organization, the progress they were making against those, whether customers were involved, and if they had the support of management—all of those would be a positive response.

A collaborative decision

The ratings include a community aspect. We go around the room and everybody tells what their rating is. If there is a big difference between two ratings, each individual will defend their ratings and we come to a consensus. Is it one or the other, or is it somewhere in between? Then we mark the vital few, identify which ones will have the most impact, and spot those that had the lowest performance level on our common goals. We then come back and look within our organization, and ask, “what things can we do differently to really have a big impact on those common goals?”

Four steps to the validation process

Each unit has their plan validated. It is a one day event, and the purpose is two way communication. We want to be a coach when we look at another operation and give them our opinion. We also want to share with them any best practices that we are using or we have heard about. We assume that their rating and their assessment is correct, but we are really looking to see that the assessment is done by fact and observation, not by opinion. To that end, we might do some probing and if we see a weak area, we will coach them on it.

There are four steps to a validation. The first step is that the organization invites someone to come in and create a portfolio, a report on organizational structure. It would probably include some demographics about the state that they are in, and the kinds of operations that they’re in. Or, they might just share the quad sheets on the different elements with the action plans. They send that to the validator three weeks before the visit. Then the validator can develop an agenda, questions, etc. Then there is the actual visit. The evening before, the validator meets with the senior team of managers to go over the agenda. The next day the validator meets with all the process owners in each of the elements and the senior management team, and begin testing for understanding, providing the coaching, providing the verbal feedback. We take a consultative approach, so the validator writes up a summary before they leave. It is a written report that’s very simple and helps to share the best practices. The final step is that the organization then takes that input and makes some modifications in their action plans, firms up their portfolio, and then goes through their implementation.
Conclusion

Those are some of the ways we've taken the model and tried to operationalize it. That's what we do with these kinds of models, how it keeps us in balance, how we are able to break out of not doing the same things over and over and hoping the results will be different, and how we use it to effectively change the way we work within our business.

Author information

John Barr is Senior Managing Partner for Xerox Quality Services, a division of the 1997 Malcolm Baldrige Award winning Xerox Business Services. He has led the efforts for planning, training, education, and deployment of a corporate-wide Total Quality Management program for Xerox. He was coach to the core Xerox team that prepared the corporation's winning application for the Malcolm Baldrige National Quality Award in 1989. He was also a member of the design team that authored the internal 1989/1990 quality assessment for Xerox Corporation, and has served as a senior internal quality examiner and member of the company's quality council. John was a principal in the division office that designed and developed Xerox's approach to business process management. He teaches quality management at Columbia Business School and Rochester Institute of Technology. He received his Bachelor's degree from Eastern Michigan University.

Larry Staneart is Vice President and General Manager of Florida Customer Business Unit for Xerox Corporation. In this capacity, he is responsible for customer operations in the state of Florida. Larry joined Xerox in 1968. Since joining Xerox in 1968, Larry has held a number of key management positions, both in the field and in headquarters in Rochester, New York. Most recently, he was Vice President of the United States Customer Operations division and Xerox Business Services division. Larry has served as a member of the policy committee for both divisions. He earned his bachelor's degree from Oklahoma State University and serves on the Board of Directors for the Governor's Quality Council in Florida.
Bagel Sales Double at Host Marriott
Using Quality Function Deployment

Authors

Steve Lampa, Brand Team Vice President, Marriott Hotels, Resorts, and Suites, Washington, DC
Glenn H. Mazur, Japan Business Consultants, Ltd., Ann Arbor, Michigan

Three recent trends have led to changes in the way travelers view airport food: (1) healthier and lighter food, (2) more women travelers, and (3) fewer on-board meals being served. Host Marriott, which operates 70% of the U.S. airport food and beverage market, wanted to assure that its product offerings were keeping up with customer demands. What they discovered was that their traditional approach to new product and service development was penny profit driven and not customer focused. Quality Function Deployment (QFD) was employed to make quality and customer satisfaction more important. What ensued startled us all: within two weeks sales were up 50%, and after one year sales had evened out at more than double their previous year’s level.

Host opened in 1897 as a purveyor of food, beverage, news, and general merchandise in train stations, the leading form of mass land transportation at that time. We have continued to serve that market by now controlling over 70% of the food and beverage sales in U.S. airports. We also operate food, beverage, and merchandise facilities in travel plazas on 12 east coast and Midwestern highways.

Host currently enjoys $1.2 billion in sales per year from its over 2,000 units in 170 locations worldwide. Over 40 different types of regional and international branded products, such as Burger King, Taco Bell, TGI Fridays, etc., make up 65% of this business.

Our approach to developing new products and services has been primarily localized, with each operation identifying the needs of its market, sourcing new products, testing them, and keeping the ones that worked. That is a loose, vaguely defined, process. The two driving forces behind this were: (1) to get a product that fit the category at the lowest price in order to drive the penny profit and cost of sales margins, and (2) how much free equipment the vendor would provide. Customer input was not normally sought before or after that. Core items (coffee, hot dogs, baked goods, etc.) were secured through national contracts, also driven by price and sales margins. Merchandising and delivery to customers were handled in the traditional way, where we determined what was to be done. Customer usage issues were not normally considered.
In 1994, we began a strategic planning process to assess our strengths for the rest of the decade. Specific competitive opportunities were identified that exploited the competencies we had built up over the last century. Several task forces were commissioned by Tom O’Hare, Vice President of Operations, set up to explore ways to improve product quality. Some of the task forces focused on core items like hot dogs, baked goods, deli, etc. We felt, however, that given our widespread activities and the importance of these new business directions, a more unified new product development process (NPD) was needed to assure that the quality of the output could be maintained from the strategic planning phase down through concept and delivery of the service.

Through our work with GOAL/QPC, a Massachusetts based quality training organization, we were introduced to quality function deployment (QFD) and to Glenn Mazur of Japan Business Consultants and the QFD Institute, one of the leading proponents of the methodology in North America.

QFD is designed to improve customer satisfaction with the quality of our products and services. What can QFD do that is not already being done by traditional quality systems? To understand QFD, it is helpful to contrast the differences between modern and traditional quality systems.

Traditional approaches to assuring quality often focus on work standards [Love 1986], automation to eliminate people, or in more enlightened organizations, Quality Improvement Teams to empower employees to resolve problems. As organizations are finding out, however, consistency and absence of problems are not enough of a competitive advantage when the market shakes out suboptimal players.

QFD is aimed specifically at maximizing customer satisfaction, measured by metrics such as repeat business. QFD focuses on delivering value by seeking out both spoken and unspoken needs, translating these into actions and designs, and communicating this throughout the organization. Further, QFD allows customers to prioritize their requirements, benchmark us against competitors, and then optimize those aspects of the organization that will bring the greatest competitive advantage.

Quality Function Deployment began about 1966 in Japan as a quality system focused on delivering products and services that satisfy customers. To efficiently deliver value to customers, it is necessary to listen to the “voice of the customer” throughout the product or service development process. The late Dr. Shigeru Mizuno, Dr. Yoji Akao, and other quality experts in Japan developed the tools and techniques of QFD and organized them into a comprehensive system to assure quality and customer satisfaction in new products and services [Mizuno and Akao 1994, Akao 1990].
A brief history of QFD, continued

In 1983, a number of leading North American firms discovered this powerful approach and have been using it with cross-functional teams and concurrent engineering to improve their products, as well as the design and development process itself [Akao 1983, Sullivan 1986, King, 1987]. Service organizations have also found QFD helpful. It has been successfully applied in the U.S. healthcare industry since 1991. New applications are being reported every year in small businesses as well [Mazur 1993c, 1994a].

Early applications of QFD in service organizations in Japan by Ohfuji, Noda, and Ogino in 1981 were for a shopping mall, a sports complex, and a variety retail store [Akao, 1990]. More recently, Kaneko has been integrating QFD, reliability, and quality circle activities in hotels, shopping centers, and hospitals [Kaneko 1990a, 1990b, 1991, 1992].

QFD has been heralded for such benefits as promoting cross-functional teams, improving internal communications between departments, and translating the customer’s needs into the language of the organization.

Meeting different types of customer requirements

To be able to satisfy customers, we must understand how meeting their requirements effects satisfaction. There are three types of customer requirements to consider (see Figure 1) [Kano, et. al., 1984].

Figure 1. The Kano Model (adapted)

Revealed Requirements are typically what we get by just asking customers what they want. These requirements satisfy (or dissatisfy) in proportion to their presence (or absence) in the product or service. Fast delivery would be a good example. The faster (or slower) the delivery, the more they like (or dislike) it.

Expected Requirements are often so basic the customer may fail to mention them—until we fail to perform them. They are basic expectations without which the product or service may cease to be of value; their absence is very dissatisfying. Further, meeting these requirements often goes unnoticed by most customers. For example, if coffee is served...
Meeting different types of customer requirements, continued

hot, customers barely notice it. If it's cold or too hot, dissatisfaction occurs. Expected requirements must be fulfilled.

Exciting Requirements are difficult to discover. They are beyond the customer's expectations. Their absence doesn't dissatisfy; their presence excites. For example, if caviar and champagne were served on a flight from Detroit to Chicago, that would be exciting. If not, customers would hardly complain. These are the things that “wow” the customers and bring them back. Since customers are not apt to voice these requirements, it is the responsibility of the organization to explore customer problems and opportunities to uncover such unspoken items.

Particular aspects of Kano's model

Kano's model is dynamic in that what excites us today is expected tomorrow. That is, once introduced, the exciting feature will soon be imitated by the competition and customers will come to expect it from everybody. An example would be the ability to have pizza delivered in thirty minutes. On the other hand, expected requirements can become exciting after a real or potential failure. An example might be when the passengers applaud after a pilot safely lands the airplane in rough and stormy weather.

The Kano Model has an additional dimension regarding which customer segments the target market includes. For example, the caviar and champagne that's exciting on the domestic flight might be expected on the Concorde from New York to London. Knowing which customer segments you serve is critical to understanding their requirements.

Thus, eliminating problems handles expected requirements. There is little satisfaction or competitive advantage when nothing goes wrong. Conversely, great value can be gained by discovering and delivering on exciting requirements ahead of the competition. QFD helps assure that expected requirements don't fall through the cracks and points out opportunities to build in excitement.

In summary, Kano found that the exciting needs, which are most tied to adding value, are invisible to both the customer and the provider. Further, they change over time, technology, market segment, etc. The Japanese creators of QFD developed tools such as the Voice of Customer Tables [Akao 1990b, Ohfuji et al 1990, Nakni 1991, Marsh et al 1991, Mazar 1991a, 1991e, 1992c, 1993a, 1993c] and coupled them to affinity diagrams and hierarchy diagrams to break through this dilemma.

Going to the gemba

This process works best when the QFD team goes to gemba (where the customer interfaces with the service) to observe, listen, and record the problems customers experience and the opportunities they wish to seize. The voice of the customer tables provide a structure for recording the data. Going to the gemba can be difficult for those who are used to seeing things from an internal point of view. They tend to see more process problems and solutions than customer needs. Systematic tools can help the QFD team see the world from the customer's point of view.
**Customized QFD for Host Marriott**

Although Host had previously experimented with the House of Quality, this was their first attempt at Comprehensive Service QFD [Mazur 1993a]. In order to thoroughly examine all facets for applicability beyond the current project, they elected to explore all the deployments in Comprehensive Service QFD. The standard deployments are explained in Table 1.

**Table 1. The Standard Deployments of Comprehensive Service QFD**

<table>
<thead>
<tr>
<th>Deployment</th>
<th>Purpose</th>
</tr>
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<tbody>
<tr>
<td><strong>Customer Deployment</strong></td>
<td>To determine which customers and gembas are critical to our success.</td>
</tr>
<tr>
<td><strong>Voice of Customer Deployment</strong></td>
<td>To understand the true needs of the customer through analysis of spoken and unspoken requirements and context of use.</td>
</tr>
<tr>
<td><strong>Quality Deployment</strong></td>
<td>Prioritization of customer needs and translation of them into service measures.</td>
</tr>
<tr>
<td><strong>Function Deployment</strong></td>
<td>To identify and prioritize required and new activities without identifying how they are to be performed.</td>
</tr>
<tr>
<td><strong>Reliability Deployment</strong></td>
<td>To identify and preclude failpoints from a process.</td>
</tr>
<tr>
<td><strong>New Process Deployment</strong></td>
<td>To conceive and select alternative ways to perform the above functions.</td>
</tr>
<tr>
<td><strong>Task Deployment</strong></td>
<td>Detailed breakdown of the selected process to identify responsibility and performance requirements.</td>
</tr>
<tr>
<td><strong>Standardization</strong></td>
<td>Job descriptions and standard operating procedures to hold the gains.</td>
</tr>
</tbody>
</table>

**Getting executive buy-in**

The customization process began in March, 1995 with a one-day QFD overview presented to executives of both Marriott International and Host. The purpose of this meeting was to expose these executives to the methodology so that they could participate in determining whether QFD should be adopted as the standard new product and service design process. At this meeting, it was determined to do a pilot QFD project at the Phoenix Sky Harbor International Airport around improving baked goods products.

As a service, there are fewer large capital investments than in manufacturing companies, and it is possible to experiment in a “living lab” and make modifications relatively quickly. QFD should be tailored to address these simpler business needs.

Not everything in our core businesses need to be new and innovative products, so this limited trial helped us to find an appropriate depth.

We did not want to take on all baked goods for the first project, and so our first job in QFD was to determine what would be best suited for product change. We began this three month journey in May, 1995.
Customer Deployment

Since QFD, like most TQM activities, tries to focus resources on the most important areas, it was useful to determine the key customers we needed to satisfy. The logic here was that if we could meet or exceed the most important expectations of the most important customers, the rest would take care of itself. The generic model of customer deployment [Mazur 1993a] flows from identifying and prioritizing project success criteria to identifying and prioritizing core competencies to identifying and prioritizing customer segments. Since we were already dealing with strategic competencies, Mazur helped us redefine the customer deployment to fit our situation. (Figure 2 is a matrix flow chart of that process.) The purpose of these matrices was to determine key customers of key unit types (terminal, unit area, etc.), that would sell the targeted baked good, that would lead to the project being deemed successful by management. Once identified, we would target our market research on these customer segments first, thus conserving our research activities to the most fruitful segments.

Figure 2. Customer Deployment Matrices

Our first task was to clearly define how the project would be deemed successful by our management. First we brainstormed and then drew an interrelationship digraph (details omitted) to understand the “drivers” and “resultors” of these goals. We found that customer satisfaction drove many of the other goals and should be the primary focus of the project. Increased sales, profit improvement, landlord satisfaction, associate satisfaction and 15 other goals were identified. We then drew an affinity diagram, grouping the goals under 5 headers: customer satisfaction, associate satisfaction, landlord (airport authority) satisfaction, profit, and won and retained sales contracts. Some goals were more important than others, and so a prioritization matrix [Brassard 1989] was used to prioritize them. (See Figure 3.)

The next step was to augment our traditional baked goods with other potential varieties in order to identify the kinds of baked goods that might lead to customer satisfaction in an airport setting. Following Mazur’s “batman” process of brainstorm, affinity, tree, matrix, a hierarchy of possible baked goods was created. This assured that
Customer Deployment, continued

The baked goods tree was prioritized in a matrix from the project goals and their priority weights (details omitted). The analysis was to determine which baked goods would contribute most to the success of the project goals. From this bagels were selected.

The next step was to determine the type of retail unit we would sell these in. The batman technique was used to detail these and a matrix was created with the highest priority baked goods and the type of unit (details omitted). The unit types included full service restaurant, concourse kiosk with large display cases, kiosks with small display cases, and branded outlets. From this matrix we learned the type of sales unit which would be most successful at selling bagels—the concourse kiosk with large display cases.

The next phase was to identify customer segments based upon use characteristics such as time of day, purpose of coming to airport, etc. This was a change from the usual market research that delivers demographic characteristics, such as income, education, etc. The batman process was applied to organize these into a matrix (details omitted) with

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**Figure 3. Prioritization of Project Goals**

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>AS</th>
<th>LL</th>
<th>PI</th>
<th>WR</th>
<th>Raw Score</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Satisfaction (CS)</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>31.0</td>
<td>40.5%</td>
</tr>
<tr>
<td>Associate Satisfaction (AS)</td>
<td>0.2</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>21.2</td>
<td>27.7%</td>
</tr>
<tr>
<td>Landlord Satisfaction (LL)</td>
<td>0.1</td>
<td>0.2</td>
<td>1</td>
<td>0.2</td>
<td>5</td>
<td>6.5</td>
<td>8.5%</td>
</tr>
<tr>
<td>Profit Improvement (PI)</td>
<td>0.2</td>
<td>0.2</td>
<td>5</td>
<td>1</td>
<td>10</td>
<td>16.4</td>
<td>21.4%</td>
</tr>
<tr>
<td>Win &amp; Retain Contracts (WR)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>1</td>
<td>1.5</td>
<td>2.0%</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>1.6</td>
<td>6.5</td>
<td>21.2</td>
<td>11.3</td>
<td>36.0</td>
<td>76.6</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

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**Figure 4. Tree of Types of Baked Goods**

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we had not overlooked any baked goods that could have made an especially exciting offering. (See Figure 4 for a portion of the tree.)
CASE STUDY / TOOLS

Customer Deployment, continued

the unit type based upon what type of customer was most likely to eat at a concourse kiosk. The highest priority customer segment turned out to be women traveling in the morning on business. We decided to look at both men and women. This is how we selected the gemba. The next step was to go to the gemba and determine the needs of these key customers.

In our traditional approach to going to the gemba in the context of product planning, our attention was on internal issues such as sanitation, staffing levels, product display, etc., rather than on the customer using our products and facilities. Mazur took us on a practice run down to the cafeteria, where the team spent about an hour observing customers enter (or choose not to enter) the cafeteria, look around for menus, inspect the food, take things, put things back, pay, and try to find a table. What we were taught to look for and record was evidence that the customer was able to complete each action easily and pleasurably and to identify barriers. Especially valuable were smiles and grimaces on the faces of our customers.

What we got was a view we don't normally see when planning sessions are held in meeting rooms. Later, at the bagel gemba, there were many usage issues we had not seen before. For example, the packaged cream cheese was difficult to open, plastic utensils broke, there was no place to sit. Careful analysis of this data and interviews revealed that more bagel varieties and flavored cream cheeses were desired. We also noticed that we were selling bagels in a way that focused on speed of service (we wouldn't cut bagels or toast them which we thought could hold up the line), so we didn’t offer the most popular ways bagels are eaten! Our managers didn’t believe customers really wanted a toasted bagel because they never asked for them. Boy, were we wrong!

At the gemba, the spoken words and observed actions of the customer were recorded in the Voice of Customer Tables Part 1 and 2, which record usage data, such as time of day, whether meal or snack, etc. and sort the voices into benefits vs. features, respectively. The benefits, called demanded qualities in QFD, were put through the batman process, and included items such as “I have more choices,” “Tastes good,” “Easy to carry,” etc.

A survey was conducted of bagel eaters at the gemba and about 50 responses were received. Demographics were about 40% men to 60% women, about evenly split between Phoenix residents and those who were not, and included about twice as many pleasure travelers as business travelers. They were asked to prioritize these benefits so that we would know which they valued the most. The survey also asked them to compare the current bagel offered at our airport terminals with those they had elsewhere in terms of each of the benefits. Frequency distributions of responses were incorporated into an analysis that showed us what was most important to customers and where competition was perceived as better. Our mission then became to exceed the competition in those benefits which were most important to the customer (see Table 2).

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The next phase was to translate the customer benefits into service measurements and performance targets that would help us design the new bagel service right the first time. QFD uses a special matrix called a House of Quality for this purpose. The House of Quality brings together on one sheet of paper the customer needs, preferences, and choice data from the market survey, the company’s response to those needs in terms of service measures and performance targets, and yields a prioritized set of areas the company needs to address first (see Figure 5).

Figure 5. Demanded Quality vs. Quality Attributes

To save time, we approached the House of Quality at two levels. First, we used just the general categories of customer benefits or demanded qualities, and then we made a second House detailing only the most important areas from the first House.
The top four performance measures were selected for improvement efforts; the rest were to be maintained at the current level of performance. These four were (1) increase visibility by giving 50-60% of a display case for bagels, (2) increasing the number of bagel varieties from two to six, (3) increasing the number of topping varieties from three to five, and (4) adding a toaster option to heat the bagels at time of serving.

Once the performance targets were specified, it was necessary to determine what activities would be affected and who would be responsible for maintaining these performance levels. In Comprehensive Service QFD, these are identified through function deployment. Again, a two step approach: first a general matrix, and then a specific one was generated to identify the business functions that would be necessary to implement the changes. The matrix deployed the quality attributes and their priority weights from the House of Quality to prioritize the most critical business functions for assuring success of the new bagel service. It showed that at the commissary level, sourcing, acquiring, preparing and shipping of the bagels would be critical. At the operations level, displaying and maintaining the attractive appearance of the bagels was identified as critical. The sourcing people began right away contacting the big bagel vendors and cream cheese producers to learn what the current favorites were. Industrial toaster company Prince Castle had a toaster that could toast the bagel in about the same time as it takes to complete the sale, so there would be no delay of the airline passenger (see Figure 6).

Figure 6. Quality Attributes vs. Functions

Supplier’s Functions in Delivering Customer Demands

Top-Rated Customer Demanded Qualities

Reliability deployment

When developing a new service, it is important to assure that any new processes employed are not failure prone prior to the new service starting up. Comprehensive QFD uses reliability deployment to first identify the potential fail points, and then to eliminate them in the design of the service. The failpoints are prioritized by deploying the demanded qualities from the House of Quality into the reliability matrix. The highest ranking failpoint identified in our matrix was “running out of product.”
At this point in the QFD study, we now understood customer preferences and choices, performance targets, key business functions, and potential failures to avoid. This gave us the information to begin developing alternative processes to fulfilling these requirements.

Different display cases, heating equipment, sourcing of bagels and cream cheese were worked into process flows and examined for their ability to meet the requirements. As mentioned before, we knew about Prince Castle, a company that uses QFD to develop its commercial kitchen equipment, and from their product line, the Excalibur conveyor toaster was selected for its speed and safety. Several bagel sourcing options were considered, including: (1) having bagels delivered by a local bakery twice a day, (2) baking them at the commissary and delivering them to the kiosks on a pre-set or per request basis, and (3) baking them on site. New cutting devices were also explored.

After analyzing the alternative concepts, a parbaked and frozen bagel supplied by Uptown Bagels was selected. This product can be thawed quickly and baked in the kiosk in six minutes and would allow fresh baked bagels produced to business demands. A mandatory selection of plain, onion, cinnamon raisin, and honey wheat were chosen, along with an optional blueberry and flavor of the month. Different cream cheese options were also explored. The selected process called for mixing flavors into a cream cheese that is whipped and blended on premise and then pre-packaged. Mandatory flavors are plain, onion/chive, and garden vegetable, with options of strawberry, low fat, and a flavor of the month. Appropriate signage was also developed.

The best laid plans come to fruition when individuals are made responsible for carrying out specific tasks in a manner that achieves the targets that were designed and planned in the previous steps. This is what task deployment does. Mazur developed this deployment from the process quality control sheets commonly found in manufacturing. The purpose of task deployment is to assign, for each step in the newly developed process, the person responsible, timing, location, equipment, skill or training, performance, and self inspection requirements. When these are met, then the new process is
assured that it can meet all the requirements specified, and can thus meet the most important customer benefits, which will lead to achieving the goals of the project as defined at the beginning of the QFD.

No project is complete until we can assure the ongoing performance of the new system. Since QFD is a Total Quality Management approach, standards should be created for things such as initial and ongoing training of employees and associates, and vendor compliance. After the tests were completed in August, the QFD team began to develop standards that have been compiled in a booklet that shows the specifications, procedures, policies, equipment, and expected results of this new service. This standard has been adopted as the standard for all our generic (non-branded) units that sell bagels.

Sales in the Phoenix airport concourse kiosks more than doubled as a result of the QFD efforts. Changes in customer choice data were also tracked. There were dramatic improvements in the key customer benefits of more bagel and cream cheese variety and heating options, as well as other benefits such as tastes good and easy to spread. And we were pleased that the enhanced options actually yielded improvements in service speed, which was contrary to what we initially worried would deteriorate.

Host Marriott Services has adopted the approach developed in Phoenix as the standard for the organization. All snack bars and delis that offer bagels now offer a variety of options on bagel and topping flavors. The bagel preparation methods and delivery options (cut, toasted, etc.) are also standard.

Bagel sales in Host has doubled across the company in the past two years. However, it is difficult to attribute this success entirely to the redesigned process developed through this project. Bagels have become a hotter consumer item in recent years, which contributes to the increase in demand. Vince Modica, Vice President of Standards for Host Marriott, estimates that at least half of the increase in sales is due to the new product and service standards.

The benefits of QFD were certainly proved in this project. That we were able to achieve two to three times sales growth in only one month and then sustain that over the next six months speaks to the staying power of focusing on the customer and then standardizing the resulting improvements. Through this careful analysis, job responsibilities have been improved and those who are responsible for the day-to-day operations are involved in the process.

Our next step is to carry this to our San Francisco operations, and to build this process into other future operations (see next section). The time commitment still concerns us in terms of a cost-benefit ratio. By the end of the project, six people had spent fifty-three hours each (a total of 318 hours) on this QFD project. Three issues
Conclusions, continued

emerge that affected this:

1. The team was new to QFD and many of its tools. In the future, the Seven Management and Planning Tools should be taught first.

2. We wanted to explore the full power of Comprehensive Service QFD in order to judge its applicability to future projects. Thus, some of the steps we took were more for learning purposes.

3. We wanted to involve the corporate TQM department and so the project was stretched out over three months.

Future activities

The benefit of going to the gemba to understand the customer’s perspective is being integrated into our planning process at Phoenix Sky Harbor International Airport. Two projects have been engaged recently. One was the design of a new sandwich deli. Strong customer demands such as “sandwich is made the way I like it,” “sandwich is fresh” and “sandwich is fast,” have been realized with a moving sandwich line where the sandwich is moved from station to station by the attendants who add ingredients chosen by the customer. This has reduced a line back up as well as increased satisfaction by being able to choose what they get. Also, to make it easier for both the attendants to load bottled drinks in the refrigerator and for customers to remove them, the sliding door refrigerator has been replaced by one with an air curtain similar to units in a supermarket. Drink sales jumped almost immediately, and this is now becoming a standard configuration at other Host airport properties in the Southwest.

The quality of the training and materials was essential to the overall success of the project, and played a key role in the continued efforts of the teams. Additional QFD projects have been carried out successfully by team members without the need for additional external consultants.

References


References, continued

References, continued

REFERENCES, continued


AUTHOR INFORMATION

Steve Lampa is currently Brand Team Vice President with Marriott Hotels, Resorts, and Suites. From 1991 to 1996 he was Vice President of Total Quality Management at Host Marriott, and prior to that spent 16 years in operations and human resources at Marriott Hotels. Lampa earned his Bachelor’s Degree in English at Northern Illinois University. He was a Malcolm Baldrige National Quality Award Examiner in 1995 and 1996.

Glenn H. Mazur has been active in QFD since its inception in North America, and has worked extensively with the founders of QFD on their teaching and consulting visits from Japan. His primary focus is in the service industry, as a manager for over 15 years in automobile repair and parts warehousing, as a teacher, and as an owner of a translating and consulting business he started in 1982. He is one of North America’s leaders in the application of QFD to service industries, sits on several advanced QFD research committees, and sits on the steering committee of the Symposium on Quality Function Deployment held annually in Detroit. He is also Executive Director of the non-profit QFD Institute, Executive Director of the International Council for QFD, and an Adjunct Lecturer of Total Quality Management at the University of Michigan College of Engineering. He lectures and trains in QFD worldwide.

Mazur holds a Master’s Degree in Business Administration and a Bachelor’s Degree in Japanese Language and Literature, both from the University of Michigan.
Improving the Classroom Process by Process Thinking and Student TQM Teams

Eugene H. Melan, Distinguished Professor of Business, Marist College, Poughkeepsie, New York

Introduction

The business world has directed much criticism and pressure toward higher education in recent years for its slow response to the quality management. Its major response has been to offer quality related courses and implement Total Quality Management (TQM) concepts in administrative or support functions. However, little has been done to improve classroom quality. This article will describe how process thinking, TQM principles, and student teams were employed to improve the instructional process in the author’s undergraduate courses over a five year period.

Student teams serve a threefold purpose: (1) to learn how an improvement team works; (2) to act as change agents of improvement as well as representatives of the class, and (3) to learn the principles and practice of TQM. After evaluating results of a pilot study in 1992, we have continued the basic approach for all successive classes. The results of five years of improvement efforts show that each new class is unique and presents an opportunity to enhance and improve the teaching-learning process. Each team serves as an agent to identify factors inhibiting learning, assists the instructor (who serves as a facilitator/mentor) in the implementation of corrective action, and assesses the effectiveness of the actions.

Overall, there was a measured improvement in course quality of about 35 percent and an improvement in student satisfaction of 20 percent. This approach has also shown that student teams can successfully apply TQM principles that can serve as an effective means for identifying and validating improvements in the teaching process.

A brief background

The decade of the 1970s saw the re-exportation of the philosophy and concepts of TQM from Japan to the United States. Quality gurus such as Deming, Feigenbaum and Juran were, in effect, transfer agents as well as originators of many of the ideas embodied in TQM. The decade of the 80s witnessed appreciable activity in the private sector, followed by the public sector, in TQM training and application. It was not until early in this decade that the academic community began to encounter criticism and experience pressure from the business sector to bring TQM into education.

Response to business pressure has occurred in three areas: administration, courses
A brief background, continued

and curriculum, and the classroom. A survey conducted by the ASQC in 1995 showed that 303 institutions of higher education reported involvement in the application and teaching of TQM (Calek, 1995). Over 80 percent of colleges and universities reporting were in various stages of implementing TQM in administration and 60 percent offer certificates, minors, or degrees in quality. Results indicate an increasing trend of TQM-related activity in the education field.

In the last five years, the literature has become flooded with articles, papers and books on quality management in higher education. Academic organizations such as the American Association for Higher Education (AAHE) are serving to promote dialog and disseminate information on the topic, and major conferences have been devoted to TQM in academia.

Three areas of response

It is not surprising that many college and university improvement efforts are directed towards administrative functions such as admissions, registration, physical plant and finance because of their similarity to operations found in business and industry where the original applications of TQM occurred. The realities of reduced operating budgets and pressures to improve service quality serve as primary motivators to implement TQM in administrative operations. Some institutions are even examining reengineering of their support functions.

The second area, courses and curriculum, has also shown a substantial response by academe numbering in the hundreds and ranging from lectures to courses and to curricula leading to degrees with concentrations on the subject. An analysis by the author of the previously-mentioned ASQC survey shows that 231 two- and four-year colleges and universities in the U.S. reported offering courses on TQM. Prior to 1990, few, if any, college-level TQM courses existed other than non-credit training courses.

The third area of response to TQM by academia, and the subject of this article, is that of the classroom. This aspect of TQM involves improving the classroom activity by the use of TQM principles. Literature searches, conference and seminar topics, and faculty contacts lead one to conclude that practicing TQM in the classroom is more the exception than the rule. Ian Hau (1991), at the University of Wisconsin, showed how appointed student teams employing TQM tools can identify areas for improving lecture delivery of a statistics course. Kathryn Baugher (1993) developed a 5-step improvement model based on the Deming PDSA cycle for improving classes at Samford and Belmont Universities. Jose Romero-Simpson (1992) applied the Deming philosophy, TQM techniques and experiential, team-based learning to an advanced organization behavior course at the University of Miami. Richard Peregoy (1996) at the University of Dallas has employed statistical methods (control charts) in measuring teaching effectiveness parameters such as subject mastery before and after course changes.
The purpose of this article

This article describes how process thinking and TQM principles are employed by empowered student teams to improve the quality of the instructional process in the classroom during the progression of a course. The results of five years of classroom quality improvement efforts are presented as well as survey results of student satisfaction and student assessment of instructor teaching effectiveness. The results show that the concept of continuous improvement practiced by student teams in a student-focused environment provides a direct and powerful means of enhancing the quality of the teaching process and student learning.

Process thinking applied to the classroom

The primary activities of the classroom constitute a fundamental process of an educational organization, namely, the teaching process. In my book *Process Management: Methods for Improving Products and Services*, I showed that a process approach to improvement provides systemic advantages to an organization. Applying process thinking to instruction can serve as a basis for improving an educational system. Applying process concepts and TQM principles to the teaching process becomes an approach to achieving continuous improvement in the classroom.

A process has a number of properties similar to that of an open system. Among these properties is a regulatory feature known as feedback. In education, outcomes assessment is intended to measure and provide feedback to regulate the teaching-learning process. Traditional assessments such as essay examinations may not provide sufficient information to enable learning to occur. The lack of timeliness and usefulness of the standard end-of-term evaluation forms as an improvement tool for teaching is evident to any instructor required to use them. Typically, faculty administrations use it as a measure of the teaching effectiveness of an instructor. Unfortunately, such feedback, usually received months later, does nothing to improve the class that was under way at the time and may have few specifics for the instructor to evaluate for longer-term improvement. Figure 1 shows the instructional elements addressed in a typical, end-of-term evaluation form. It is evident that few of these elements address the important factors of teaching in relation to learning. Ideally, unbiased feedback should be provided directly by students on a continuous basis from the onset of a course. In practice, one finds students reluctant to provide direct feedback to the instructor, suggesting that a surrogate may be more appropriate in providing feedback.

The pilot study: beginning a continuous improvement journey in the classroom

It is in this context that student teams using TQM concepts of customer (student) focus and continuous improvement offer a viable approach to enhancing the teaching process. The approach also served as an opportunity to introduce students to TQM. With these considerations in mind, we embarked on an open-ended improvement journey. A senior undergraduate capstone course for business majors, Management Strategy and Business Policy, was selected for a pilot study in the fall of 1992. I had previously taught this course for four years.
At the onset, it was decided to form the student team by soliciting three to five volunteers, rather than appointing students, since volunteers are generally more effective participants and overtones of coercion, due to the instructor’s position, are absent. During the first week of class, volunteers were solicited by the instructor to become members of a team that would help improve the quality of the course, as well as learn and apply the basic concepts of TQM. Four volunteers were obtained from a class of 16. The first team meeting was held after class during week two of the semester, during which the members were introduced, the objectives of the team defined, and a weekly meeting schedule set. The instructor requested that the team members develop a mission statement for the second meeting and come up with some ideas on how the course could be improved. The members were told that, as of the second meeting, leadership would...

Forming a student team
Forming a student team, continued

be turned over to them and the instructor's role would be that of a mentor, facilitator and TQM trainer.

The team begins its work

In the weeks leading up to the mid-semester point, the team developed a mission statement and designed and administered a class survey to apply the Deming principle of managing by fact (Deming 1982). The mission statement served as the team's purpose for existence, a statement of philosophy, and was a practical application of writing mission statements—a topic germane to the course. The mission statement developed by the team was the following:

The team is to provide a communication link between the instructor and class members in order to address any concerns of the students and to help fix problems. The team will also assist in improving course contents, delivery and student evaluation.

The survey was based on factors that the team believed should be addressed in a quality course and in the instructional process:

- course content and materials
- presentation-delivery style
- teaching style
- evaluation (assignments, exams).

The survey was administered by the team, during class, shortly after the mid-term while the instructor left the room. Results were compiled and analyzed using some of the basic quality tools: check sheets, affinity diagrams, bar graphs, and Pareto charts (Bras-sard, Ritter 1988). TQM instruction and presentation skills were provided by the instructor on a just-in-time basis as the team progressed. Figure 2 shows the primary

Figure 2. TQM Concepts and Tools used by Course Improvement Teams

<table>
<thead>
<tr>
<th>Customer focus:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The student as a customer and participant in the education process</td>
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<table>
<thead>
<tr>
<th>Manage by fact, not opinion:</th>
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</thead>
<tbody>
<tr>
<td>• Gather and analyze data</td>
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<table>
<thead>
<tr>
<th>Employ the scientific method:</th>
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<tbody>
<tr>
<td>• Use the plan-do-check-act model</td>
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</table>

<table>
<thead>
<tr>
<th>Data-analysis tools:</th>
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</thead>
<tbody>
<tr>
<td>• Affinity Diagram</td>
</tr>
<tr>
<td>• Check Sheets</td>
</tr>
<tr>
<td>• Bar Graphs</td>
</tr>
<tr>
<td>• Histograms</td>
</tr>
<tr>
<td>• Pareto Charts</td>
</tr>
<tr>
<td>• Run and Trend Charts</td>
</tr>
</tbody>
</table>
The team begins its work, continued

TQM principles and tools taught by the instructor to both the pilot team and the teams that followed. Team members had to learn survey design and focus group interviewing skills on their own.

Results from the survey and actions taken

The initial survey responses were presented to the class by the team members. The instructor intentionally excused himself to allow a freer dialog between the team members and the rest of the class. The responses reflected three areas of concern by the class:

- 55 percent of the responses reflected concern that the workload was too heavy;
- 25 percent of the responses reflected the instructor's moving too quickly through overheads used in lectures, resulting in students having difficulty taking notes;
- 20 percent of the responses indicated the learning could be improved by more group work in and out of class.

Figure 3 shows a Pareto chart of the responses. Based on these results, the following improvement actions were taken by the instructor:

1. Each new assignment was reviewed in terms of appropriateness to the learning process and reasonableness of due date. Work load, however, would not be reduced since assignments are a key component of the learning process and serve as a means of reinforcing the material being taught.
2. Overheads, when used, were given more screen time to enable note-taking.
3. More in-class and out-of-class group assignments were given. A group case study with oral presentations was added and a case was assigned that could be done either in groups of two or individually for the out-of-class assignments.
4. Lectures were revised to allow for more in-class group work and intra-group problem-solving.

Figure 3. Pareto Chart of Student Responses to the Pilot Study
The final stage of the pilot

The team then entered the final phase of the cycle—measuring the effectiveness of the improvement actions. Understanding the need to measure improvement, the team researched and designed a second survey form which contained a Likert response scale. The survey was given to the students (with the instructor again absent) during the last week of class. The final team meeting was spent analyzing the results and preparing a feedback presentation to the class on the last day of the semester. The results of the survey are shown in Figure 4. Students thought the course quality had improved between “average” and “much,” but with a relatively large dispersion. Team members unanimously expressed satisfaction in “having made a difference” in the structure of the course and in being able to apply the TQM concepts they had learned.

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2.6</td>
<td>0.82</td>
</tr>
<tr>
<td>2.</td>
<td>3.4</td>
<td>1.03</td>
</tr>
<tr>
<td>3.</td>
<td>3.6</td>
<td>0.81</td>
</tr>
<tr>
<td>4.</td>
<td>3.4</td>
<td>1.02</td>
</tr>
<tr>
<td>5.</td>
<td>3.5</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Ongoing improvement

Based on the positive results of the pilot study, I decided to use this approach in future classes, incorporating lessons learned and process improvements fundamental to the conduct of the course. Some of the lessons learned that were incorporated were:

1. Launch the teams as early as possible (during week 1)
2. Perform the initial course assessment well before the midterm, during week 3 or 4
3. Have the class define the criteria for the quality of the course rather than the team
4. The team members must work their role as representatives of the class and not a governing body.

Each class was treated as a new improvement project. Each team developed its own set of assessment questions and arrived at its own improvement recommendations independent of earlier teams to avoid the influence of prior work. While certain general improvements were made to the course, contingency theory teaches that each class is essentially unique in its learning responses with its own set of process factors. Hence, teaching methods require adaptation to maximize student learning. The improvement team serves as an agent to identify factors inhibiting as well as promoting learning. For example, factors such as clarity and understandability of the material (written and
verbal), the teaching methods used, pace of presentation, the manner of reinforcement, and the degree of group learning enter into play in the learning part of the T-L process. Determination of these factors in relation to the students at hand provides a foundation for improving the quality and effectiveness of the instructional process. Adopting this approach using student teams represents a major paradigm shift for higher education today.

We have employed the course quality improvement team concept for five years and it still continues. During this time, a total of eleven classes have been conducted using this approach. It is currently being applied to a series of Management and Organizational Behavior classes.

Some results from the team

Figure 5 is a summary of the course quality factors addressed by the various teams. Each team chose the top five factors perceived by the class as important to the quality of the course. Work load, assignments and group work were the common factors among the teams.

Figure 5. Course Quality Factors Addressed by Teams

- Assignments (work load)
- Case studies: quantity, timing
- Exams, quizzes
- Grading procedure, fairness
- Group work, assignments
- Handouts
- Instructor accessibility, preparedness
- Overheads
- Pace of lectures
- Presentation methods
- Term project
- Text
- Topical balance
- Material variety
- Supplementary audio/visual material

Figure 6 is a summary of key findings and recommendations made by the teams and the actions taken by the instructor as a result of analysis of class surveys. Overall, there was a perceived improvement in course quality ranging from 25 to 40 percent with an average of about 35 percent. Instructor evaluations improved by over 20 percent after implementing the approach, reflecting improved student satisfaction. Before implementation, the instructor’s four-year mean was 1.65 on a scale of 1 - 5 where 1 represents the most positive end of the scale. After implementation, the mean score was 1.32.
Some results from the team, continued

Figure 6. Team Findings / Recommendations and Actions Taken

<table>
<thead>
<tr>
<th>Key Findings / Recommendations</th>
<th>Actions Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relevancy of assignments questioned.</td>
<td>1. Assignments reviewed. Explained the rationale for the assignments.</td>
</tr>
<tr>
<td>2. Case studies: relevancy questioned.</td>
<td>2. Explained relevancy to class.</td>
</tr>
<tr>
<td>3. Illustrative (cohesion) cases, used for topic assignments, repetitious.</td>
<td>3. Case assignments changed; new cases assigned.</td>
</tr>
<tr>
<td>4. Grading procedure perceived inequitable.</td>
<td>4. Weighting modified to be consistent with time spent on assignment.</td>
</tr>
<tr>
<td>5. Provide handouts to supplement overheads.</td>
<td>5. Handouts provided for detailed, complex material.</td>
</tr>
<tr>
<td>7. Modify grading of group work.</td>
<td>7. Individual contributions graded.</td>
</tr>
</tbody>
</table>

Conclusions

The results of the studies thus far lead to the following conclusions:

• There are students ready, willing and able to participate in an improvement process on a voluntary basis without expectation of a reward.

• Courses that are mature in terms of instructional development are capable of further improvement in quality.

• Student teams can serve as an effective communication link between the class members and the instructor to facilitate feedback or improvement.

• Improvement teams in which the instructor participates are a manifestation to the students of the instructor's interest in, and willingness to, improve the teaching process.

• Most improvement suggestions developed by the team and based on class inputs do serve as a basis for improving the teaching process.

• This approach provides students with a relevant application of TQM methods.

• Finally, this approach shows that student satisfaction with the course and the instructor improves.

A student's view of this approach is reflected by a comment of one of the improvement team leaders when asked to report on lessons learned by the improvement team experience:

"Certainly there should be boundaries regarding the areas in which students can create change, but their opinions and insight should not be ignored. These teams allow the student to be a more participative member of his/her education. The value contained therein cannot be overstated."

The use of student teams to improve the teaching process by applying TQM concepts affords the instructor and student a number of advantages. First, it provides the students with practical experience in team participation, its operative elements and its
behavioral aspects. Second, it provides a vehicle for teaching and applying key TQM and management concepts that are vital to the education of today’s student. Third, it demonstrates instructor interest in student learning. Combining the concept of the team with quality management concepts of continuous improvement and customer focus in a contingency framework and applying them to the teaching process provides a real-time approach to address the fundamental activities of the classroom. Improvement in the classroom is not only feasible as has been shown, but can serve to transform the educational process and provide a paradigm shift needed in higher education today.

Finally, the approach described may be used in other instructional applications. It can be employed in business and industry training courses as well as in shorter, in-service type programs. I have used this approach to replace the less effective “how did I do?” survey in two-day instructional sessions of administrative personnel with excellent results.

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