Improving the way organizations run through participative planning and management.
Counteracting the Harmful Effects of Stress through Self-Care to Enhance Wellness and Profitability

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Editor’s note
Employers and employees are rightly concerned about the quality and cost of health care. Today, affordability is forcing decisions about healthcare coverage options and who pays for it. In this article by Dr. Benson, we see health care as a tripartite system that includes the informed and active participation of the employee and employer to maintain health in the workplace. In the absence of such participation, illness and the cost of health care will continue to escalate out of control.

Dr. Benson describes health care as a three-legged stool with one leg—self-care—being shorter than the other two. The need, to enable good health and to control costs at the same time, is to increase the size of the self-care leg and achieve a stable system.

Experience with large-systems change, however, teaches us that systems tend to be strongly invested in current processes and procedures and tend to resist substantive changes because they are viewed as financially harmful to the system. A system may be populated with many expert and well-intended individuals who see a need and advocate improvement, but within a system, change is slow and difficult to achieve in the absence of a crisis and outside influence. Dr. Benson’s pioneering work on stress and self-care—as a practitioner, researcher, and educator—is reflected in this important article—Editor.

Introduction
We at the Mind/Body Medical Institute view health and well-being as a three-legged stool. One leg is pharmaceuticals, the second is surgical procedures, and the third is self-care. Mind/body medicine is the third leg that incorporates all of the following: stress management, exercise, nutrition, belief, and the relaxation response (which I will define later).

The awareness that mind and body interact has important implications for the way we view illness and treat disease. According to the Mind/Body Medical Institute’s model, the treatment of illness is most effective if attention is paid to mind/body interactions. Physical symptoms are influenced by thoughts, feelings, and behaviors; conversely, thoughts, feelings, and behaviors are influenced by physical symptoms. Social factors are important as well.

Mind/body science has made enormous progress but has yet to be incorporated as an equal, fully respected partner in Western medical disciplines. As many times as
Introduction, continued

science has affirmed the original message of The Relaxation Response over the past two and a half decades, medicine and society have yet to take full advantage of the healing resources within the mind/body realm.

So much has changed in the world: our economy is becoming more globalized, and barriers between countries are being pulled down. But we have yet to witness a corollary paradigm shift in medicine. Today, our appetites have been whetted with quick fixes—so much so that our diagnostic gadgets and miracle drugs have almost overcome common sense. We expect that surgical acumen will be enough to save us, and if not, the next remarkable scientific discovery will.

Although mind/body therapies have been proven effective for the vast majority of everyday medical problems, we are still far more likely to run to our medicine cabinet to relieve our aches and pains than to consider using relaxation or stress-management techniques.

Stress is a fact of life for most working people today. It is estimated that job stress costs employers a staggering $2 billion annually in absenteeism, sub-par performance, tardiness, and worker’s compensation claims. Research has shown that more than 50% of adults report high stress every day and that stress is directly linked to numerous medical conditions, such as hypertension, asthma, chronic pain, and allergies, which can account for significant job absenteeism.

Sadly, though, we still rely far more than we should on external fixes—on medications and medical and surgical procedures developed in laboratories—and not enough on our natural potential for self-healing. Therapies we can purchase and caregivers we can consult, whether available through conventional or unconventional medicine, are still far more impressive to us than our own hearts and minds, lungs and hopes, and muscles and beliefs, even though they sustain us day in and day out.

The three-legged stool

The two legs of pharmaceuticals and surgical procedures are absolutely vital to our overall health and well-being. But they take care of only 10% to 40% of the visits patients make to healthcare professionals. The third leg, which I’ll be emphasizing the importance of here, is self-care (see Figure 1 on the next page).

Although I will be concentrating on the third leg, it’s important to keep in mind that health care must include the other two legs, too. For patients with problems such as heart attacks, broken bones, and punctured lungs, surgery and pharmaceuticals are obviously necessary. No amount of self-care or mind/body practices can deliver what the first two legs of the stool do for these patients.

A definition of self-care

First, let me say what self-care is not. Self-care is not alternative, complementary, or integrated medicine. It differs from alternative medicine for three reasons. First, self-care is scientifically based and evidence based. Alternative medicine is not scientifically based. If it were, it would cease being alternative.
The three-legged stool, continued

A definition of self-care, continued

Second, think about what alternative medicine is. There is little difference between administering an herb and administering a pharmaceutical. They are both substances that are given to the patient. Similarly, there is little difference between surgery and acupuncture. They are both things that are done to the patient. The term self-care refers to what a patient can do for himself or herself.

Third, when a healthcare provider administers appropriate self-care strategies, patient visits to HMOs decrease by 35% to 50%. Therefore, self-care involves significant cost savings. Compare that to alternative medicine, which is costing the nation scores of billions of dollars per year.

The Yerkes-Dodson Law

Self-care incorporates the principles of the Yerkes-Dodson Law, which was defined at Harvard in 1908. This law stipulates that as stress or anxiety increases, performance and efficiency increase as well (see Figure 2 on the next page). Simply put, when we are under pressure, we perform better. But this trend does not continue upward indefinitely; when the level of stress and anxiety goes up too high, performance and efficiency decline rapidly.

Some degree of stress is absolutely necessary, but too much can cause you to get into burnout situations, as the Yerkes-Dodson Law illustrates. Stress is beneficial if it can lead to production. But the ability to balance it is the key.

Stress can result from any situation that requires a behavioral change. Anything you have to adjust to, be it a deadline, an illness, a family crisis, or a financial problem—situations that companies’ human-resources personnel commonly observe among employees—will evoke the fight-or-flight response, which is described on the next page.
The Yerkes-Dodson Law, continued

The fight-or-flight response

When you are under stress, you experience an internal pouring forth of hormones from your adrenal glands. The result is an increase in blood pressure, heart rate, breathing rate, metabolism, and the amount of blood flowing to the muscles. This prepares you physically for running or fighting—hence the name “fight-or-flight response.”

In our society we don’t actually run or fight, of course; it would be socially inappropriate to do so. But that is what your body is being prepared for. It has been scientifically established that this internal injection of adrenaline and noradrenaline (which are catecholamines) leads to an increase in anxiety, depression, anger, hostility, and blood pressure.

Problems related to stress

When you experience stress, your threshold to pain is lowered by the catecholamines that are released. As a result, a vicious cycle is created: when you have a pain and you worry that it might be something serious, you evoke the fight-or-flight response, your pain threshold is lowered, the pain gets worse, and so on.

There are also gender-specific problems directly related to stress. In men, sexual performance and sperm count decrease. In women, PMS, infertility, and hot flashes and other unpleasant symptoms of menopause are made worse both in frequency and severity.

In America, over 60% of the visits made to healthcare professionals are stress related. But stress- and mind/body-related problems are poorly treated by the first two legs of the three-legged stool, our traditional modes of therapy.
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Blood pressure readings spawn self-care theories

Now I will provide a background for how I arrived at my theories about self-care. Then I will describe the positive things self-care can do for the overall healthcare system and how it can increase productivity and efficiency.

When I worked as a cardiologist during the late 1960s, I noticed that many of my patients’ blood pressure readings taken in my office were unduly high. As a result, I was consistently overmedicating these patients. They would then come back with symptoms of hypotension, or abnormally low blood pressure.

An animal model for stress-induced high blood pressure

I wondered if the stress of having their blood pressure measured could be causing my patients’ blood pressure to go up. Together with some associates at Harvard Medical School, I established an animal model for stress-induced high blood pressure.

We worked with monkeys. We measured their blood pressure, fed back their own blood pressure information to them, and rewarded them each time their blood pressure increased. Soon they became hypertensive.

We turned the experiment around midcourse and began rewarding the monkeys to re-enforce lower blood pressure. As we had hypothesized, their blood pressures could then be decreased.

A link with transcendental meditation

At about the same time in California, Robert Keith Wallace and Archie F. Wilson were studying transcendental meditation, and we discovered that our experimental designs were exactly the same. Wallace came east to join me at Harvard, and we collated our data.

We brought young, healthy people into the laboratory and attached equipment to them so we could measure their heart rate, blood pressure, electrocardiogram readings, oxygen consumption, and brain waves.

First we had them sit for an entire hour, and then we conducted the following experiment. It was divided into three periods. During the first period, which we called the premeditation period, they simply sat quietly with their eyes closed and thought regular thoughts. During the second period, the meditation, they sat with their eyes closed and thought meditation-like thoughts. During the third period, the post-meditation period, they thought regular thoughts once again.

Results of the meditation experiments

During the second period, the subjects exhibited a significant decrease—16% to 17%—in oxygen consumption and energy metabolism compared to the first period. There was a corresponding decrease in the amount of carbon dioxide produced, which meant that the decrease in oxygen consumption wasn’t through the subjects’ increasing or decreasing their respiration. There was a true decrease in the metabolism of the body. There was also a decrease in the rate of breathing, from sixteen breaths per minute to about ten or eleven.

In subsequent experiments working with advanced Buddhist meditators in
Tibet, we found that these subjects could lower their metabolism to such an extent that they could almost stop breathing. Their respiratory rates went down to just four to five breaths per minute.

During the late sixties when we conducted these experiments, sleep and hibernation were the only two recognized stages during which one could decrease one’s energy metabolism from its level at a resting state. We knew that what we observed wasn’t sleep. The brain-wave patterns were different. In addition, during sleep there is a slow, progressive decrease of oxygen consumption over three to six hours and then an increase, whereas with the meditators, it dropped within three minutes and stayed at that level as long as they remained in a meditative state. Then it returned to normal.

With regard to hibernation, a good way to differentiate it from sleep is rectal temperature. The rectal temperature of a sleeping animal decreases by one or two degrees, while that of a hibernating animal goes down to almost the freezing point. We measured the rectal temperature of the meditators during the three periods of the experiment, and there was no effective change.

What we were looking at, then, was a physiological reaction that is the opposite of the fight-or-flight response and is induced by transcendental meditation. We named this set of physiological changes the relaxation response. But how could it be caused by transcendental meditation alone?

We then set out to determine what the components of transcendental meditation are. At first we believed there were four, but now we believe there are just two.

The first component is the repetition of a word, sound, prayer, thought, or phrase, or a repetitive muscular activity. The second is a passive return to the repetition whenever other thoughts intrude.

With my colleagues I searched through the religious and secular literatures of the world to see whether these two steps had ever been described before. We found that every single culture of humankind that has a written history has these two steps described within it.

Normally these steps are described within a religious context. We found examples in Hinduism, Judaism, Christianity, Islam, Shintoism, and many others. In shamanistic religions, people would achieve the same state by chanting in time to the beating of a drum or the stamping of feet.

Outside of religious tradition, we found the same two steps described in the pre-suggestion phase of hypnosis, in autogenic training, in progressive muscular relaxation, and in yoga, tai chi, and chi gong. It is also described in the literature of Wordsworth, Thoreau, Emerson, and Alfred Lord Tennyson.
Experimenting with students

We continued our experiment by bringing some college students into the laboratory and monitoring them in the same fashion as the meditators, attaching equipment to them to measure their heart rate, blood pressure, electrocardiogram readings, oxygen consumption, and brain waves. We measured what was going on physically when they did the two steps and used the number one as a repetition. We found that their physiological changes were virtually indistinguishable from those of the meditators.

Then we brought in another group of people and had them do the two steps and say a repetitive prayer, such as the rosary or a centering prayer. We found that the same physiological changes occurred.

The word, prayer, phrase, or sound that is used doesn’t matter. When you carry out these two basic steps, you will experience a measurable, predictable, reproducible set of physiological changes that is the opposite of the set of changes that occurs with the stress response. Under no circumstances should what I am saying here be interpreted as a scientific or mechanistic explanation of prayer. It is simply a reaffirmation of what religious people have told us for millennia: prayer is good for you.

Benefits of the relaxation response

Once our experiments were completed, we hypothesized that the relaxation response could effectively treat disorders to the extent that they are caused or made worse by stress. In other words, those 60% of visits to healthcare professionals that are attributable to stress could be treated effectively.

Furthermore, these patients’ performance and efficiency increase; they climb back from the downward slope of the curve of the Yerkes-Dodson Law and start getting back to optimal levels. We published these findings in 1974 in the *Harvard Business Review*, and it rapidly became one of the publication’s best-selling issues.

Mind and body are inexorably linked

When one evokes the relaxation response, the result is decreased blood flow across the entire brain. The probability that this is due to chance is less than $10^{-29}$. In addition, when a person evokes the relaxation response, the limbic areas of the brain involved with the autonomic nervous system show signs of activity.

In other words, these experiments do away with the concept of mind being separated from body. The brain generates the mind, which in turn affects the brain, as well as the entire body. There is no separation. Mind and body are intermeshed.

Applying the third leg to patients with chronic pain

At a New Hampshire HMO, one of our colleagues, Dr. Margaret Caudill, set up a program to apply the third leg of the three-legged stool to groups of patients suffering from chronic pain. The demographics of the primary site of pain for these patients were as follows: 28% suffered from head pain, 28% had lower back pain, 17% had neck pain, 14% experienced pain in their thoraxes and upper extremities, and the other 13% had pain in the abdomen, pelvic area, and lower extremities.

All of these patients were already utilizing the first two legs of the three-legged
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Applying the third leg to patients with chronic pain, continued

stool: pharmaceuticals and surgical procedures. But to that course of treatment we added group sessions.

Makeup of the group sessions

Group leaders included physicians, nurses, psychologists, nutritionists, and exercise physiologists, all working as a team. A physician did not need to be part of every group except when necessary for insurance reasons, and the other leaders could split up the task of leading group sessions. This made the program cost efficient.

Each group was comprised of fifteen to twenty people suffering from some sort of chronic condition. In addition to the general pain-reduction groups mentioned above, our program had groups for cardiovascular disease, insomnia, infertility, PMS, cancer, and AIDS.

The program’s five components

The program that each group followed had five components: the relaxation response, nutrition, exercise, stress management (i.e., cognitive restructuring), and the belief system of the patient. Each patient was allowed to choose his or her own focus (a prayer, number, or word to repeat). Together, these five components form the third leg of the three-legged stool: the self-care leg.

We used tapes to teach the patients to evoke the relaxation response for ten to twenty minutes once or twice a day. Immediately after you evoke the relaxation response there is less static in your mind, you listen better, and you learn better. For this reason, we started group sessions with a relaxation-response period and then applied the appropriate nutritional lecture, stress management lecture, and exercise. Normally each group attended about ten weekly sessions.

Results of the chronic-pain program

After the chronic-pain program, we compared the patients’ pretreatment status to their post-treatment status. To determine their pretreatment status, we viewed their medical records from the year before they participated in the program. We compared that information to their condition after they attended the group sessions.

Overall, we found a decrease in anxiety, depression, hostility, pain severity, and pain interference (i.e., patients reported that the pain interfered less with their lives). In addition, they needed less social support, their effective stress diminished significantly, and their feelings about life control increased significantly.

Significant cost savings

We had 109 patients enrolled in this behavioral medicine mind/body pain program. One year prior to the program, they were visiting their healthcare facility an average of more than once per month (see Figure 3 on the next page). One year after the program ended, the frequency of their visits decreased to an average of 0.6 per month. This trend persisted for two years.

The program lasted just ten weeks, yet it resulted in significant cost savings. Initially the patients’ health care cost $64,000 per year before the program. (These are old statistics; today’s costs would be higher.) One year after the program, there
Significant cost savings, continued

was an overall $12,000 saving even after the cost of the program was factored in. In the second year, there was a $24,000 saving, and this continued.

Overall, there was a decrease of 34% in HMO visits for this group. For groups of so-called high utilizers of another HMO, the number of visits decreased by 54% six months after these patients completed the group program.

The program is growing

I am proud to say that we have arranged for the Health Care Finance Administration (HCFA) to pay for our cardiovascular group programs. This four-year demonstration project will involve thousands of patients across the country, and it will be paid for by Medicare.

We at the Beth Israel Deaconess Medical Center have fourteen affiliates throughout the nation who are conducting these kinds of group sessions, in addition to affiliates located throughout the world. Our only problem now is one of maintaining quality and not expanding too quickly even though there is currently a great demand for this program.

How to evoke the relaxation response

Here is the basic technique that we taught to the patients who participated in our mind/body pain program groups. To invoke the relaxation response, first get into a comfortable position. You can do this while sitting cross-legged, kneeling, or even standing and swaying to keep from falling asleep. (If you do this lying down, you are likely to fall asleep.) Then choose a word, sound, phrase, or prayer that conforms to your own belief system.
Close your eyes and relax all your muscles, starting with your feet and working upward. Next, be at ease without moving, and focus on your breathing. Breathe slowly. Each time your breath goes out, say silently to yourself your chosen word, sound, prayer, or phrase. All sorts of other thoughts will come to mind. These are natural, and they should be expected. But when they occur and you become aware of them, don’t be upset. Just passively come back to your repetition.

Continue to do this for ten to twenty minutes; then keep your eyes closed, but start thinking regular thoughts. Then slowly open your eyes. The technique is that simple.

We instructed our patients to do this ten to twenty minutes once or twice a day. What is the significance of this? During my research, I looked back to historical precedence of what people did and found that they would pray in the morning and in the evening for ten to twenty minutes at a time.

We then adopted that idea, and we found that it works. More than ten minutes and less than twenty minutes is the optimal time frame. When you are in a stressful circumstance, there is usually very little you can do about it, but if you invoke the relaxation response daily, the likelihood of your reacting to a situation stressfully is decreased.

One condition that responds well to evoking the relaxation response is hypertension. In our studies, we have seen hypertensive people lower their resting blood pressure, for both the systolic and diastolic readings, by six to eight millimeters of mercury just by evoking the relaxation response. That might not sound like very much, yet over 90% of hypertensive patients have elevations of less than 10 millimeters of mercury.

In addition, 80% of these patients were able to decrease the amount of their medication; of that 80%, 16% gave up their medication completely. These patients all continued to take no medication or less medication over a three- to five-year study period afterward, and their blood pressure remained low. We were disappointed to see that some regained weight they had lost, but their lowered blood pressure was maintained.

We can also help patients effectively prepare themselves for surgery or x-ray procedures simply by teaching them the relaxation response immediately before they undergo the procedure. They don’t have to attend any group sessions.

In addition to its applications for better health, the relaxation response can be used to enhance mental and physical performance. For example, athletes now routinely evoke the relaxation response and simultaneously visualize their perfect event over and over again.

The bottom line is that any disorder caused or made worse by stress can be treated by the third leg—the self-care leg—of the three-legged stool.
Getting physicians to accept the third leg

In a survey we conducted of family practitioners, 96% of them said that personal belief and relaxation-response procedures are effective and that they use them in their family practice. When we did the same survey among HMO executives, over 90% of them said that they believed these procedures can heal. However, only 10% said they have applied them in their HMOs.

About two-thirds of physicians today readily accept the concept of the three-legged stool. What often happens with doctors who don’t is that their patients hear about these programs from patients of physicians who do. These patients demand that their doctors incorporate them as well.

It’s possible to work together to influence insurers

I think people in small and relatively large businesses alike can work together as purchasers of insurance. They can form groups to make their numbers large enough so they will be heard and then refuse to buy any insurance policies from an insurer that does not offer the components of the third leg of the three-legged stool.

Ultimately patients and employers will have to demand use of the third leg. Even though some insurers are balking at it now, they will ultimately agree to pay for these programs because it will be to their ultimate benefit to do so.

Getting corporations to buy in

There is no question that any series of interpersonal relationships—especially those of work—generates stress. We try to do away with stressful relationships, of course, but often you can’t do away with all of them. What you can do is have a protective mechanism for dealing with the stress.

The lesson we learn from the Yerkes-Dodson Law is so important. Enabling companies to see that if you decrease stress you increase performance and efficiency will make that lesson more readily adopted.

There is no reason why the relaxation response cannot be applied within a corporate setting. The technique has roots in age-old human behaviors, but it has direct manifestations in our everyday business world.

In addition, we have already taught the relaxation response to industries around the country. Two companies that we work with, State Street Bank and Fidelity, have designated quiet places available in their facilities for people to do the relaxation response on their own.

Enabling people to help themselves

I consistently emphasize all three legs of the three-legged stool. The first two are vitally important, yet it is obvious that they are not doing the whole job. The data I have presented here supports the basis of the third leg. During our work with the groups in the mind/body program, by the third week we consistently hear statements such as “I am a new person,” “I am viewing the world differently,” “I am no longer bothered by these hang-ups,” “It’s remarkable that I never thought this way before,” and “I am rejuvenated.”

We will always need the first two legs of the stool, but the third leg gives us a
Enabling people to help themselves, continued

new approach that enables people to help themselves. I firmly believe it will also help them at the workplace because it makes them happier and healthier, there is less stress, and they become more efficient and more productive.

Author information

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Dr. Benson is widely acknowledged as a pioneer in the fields of behavioral medicine, mind/body studies, and spirituality and healing. His work serves as a bridge between medicine and religion, East and West, mind and body, and belief and science.

Editorial assistance for this article was provided by Cathy Kingery and Laurence Smith.
A Proposal for Continuous Improvement in Health Care

Washington, D.C. — The U.S. healthcare delivery system needs a major overhaul to improve quality and safety. The healthcare industry has founndered in its ability to provide safe, high-quality care consistently to all Americans, says a new report from the National Academy of Science’s Institute of Medicine. Reorganization and reform are urgently needed to fix what is now a disjointed and inefficient system.

To spur an overhaul, Congress should create an “innovation fund” of $1 billion for use during the next three to five years to help subsidize promising projects and communicate the need for rapid and significant change throughout the health system, the report adds. Just as a solid commitment of public funds and other resources supported the ultimately successful mapping of the human genome, a similar commitment is needed to redesign the healthcare delivery system so all Americans can benefit.

“The system is failing because it is poorly designed,” said William C. Richardson, chair of the committee that wrote the report and president of the W.K. Kellogg Foundation. “For even the most common conditions, such as breast cancer and diabetes, there are very few programs that use multidisciplinary teams to provide comprehensive services to patients. For too many patients, the healthcare system is a maze, and many do not receive the services from which they would likely benefit.”

The committee’s previous report, To Err Is Human: Building a Safer Health System, found that more people die from medical mistakes each year than from highway accidents, breast cancer, or AIDS. But findings in that report amounted to only the tip of the iceberg in the larger story about quality care. America’s health system is a tangled, highly fragmented web that often wastes resources by providing unnecessary services and duplicating efforts, leaving unaccountable gaps in care and failing to build on the strengths of all health professionals, the new report states. It calls for immediate action to improve care—in all aspects and for everyone—over the next decade, and offers a comprehensive strategy to do so. The committee examined the healthcare delivery system as a whole; it did not address the issue of the uninsured, who are the subject of a separate Institute of Medicine project.

Use of Information Technology Is Key

The report envisions a revamped system that not only is centered on the needs, preferences, and values of patients, but also encourages teamwork among healthcare workers and makes much greater use of information technology. Healthcare organizations are only beginning to apply technological advances. For example, patient information typically is dispersed in a collection of paper records, which often are
poorly organized, illegible, and not easy to retrieve, making it nearly impossible to manage various chronic illnesses that require frequent monitoring and ongoing patient support. Many patients also could have their needs met more quickly and at a lower cost if they had the option of communicating with healthcare professionals through e-mail.

The use of automated medication order-entry systems can reduce errors in prescribing and dosing drugs, and computerized reminders can help both patients and clinicians identify needed services. However, the report recognizes that a number of policy, payment, and legal issues would have to be resolved before much headway could be made.

A nationwide effort is needed to build a technology-based information infrastructure that would lead to the elimination of most handwritten clinical data within the next 10 years, the committee said. Congress, the executive branch, leaders of healthcare organizations, and public and private purchasers should work together toward this goal. Without a national pledge to create and fund such a technological framework, progress to enhance the quality of care will be painfully slow.

A Broad View of Quality

To stay aware of the big picture, the U.S. Department of Health and Human Services (HHS) should monitor and track quality improvements in six key areas: safety, effectiveness, responsiveness to patients, timeliness, efficiency, and equity. And the secretary of HHS should report annually to Congress and the president on progress made in those areas, the report says.

In addition, public and private purchasers should develop payment policies that reward quality. Current methods provide little financial reward for improvements in the quality of healthcare delivery, and they may even inadvertently pose barriers to innovation. With input from relevant private and public interests, the federal government should identify, test, and evaluate various payment options that more closely align compensation methods with quality-improvement goals.

The committee also offers ten new rules intended to make the health system more responsive to patients’ needs and preferences and to encourage their participation in decision-making. These rules are also intended to promote the development of systems that are consciously and carefully designed to be safe, anticipate patient needs, promote cooperation among clinicians, use resources wisely, and make available information on quality and safety performance.

1. Care based on continuous healing relationships. Patients should receive care whenever they need it and in many forms, not just via face-to-face visits. This rule implies that the healthcare system should be responsive at all times (24 hours a day, every day) and that access to care should be provided over the internet, by telephone, and by other means in addition to face-to-face visits.

2. Customization based on patient needs and values. The system of care should be
designed to meet the most common types of needs, but have the capability to respond to individual patient choices and preferences.

3. **The patient as the source of control.** Patients should be given the necessary information and the opportunity to exercise the degree of control they choose over healthcare decisions that affect them. The health system should be able to accommodate differences in patient preferences and encourage shared decision-making.

4. **Shared knowledge and the free flow of information.** Patients should have unfettered access to their own medical information and to clinical knowledge. Clinicians and patients should communicate effectively and share information.

5. **Evidence-based decision-making.** Patients should receive care based on the best available scientific knowledge. Care should not vary illogically from clinician to clinician or from place to place.

6. **Safety as a system property.** Patients should be safe from injury caused by the care system. Reducing risk and ensuring safety require greater attention to systems that help prevent and mitigate errors.

7. **The need for transparency.** The healthcare system should make information available to patients and their families that allows them to make informed decisions when selecting a health plan, hospital, or clinical practice, or when choosing among alternative treatments. This should include information describing the system’s performance on safety, evidence-based practice, and patient satisfaction.

8. **Anticipation of needs.** The health system should anticipate patient needs, rather than simply reacting to events.

9. **Continuous decrease in waste.** The health system should not waste resources or patient time.

10. **Cooperation among clinicians.** Clinicians and institutions should actively collaborate and communicate to ensure an appropriate exchange of information and coordination of care.

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STMicroelectronics, Inc. –
Region Americas
1999 Malcolm Baldrige National Quality Award Winner

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Business Overview
Richard J. Pieranunzi—STMicroelectronics, Inc., a subsidiary of STMicroelectronics, NV, manufactures and markets a broad range of semiconductor products to automotive, communications, computer peripherals, consumer, and industrial markets. ST Region Americas represents 24% of the global corporation’s business in the Americas, and it impacts 36% of the worldwide business.

ST is helping to enable the digital revolution by servicing customers who are leaders in the many explosive markets driven by the power of semiconductors. Technology is accelerating change as never before. The market has evolved from one based on infrastructure (driven by mainframes), through a corporate phase, to an individual or consumer phase (i.e., personal computers, PDAs/palm tops, cell phones, DVDs, internet, etc.), empowering individuals.

Excelling in bad times
With this explosive growth, the semiconductor industry incurs its own little recession about every four years. From 1996 to 1998, this recession was exaggerated by the Asian Economic Crisis. However, during this critical phase, ST Region Americas grew its market share by about 50%, a noteworthy achievement among more than 200 semiconductor companies. In good times and bad, we continued to expand our research and development investment to ensure long-term viability and innovation.

Leadership
Richard J. Pieranunzi—A key component of Region Americas’ successful approach to business is our approach to leadership. STMicroelectronics is a global matrix organization (Figure 1 on the next page). Within Region Americas are traditional marketing and sales, finance, human resources, and information technology functions.
CASE STUDY

STMicroelectronics, Inc. - Region Americas: 1999 Baldrige Award Winner

Global efficiency with regional execution, continued

Figure 1. Global Leadership Matrix.

<table>
<thead>
<tr>
<th>Functions</th>
<th>Product Divisions</th>
<th>Manufacturing</th>
<th>Research and Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia-Pacific</td>
<td>-</td>
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<tr>
<td>Europe</td>
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<td>Japan</td>
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<tr>
<td>America</td>
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</table>

reporting directly to the Region Americas' president. The Region Americas' president is a corporate vice president and staff member of the parent company, with dotted line relationships to other areas of the business, which include manufacturing, research, and design. The global matrix and dotted line relationships combine to simultaneously create an overall global efficiency with the effectiveness of regional execution.

**Shared Values**

Our global “Shared Values”—our Mission, Vision, Guiding Principles, Total Quality Management (TQM), and Strategic Guidelines—are developed by our corporate staff to effectively empower employees to execute strategies and reach global objectives. Shared Values give our matrix approach its alignment and cohesiveness and are cascaded through Policy Deployment. The organization’s Shared Values are communicated to employees during orientation on a pocket card (Figure 2 on the next page).

**STMicroelectronics’ Mission and Vision**

Our Mission is “to offer strategic independence to our partners worldwide, as a profitable and viable, broad range semiconductor supplier.” Our Vision is (1) to position ourselves to be well entrenched as one of the top ten semiconductor companies worldwide with (2) financial strength that continues funding aggressive research and development and manufacturing innovation while (3) protecting the environment and providing service that is best-in-class.

Customer focus and total customer satisfaction ensure that our investment in technology and manufacturing is properly and effectively directed. Environmental
protection is our social contract, but it does have a positive impact on the bottom line. Continued bottom-line success ensures the long-term viability that our customers expect.

Together, our Guiding Principles and Five Key Principles of TQM support the organization’s Mission and Vision (see Figure 2). The Guiding Principles are the foundation on which the company is built and outline those areas of individual performance that are most important for continued success. The Five Key Principles of TQM support the Guiding Principles and are key components in our successful drive to date and for our future evolution.

TQM requires employee empowerment as its most essential part. Empowerment is really the magic of our corporation so we must train, educate, motivate, empower, recognize, and reward our work force. Pasquale Pistorio, STMicroelectronics’ worldwide corporate CEO, says, “Employees must become factors, not actors, in the corporate environment.” The Shared Values that are cascaded through Policy Deployment and reinforced through role modeling, mentoring, and training develop the skill sets that lead to empowered employees.

The organization has developed three company objectives—financial, growth, and social—to enable us to fulfill our Mission and Vision. We have also developed seven Strategic Guidelines to support these company objectives and provide direction on the factors that are critical to our long-term success:

- Service—Number one in service and quality,
- Manufacturing—World-class manufacturing,
Strategic Guidelines, continued

- Globalization—An integrated presence worldwide,
- Innovation—A commitment to research and development,
- Strategic alliances and partnerships,
- Product portfolio,
- Segment portfolio.

Our environmental decalogue

STMicroelectronics' goal is to be environmentally neutral by the year 2010. To support this commitment, we have defined an environmental decalogue (Figure 3) to guide our actions. We were the first manufacturing company in the United States registered ISO 14001 compliant, and we are committed to continuous reduction in the consumption of power, paper, and water in all of our processes. We have seen our environmental commitment validated through numerous awards, including an Environmental Protection Agency Award and a Dow Jones Sustainable Business Award.

Strategic Planning

Angelo Uggé—The strategic planning process (Figure 4 on the next page) within STMicroelectronics - Region Americas is the method by which we set directions, analyze ongoing performances, and incorporate any necessary corrections that may be required. During the application process for the Malcolm Baldrige Award, we quickly realized that there is no activity within our operations that does not derive from or cannot be included in our strategic planning process. With this in mind, we have refined the process to be specific for the business we are in. We are very globally natured and very dynamic, and therefore we need to be ready to respond to the variable market situations and conditions in which we operate.
The strategic planning process, continued

Our strategic planning process starts with a very long view of where we want to go. Our senior executives meet every few years to strategize where we want to be at the end of the next five- to seven-year period. Key executives throughout the corporation then meet in a strategy session to determine implementation strategies to reach those goals. Once the strategy session is completed, the objectives and implementation strategies are deployed to the population of STMicroelectronics, explaining where we need to go and how the global strategy needs to be adapted in each department for implementation by individuals throughout the organization.

Strategy, deployment, and implementation

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Analyzing the external environment

In the first step of our strategic planning process, we analyze the external environment. The external environment can be analyzed through standard publications that are very abundant in the semiconductor industry, but the best source of information is our customers. Our marketing and sales organization and our business managers interact closely with customers and collect the most valuable information on what is happening in the field. Segment managers then embed this information into their segment’s planning process.

Comparing our relative position

The second step of the strategic planning process is to compare ourselves against our competition at several levels. We routinely compare market share, financial performance, quality, and service standards. In addition, because we are very capital-intensive and have to maintain a very efficient manufacturing operation, we benchmark our manufacturing entities with known data from the industry and, even more important, against other ST plants worldwide. Benchmarking within ST will ensure that the productivity of our plants is state-of-the-art.

Customer input provides a competitive advantage

By being present at customer and technology symposiums and forums, we sense the evolution of the technology and the technology requirements. We develop a five-year technology road map that is updated every six months to reflect changes...
Customer input provides a competitive advantage, continued

in the market. Again, our best resource for where we stand competitively, especially with respect to product portfolio, pricing strategy, technology, and future technology requirements, is our customer. By being close to the customer we get this information before it is available to most of our competitors; therefore, we can set in motion our strategic planning resources before information is publicly known, which gives us a very important competitive advantage.

Assessing internal resources

Measuring internal resources is the third step of the strategic planning process. Each functional manager is required to submit a census plan identifying the number of people he or she may need for upcoming activities, the characteristics of those people (education or skill level), and when they need to be introduced into the company. Manufacturing must also include capital requirements, which are submitted along with a budgeting plan. Our industry is very capital-intensive, with a $1 billion investment minimum every time we decide to create a new plant. When revealing a new plant, we first focus at least five years ahead of time, and then we start implementation of the shell or building. Capital outlays are then modulated as the business will demand. Finally, every year we earmark at least 12%–15% of our revenue for research and development (which we conduct in partnership with our customers) to keep the company ahead of its time.

Segment strategies

Once we collect all the information, we are ready to set our strategy in motion. In step 4 of the planning process, our business or segment managers identify the key differentiators that they think will make them successful and include those differentiators in the business plan. These segment strategies and objectives are then combined into a yearly operating budget. Future products and future revenue coming from new products are included in this plan, to ensure that new products and new technology development are not dealt with as extraordinary events. It is not unusual to have business units with 40% of revenue (or more) every year coming from products that were budgeted but not ready or not existing at the time of the budget.

Corporate alignment and deploying the plan

When the segment managers have completed the segment strategies, the strategies are presented to the region leadership for approval and implementation. These bottom-up strategies are then reviewed by corporate management to ensure they align with the rest of ST’s divisions.

Once the Region Americas plan is ready, it is implemented with our Policy Deployment methodology. This Policy Deployment allows us to cascade our intentions down to every level of the organization.

Analyzing performance and preparing for change

Obviously, once this strategic plan is put in motion we keep a vigilant eye on what is going on. Monthly reviews and reports are compiled at every level of the organization, from the lowest level of the organization to the Regional Steering Committee. As soon as symptoms indicate that performance is not in line, we are
Analyzing performance and preparing for change, continued

Because our business is very volatile and dynamic, change is inevitable. We cannot create a business plan without planning for change. Therefore, contingency plans must be an integral part of our strategic planning process. Step 8 of our planning process refers to the risk deriving from changing market conditions after the plan has been developed. Mechanisms are built into the plan to intervene and modulate the redeployment of resources. For example, if a market declines, management may intervene by freezing the hiring of personnel or delaying introduction of new capital and expenditure. Conversely, markets may unexpectedly develop a new demand that only a few months ago was not anticipated. Management may then redeploy resources and reallocate capital to finance and fund activities that were not originally planned.

Results provide feedback

Results received from the plan are the key indicators that we collect to understand whether or not we are on the right course. If a change occurs that requires prompt intervention, the Regional Steering Committee will immediately analyze the deviation and take action, to either correct the plan and make it adaptable to the market situation or initiate internal corrective action to maintain the plan’s original course.

The strategic planning process aligns the organization

The steps of the strategic planning process are interconnected and continuous. They promote innovation, ensure technical leadership, focus our organization to meet or exceed our market and customers’ expectations, and ensure that our strategy is aligned to our overall corporate objectives. The strategic planning process is competitive and, very important, deployed to every employee throughout the region.

The financial, growth, and social objectives

Strategic goals are linked to the financial, growth, and social objectives of the organization. Financial objectives essentially mean maintaining our business by getting the best possible margin out of our sales while providing added value to our customer. Production costs must be kept under control, and assets must be optimally utilized for the organization to remain in business.

Growth is related to growing the market and, more important, gaining market share in the strategic segment in which we operate, to keep us solidly in the top ten semiconductor businesses worldwide. Strategies to support growth are based on customer focus, technology leadership, innovation, quality, and service.

Finally, we have a social contract. Our vision is to provide a place to work where every employee is empowered to achieve and pursue excellence in whatever they do. Employees are part of the global TQEM initiative (with the “E” added to stand for our commitment to the environment) to reach excellence in what we do and, most important, to be sensible of the environment and community in which we operate.
Policy Deployment and top pages

The Region Americas Policy Deployment methodology reflects a few key steps that align corporate goals to a single policy that is then deployed to all employees. Everybody at ST works from a “top page”—an executive summary customized to an individual audience to deploy improvement objectives throughout the company (Figure 5). Each corporate entity, unit, and sub-unit within Region Americas puts together a strategy, which evolves from the corporate objectives, as their own top page. Lower level top pages roll up to support each successively higher level, and individual strategies are combined into the “Region Americas Top Page”—a concise, integrated summary of the entire company’s progress toward goals in support of the financial, growth, and social objectives. The Region Americas Top Page therefore incorporates the manufacturing objective, marketing sales objective, G&IA objective, and group objective of the division.

The financial, growth, and social corporate objectives are listed in the left column of the top page (see Figure 5). The next column lists the Region Americas objectives, including RONA, sales, and market share. From each strategic objective, we derive our strategies, which are then broken down into supporting or sub-objectives that are deployed to each department and employee throughout the organization.
Each employee is a factor

Each individual sees their objective reflected in their paycheck. Employees have a portion of their pay linked to reaching the region objective as a whole, and, in particular, to their individual or team objective. Each individual objective supports a higher level objective, which in turn supports even higher level objectives. Empowered employees know what they have to do in support of their Region Americas strategies and to implement this bottom-up approach. Everybody in the region is a factor—an owner of all the action he or she has to do to implement the global strategy of the corporation.

A global focus

The Shared Values, the top page goals, and the Policy Deployment that flows down from the top page goals are worldwide concepts and practices. They give us a common language and a common set of metrics globally to refer to. We serve a lot of customers that are global in nature. Their main offices may be in America, but their production or assembly facilities may be in other countries as well. By default, we have to deal with multiple regions or cultures, so we need to adapt our corporate entity to the globality of the market to the best of our capability. Employees in Asia and France understand exactly what is important, because they have been trained in the same criteria for success that we have in the U.S.

Customer and Market Focus

Tim Chambers—STMicroelectronics operates globally but ST Region Americas manages its business flow independently. Because our customers are increasingly global and require access to technology and manufacturing expertise from all of our international locations, we must keep a broad view of the market with important linkages to manage complexity (Figure 6). Our marketing and sales groups must

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**Figure 6. America’s Region Structure.**

- U.S.-Based Customers
- Worldwide Customers
- Regional Sales and Marketing
- Regional Sales and Marketing
- Product Divisions
- Product Divisions
- Central Manufacturing
- Central Manufacturing
- U.S.-Based Suppliers
- International Suppliers

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Summer 2001
focus on establishing the needs and building relationships with our Region Americas–based customers for their facilities here and abroad. Similarly, sales and marketing teams in our sister regions must focus on the needs of customers in their region that may have facilities in other regions, such as the United States.

STMicroelectronics' products are realized at the most competent facility available worldwide. For example, products for U.S.-based customers may be manufactured or designed abroad. Likewise, products sold to non-U.S. customers by other regions may be designed and manufactured within Region Americas. All divisions select suppliers from a global pool, based upon our needs and their capabilities.

Within Region Americas, we segment customers in multiple levels. Customers are served through business units, considering both end-product industry and customer tier, to allow us to develop knowledge of requirements specific to customer industries (i.e., automotive industry quality standards or the speed dynamics of the communications and computer peripherals industries).

Initial customer segmentation is by industry, to provide a split based on products. The four largest end-product industries are:
- Automotive—passenger cars and trucks,
- Consumer—makers of cable and satellite receivers, standard and high-definition televisions, and home electronics,
- Communications—cellular telephones, pagers, wire-line phones, and modems, and
- Storage and computer peripherals—makers of hard disk drive products and printers.

The next level of customer segmentation is by tier. The top tier includes global strategic alliances—large multinationals with leading positions in their own markets. The second tier includes corporate key accounts—the companies with whom we partner on many aspects of mutual benefit. Corporate key accounts are often global with multinational operations. The third tier is geographic OEMs, which typically are large, single locations supported by nearby regional sales and marketing service centers. Geographic OEMs often use contract engineering and contract manufacturing. The fourth and final tier includes our industrial distributors, who provide consolidated purchasing and service for our smaller customers.

The two highest tiers provide us with leading-edge requirements several years into the future as we codevelop emerging technologies. In ST America we have established global strategic alliances with six key corporate accounts. In addition, twenty accounts have been selected as key segment customers because: (1) they have a high volume of semiconductor usage, (2) they're strategic on the product or sales region level, (3) they're growing fast, (4) they're open to ST as a supplier, and (5) they have demanding performance and service expectations.
Key accounts help drive continuous improvement, continued

These twenty-six customers provide over three-quarters of our total Americas’ business. In combination, the demanding standards of these customers drive the accelerating forces for our continuous improvement. These customers are therefore fully involved in the development of business and information systems appropriate to their needs, and they are provided on-line access to our systems.

Determining improvement opportunities

Customer industry trade shows and customer visit reports allow us to assess each customer’s experience with ST and determine improvement opportunities. At least twice a year we comprehensively analyze the business in each industry segment in a formal operations review chaired by the vice president of the business. The review considers the entire market—emerging customers, existing customers, and our competitors’ customers. This careful approach has proven vital to increasing our market share in such a large, dynamic total market (which continues to grow at 15%–20% per year).

Listening and learning strategies meet the needs for each tier

Our marketing and sales divisional structure is organized to communicate customer needs to the action centers of our company through a matrix (Figure 7) optimized for each market tier and segment served. Each node in the matrix has customized listening and learning processes, appropriate in level and style for the business requirement.

Requirements of the strategic alliances

The requirements of our largest tier—the strategic alliances—tend to be very rigorous and focus on the development of close ties and relationships. The general manager or vice president reporting to the Region Americas’ CEO is personally responsible for all facets of the relationship with strategic alliance customers. Specific resources, including service managers and a technical marketing team, are dedicated to each customer. Often, a joint team of ST and customer engineers is co-located for communication and cohesion leading to codesign. Executive management drives

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Figure 7. Customer Tier–Segment Matrix.

<table>
<thead>
<tr>
<th>Automotive</th>
<th>Consumer</th>
<th>Communications</th>
<th>Storage and Computers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Alliances</td>
<td></td>
<td></td>
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<tr>
<td>Corporate Key Accounts</td>
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<td>Geographic OEMs</td>
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<tr>
<td>Distribution</td>
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= Customized Listening/Learning Strategies

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steering committees with both companies, and specialists are permanently assigned for immediate support.

The results of the listening and learning processes with this tier are clear, with a superior 272% growth in sales from 1994 through 1999.

Customers in the second tier—corporate key accounts—need unimpeded access to our skills to meet their technology needs. The business unit manager reporting to the general manager/vice president provides sales executives and technical applications engineers to these customers, to ensure delivery of each new product on time. Quarterly reviews with technology and service representatives keep customers up-to-date on the latest innovations. Many products are designed by a joint applications team organized for the project to precisely meet system needs. Assigned executives and customer service personnel are available on a daily basis for short-term issues in the relationship.

ST sales and application support teams work closely with customers in the geographic OEMs tier to provide complete solutions for each customer’s needs. The segment focus here is on timely data, both technology-related and product-related. Customers benefit from early access to our standard product plan, allowing them to concurrently develop systems that use our leading-edge technologies. Sales executives meet to review promising new opportunities, supported by product specialists in the component selection stages. Customer service personnel located close to the customer provide day-to-day communication, backed by STMicroelectronics’ extensive on-line data network and order management systems.

In the industrial distribution tier, an account manager monitors and supports the business level for each distributor, providing technical liaison, inventory profiles, and promotional support. Frequent product training provides the distributor with the technical and new product availability insight needed to promote the products we manufacture. Franchise managers are available for daily interaction to maximize our response to new opportunities and changing circumstances in the distributor’s market.

In all tiers, we need to be most attentive to requirements as defined by the customer. Customers use a customer perception survey to rank-order their top ten requirements. Recent surveys indicate the top ten customer requirements are:

- On-time delivery (vital to supply chain management),
- Early warning (also vital to supply chain management),
- Technical innovation,
- Response quality,
- Literature,
- Full product and technology assessment samples,
Evaluating customer requirements, continued

- Order processing (expectation now is immediate delivery confirmation of any component, in any quantity, at anytime, anywhere),
- Technical support,
- Response cycle time (anything that delays a customer in selecting our product is an opportunity for our competitors; we want to deny as many of those opportunities as we can), and
- Flexibility (because schedules change, we must be able to adjust our manufacturing in near real time to provide the highest level of adaptability to be considered a top-tier supplier by our customers).

When evaluating the importance of customer requirements, we examine overall service requirements in our industry and specific product features. Relevant corporate service standards on metrics are set in top page goals to support survey results and meet requirements.

Subjectively measuring metrics

Many metrics are difficult to measure and often must be measured subjectively as a customer’s perception. For example, flexibility, response cycle time, and response quality can be measured subjectively on a scale of 1–10.

But each customer may define and measure each metric differently. In the distribution tier of our business, where customers typically request deliveries immediately, flexibility may be viewed in terms of our capability for upside delivery opportunities. For semiconductor manufacturers, cycle time in some areas is extremely long, so flexibility may relate to the “proactiveness” of the approach. Although these customers may define and measure flexibility differently, the subjective rating does provide an indication of how well we are doing for that metric.

Easy access for customers

A common theme that runs throughout the requirements of all tiers is the accessibility we need to provide to key data specialists, management, and customers. Our approach to providing this easy, immediate access falls into five specific categories. (1) Customers are provided multilevel access to ST specialists through segment business units. (2) All business and technical information is provided by a customer responsiveness network—a new, secure internet communications network that facilitates broad bidirectional communication and information flow between the customer and ST in real time. (3) Each business unit has dedicated customer service managers to interact with the customer for any service-related requirements. (4) Because we consider the investment community a customer equal to our direct product sales customers, a dedicated, full-time investor relations manager and staff are responsible to the CEO and corporate for investor briefings and quarterly conference calls with the investment community. (5) Internet and CD-ROM databases of technical and relevant-to-business data are provided as proactive information throughout the United States.
E-business applications with customers to improve service levels

In addition to running our own web site to provide information and service to customers, and merging electronic mail and web site internet-based data to produce the customer responsiveness network, we are also looking at merging the internet with historic EDI techniques. We want to make status reports for our internal manufacturing facilities available on-line so that our customers can look through a secure internet portal to see the status of their manufacturing in our lines anywhere in the world. This information will serve as an early warning for customers to analyze their changing dynamic against our material flow, and therefore be in a better position to adjust their manufacturing schedules.

Customer satisfaction and quality standards

Key customer satisfaction and quality standards are deployed uniformly throughout the region’s divisions and central functions. These standards are updated annually with input from the customer perception survey, customer vendor rating reports, and informal feedback from face-to-face customer reviews. We rigorously track our performance against the service standards inherent in our Policy Deployment, and the results are fed back to the appropriate employees and departments for improvement actions.

Complaint management

We set high standards for ourselves, but our execution is not perfect. Complaints we receive from customers serve as a basis for our further improvement. The primary vehicles for communication of dissatisfaction are customized for each tier but are very similar from business sector to business sector. The recording mechanisms in place include perception surveys and customer reports that compare us with either an amalgam of the best customers or, in some cases, item-by-item to the best-in-class. Customer surveys, steering committee reviews, franchise manager reviews, and technical reviews also provide opportunities to gather complaint input.

But we don’t just react to reports. Steering committees, individual management meetings, and team meetings of combined customer and ST engineers, sales engineers, and service managers follow up to analyze root causes and determine corrective actions to improve our satisfaction status with our customers.

Handling customer complaints

Responsibility for managing customer complaints ultimately rests with the account manager of the segment business unit. Complaints, along with other inputs, are aggregated and communicated internally through a weekly briefing-room report, which serves as an early warning system that allows us to tackle an issue before it becomes severe.

Product quality and reliability issues are recorded on a failure analysis report (FAR). Each FAR drives a report of our process improvement methodology, to determine root cause and corrective action. Customers receive the same report in full, and we discuss any resulting actions together.
Categorizing complaints

Complaints are gathered and categorized by severity to allow for determination of an appropriate response. Complaints can be categorized as specific, chronic, or systemic. For a specific problem, a team-oriented problem-solving solution is often established, with representatives from the customer and all involved branches. Chronic problems that remain localized to a specific functional product area are best solved by quality improvement teams using a Plan-Do-Check-Act methodology. Systemic issues require a true reappraisal of our fundamental methods to effect the necessary improvement. Business process management methods in a cross-functional deployment of team methodology have proven most useful and successful in solving systemic issues.

Comparing customer satisfaction against the competition

It is very difficult to get data from independent analysts that accurately compares our customer satisfaction against that of our competition. We therefore rely much more on customer assessments that include competitive benchmarks. A few years ago, strategic customers were asking for permission to put our name on a chart that ranked their suppliers. Initially we were worried about seeing our name earmarked as not being the best. But eventually, adding our name to the ranking of satisfied or dissatisfied suppliers caused everybody within our corporation to push to satisfy the customer and be at the top of the ranking. Whether these rankings are objective or subjective coming from the customer is irrelevant. When customers define the ten things they want to look at, we know that those are the ten most important things that customers want us to improve our ratings on, so that is where we focus.

Assessing the level of satisfaction our customers experience

Five formal, mature processes are in place to assess the level of satisfaction our customers experience. (1) Standardized customer perception surveys, performed annually since 1986, provide a consistent survey base for comparison over time. The survey closely matches the structure and content of surveys performed by industry analysts so it can be used for external comparison as well. (2) Customers regularly report findings from their own vendor rating systems back to us. These rating systems measure and report criteria that are important to customers, often with competitive comparisons. (3) We have received recognition in the form of many awards and accolades from our customers over the years, validating our success. (4) Customer audits of our facilities validate our processes. (5) Customer visits to our facilities provide useful technology competitiveness assessments.

Follow-up

We continuously follow up to improve customer satisfaction. Each customer channel has assigned sales engineers, key account executives, and geographic sales representatives or franchise managers to follow up on all transactions. Steering committees and quarterly reviews provide a forum for follow-up with key customers and distributors. Formal customer approval is required at each milestone of our product design and development process, and the effectiveness of our communications with the investment community is surveyed to ensure improved communication.
Summary

Our customers are our lifeblood and our partners. They’re the people we come to work for each day. As a company, we will continue to get feedback regularly from our customers. Quarterly reviews with our top twenty-six customers will constantly drive us to get better. As a company, we listen intently to our customers, have close ties to our top customers, and rely on them to drive us to the next-generation technologies and systems. It’s a serious trust to provide the components they need now, and an ongoing challenge to anticipate their requirements for the future. Today, empowered employees of ST Americas are focused on doing just that, and tomorrow we’ll do it a little bit better.

Information & Analysis

Charles Zhang—Our state-of-the-art information and analysis system supports two of our key TQM principles—fact-based decision making and continuous improvement. Fact-based decision making is assisted by comprehensive sets of measurements and indicators used to assess the company in all areas and at all levels with regard to short-, medium-, and long-term objectives and plans. Continuous improvement is aided by the selection of specific information and data that measure the performance of all business activities at all levels of the company.

The improvement-deployment cycle

Our complex but very effective computer network system is built on two very simple concepts: an improvement cycle and an information deployment cycle (Figure 8). This continuous “improvement-deployment” interchange reflects both

Figure 8. The Improvement-Deployment Cycle.
| The improvement-deployment cycle, continued | the fundamentals of the Malcolm Baldrige National Quality Award and our focus on performance-driven management. The improvement cycle ensures that information is continuously updated to meet user needs. The deployment cycle helps to identify those needs and ensures that the entire system is evaluated for improvement opportunities. |
| Many physical databases, but one logical database | Our information and communication network includes physical databases in many different locations, but only one logical database. The use of common hardware and software throughout the company eliminates compatibility problems, and use of a single reference code to access data internally or externally from the logical database, regardless of employee location, avoids data integrity problems. |
| An integrated systems network | Benchmarking is becoming more critical in today’s business world, especially in the semiconductor business. We select and analyze benchmarking data that is of strategic importance to us. However, a sophisticated database of information is of no use without an effective integrated system network to explore that data. ST has successfully implemented four state-of-the-art computer systems (WorkStream, Esicom2, SAP, and PeopleSoft), which are key to our success, to help generate data and reports for analysis. |
| Process-based standards and goals | Process-based standards and goals (see Figure 8) are part of our performance-driven management system. The system provides us with mountains of rich data that allow us to monitor diminished levels of activity in all processes within the company and deal with gaps in performance as they happen. |
| Secure client-server computing environment provides mobile access to data | To effectively deliver and deploy data to management and users, we developed and implemented a secured client-server computing environment that provides high security, flexibility, and mobility. In today’s world, where employees travel freely around the globe to do business, it is important to have a mobile way to access data. Secured client-server computing therefore fulfills our objective to provide all available information in real time anywhere in the world at any time. |
| Management and users | Management and users (see Figure 8) review and analyze information and data to support fact-based decision making and employee empowerment as part of the improvement-deployment cycle. Time spans for these assessments and reviews range from real-time monitoring to an annual performance evaluation. |
| Measurement and improvement | Measurement of indicators (see Figure 8) for each function helps us to assess the overall performance of our business, while at the same time providing us with excellent opportunities for improvement. Improvements can be summarized in three areas: selection of data, decision-making cycle time, and setting the performance standard. Together, all three areas of improvement lead us to an even better performance achievement. |
Looking for a better way to operate

Human Resource Focus

Bill Boyce—In 1994, we were an organization that felt we had to control people with policies to look after our manufacturing. Our TQM journey had started a few years previous, with our Learn, Apply, Teach, and Check (LATCH) process cascading the basic TQM tools and philosophies from the top worldwide management to the lowest part of the organization (Figure 9). As we went through the TQM process we thought that maybe there was a better way to operate.

![Figure 9. LATCH Cascade.](image)

Decentralizing Human Resources

We started by decentralizing our Human Resources (HR) group. We allowed the HR operations in each site to report to the operations managers of those sites rather than to the corporate vice president of Human Resources. By having HR representatives report directly to their site managers, we helped to develop those site managers into general managers and not just manufacturing managers.

We also empowered the individual HR managers with the autonomy to conduct the HR activities at their sites. Today, “HR generalists” at each site support that site by providing “one-stop shopping” for the internal customer. Internal customers can go to the one HR generalist assigned to their organization to receive on-site, real-time solutions, rather than visit numerous Human Resource representatives to get through the HR activities.

Human Resources needs to understand the business

Human Resources has to have an understanding of the business to gain the respect of team members and to see their problems in real time. HR generalists at each site must understand employment issues, close key hires, and evaluate compensation situations in real time.

Currently, our ratio of employees to HR professionals is 100 to 1. Because our industry encounters four-year cyclical turns that leave hundreds of people out of work, we're very conscious of the census in our company. We're very careful in prosperous times to not over-hire. We want to run lean in case the market turns quickly. However, that means each HR representative must have a better understanding of the organization and be able to handle multiple HR tasks effectively.
Gung-ho teams

To be the low-cost, high-performing, competitive, flexible, fast-moving organization that they needed to be, the Manufacturing function needed to empower their work force. The best way to empower the employees was to form them into natural work groups called gung-ho teams. (Gung-ho is a book written by Ken Blanchard that describes an ideal manufacturing environment.) ST’s gung-ho program promotes teaming and employee empowerment to encourage and enable employees to take control of their work.

Gung-ho teams require nontraditional management

Teams were created not because teams were trendy, but to give people a say in things that affect their work. The biggest barrier to moving into teams was the traditional command-and-control role of the supervisor. Supervisors thought it was their job to tell people what to do and when to do it. We needed to change the supervisor into a team leader, coach, facilitator, “barrier buster,” and resource gatherer.

Gung-ho teams are not self-autonomous or self-directed work teams; teams still need direction. Once teams understand their direction, they need a coach and facilitator to assist in getting the job done, not a manager. Gung-ho teams require outstanding leadership that listens to the people, responds to their needs, and is very attentive to improvements that the team requires. They require “participative management.”

Hiring leaders with the right attributes

When we hire leaders, we look to hire the attributes that we can’t train. We can teach the technical aspects of the business, but we can’t teach how to be good motivators, how to be inspirational, or how to have a caring attitude. We need to hire leaders who have those attributes because we’re looking for leaders who will serve the employees. At ST, the traditional organization chart is upside-down; management works for the employees on the shop floor.

Leadership development

After hiring, leaders are trained in conflict resolution, coaching, performance appraisals, and career development. The first career development program is called Fundamentals of Management (FOM) and is intended for employees that are currently first-level managers who could potentially become department managers. People are nominated by their hierarchy to attend this course, and a contract is developed between the current boss, STUniversity (our internal development university), and the manager who will become the FOM student. The student contracts for learning, and the current manager commits to follow up on the training. Because the manager will not be at the training, the student commits to provide feedback to the manager, and they work together for development.

The next evolution—the Advanced Management Program—is intended for people who are already at the departmental management level who may have the potential to move into directorial or vice presidential positions.

The last program is called Strategic Management. Strategic Management is intended to give people in upper management a five- to seven-year view of the company strategy and shows how to align today’s activities with that future vision.
Team training

All team members initially receive the same type of team training, with additional training—conflict resolution, conducting effective meetings, etc.—tailored toward the needs of each team. Team leaders receive training above and beyond what team members receive, often in situational leadership or understanding the evolution of teams: the different stages of forming, storming, norming, and performing, and the situational leadership style that applies to the stage of the team.

Developing team values

Team members establish the team's values, generally by sharing personal values that are soon translated into work values. When new members join the team, the team shares their values with the new members, who either agree with the team's values or decide that they could not behave toward those values and therefore should interview with another team with different team values.

Various functions of teams

Today's teams perform various functions. (1) The teams themselves manage the workflow, team assignments, and team schedule. (2) Teams assist in the traditional performance review process by measuring each other's performance against the team's Shared Values. Peer assessment includes five characteristics that are related to the values of the business and the team. Team members assess themselves and their peers for each specific characteristic on a scale of one to four (one being slightly characteristic, and four being very characteristic). A summary shows team members (a) how they assessed themselves vs. how their team members assess them, (b) an average, and (c) how they ranked in each characteristic. Team members then talk about areas where there are large discrepancies with respect to how they assess themselves vs. how the team did, and where they had lowest team assessment or team average. This peer review accounts for 40% of a team member's performance review. (3) Teams can affect a variable element of pay that rewards the team for its teamwork. For example, a manufacturing variable incentive program pays monthly, based on collaboration against manufacturing goals at each of our manufacturing sites. (4) The team will assist in training and development planning for its members. Each team member is responsible for his or her own training and development plan. The plan is shared with team members and the team leader, who are responsible and empowered to meet that training plan. Specific training is allocated based on where critical resources are needed. Career progression for team members is designed so that the more cross-trained team members are, the more opportunity for advancement and promotion they will have.

Team activity has resulted in a lower supervisors-per-operator ratio. We're doing work now with less management as teams are becoming more empowered.

Evaluating team progress

Team progress is assessed every three months by an HR generalist and at least one person from that site. Team performance, turnover rate, absenteeism, and empowerment levels are assessed, along with the team's training matrix, training plans, and the process that they use for achieving results. Each team receives a report...
Evaluating team progress, continued

with specific data on how well their team is doing, with a ranking from one to five. A ranking of one means that the team needs immediate attention. A ranking of five means that the team is fully gung-ho and operational.

Excellence teams

Employees in areas outside of Manufacturing have been empowered through the concept of excellence teams. Excellence teams have provided a better way to set improvement direction in many areas outside of Manufacturing, including Financing, Purchasing, and Human Resources. Excellence teams are created either by employee recommendation to management, or when management asks employees to meet on a specific problem. Management then charters the team to analyze data and create recommendations for change.

The employee recognition program

Because results from a 1994 employee survey suggested that we needed to do a better job recognizing good performance, we empowered an excellence team to develop an employee recognition program. The program they developed allows any employee to recognize another employee for exemplifying behavior that reinforces any of our six Guiding Principles. Peers can recognize coworkers, bosses, or team leaders with awards—movie tickets, dinner for two, shopping mall gift certificates, or American Express checks. Management has little involvement; supervisors are usually involved only if the recommendation is for over $100 in cash awards.

This type of employee recognition program generally results in a distinctive pattern. Initially, there is some disbelief on the part of the employees. They are not sure that they can present an award without getting management involved, so the program starts slowly. Once employees realize that the program is real, there is a skyrocketing jump in the percentage of base payroll that is spent on awards. This jump scares management because there is no limit on the number of awards. As time progresses, the program settles into a place where recognition becomes almost institutionalized. At ST, we believe spending for our program will settle in around 0.03% of our base payroll.

On a quarterly basis, all of the employee recognition awards for that quarter are reviewed, and the best become nominees for our Quarterly Achievement Award. Employees vote to determine the winners, who then receive Quarterly Achievement Awards at our quarterly luncheon.

Additional forms of recognition

We have developed other recognition programs as well, including excellence team awards, our CEO Awards Program, service recognition, and special recognition.

Excellence team achievements are rewarded quarterly at a lunchtime banquet. The best excellence team achievements and the best suggestions for improvement at each site are celebrated and awarded plaques and shirts.

In our annual CEO Awards Program, the best of the best nominated by site management in all regions of the world are asked by our worldwide CEO to set up an exhibit. The corporate staff selects the best of the exhibits after reviewing the
## Additional forms of recognition, continued

Presentations. The best exhibits are then given awards by the corporate worldwide CEO.

Service longevity and loyalty are recognized by the presentation of a one-ounce gold coin to anyone with five years (or any multiple of five years) of service. Special recognition includes an annual banquet to celebrate the contributions of engineers who publish patents.

## Pass downs and shift communication

Communication is very important in our manufacturing organization because long processing times span changes in work shifts. We can't just stop a process to let the next shift start producing, so we have “pass downs.” Employees meet with co-workers from other shifts for ten minutes at shift change to relay the status of everything in their work area. The sharing of this information prevents anything from “dropping through the cracks” at shift change.

At the same time, team leaders use this opportunity to have a stand-up shift meeting to talk about scheduling and project completion for the shift and reallocate shift resources if necessary. For example, if a machine is down, the machine operator can be reallocated to another area or do cross-training until the machine is ready.

## Company-wide communication

Company-wide communication occurs in a variety of ways. Departments disseminate information in monthly meetings, and quarterly all-hands meetings communicate information to all shifts in our manufacturing sites simultaneously. Managers communicate information in quarterly meetings with team leaders on each of our four shifts, and newsletters and publications at each of our sites keep employees informed.

Operators are often sent to other sites to learn best practices they've heard about through a newsletter or quarterly meeting. At ST, the best manufacturing standard from any site around the world becomes the standard for all sites. The best way to understand that standard is to visit that site to learn their practices.

## Communicating best practices on an ongoing basis

STUniversity has recently set up on-line communities, called Learning Organizations, that list best practices on a worldwide intranet. Employees can select any of the topics listed to access company-wide best practices.

We are also working to create a data warehouse that includes an “experts database” to help solve problems worldwide. Employees can log on with a specific question, and the database will provide them with the names of two or three experts from anywhere in the world who have the expertise to help solve their problem.

## Education and training

Education and training are foundations for all team building. It would be a disservice to empower our employees without providing the training and knowledge required for their success. Our three-tiered approach to education and training includes (1) worldwide initiatives, (2) regional needs, and (3) site-specific training.
Worldwide initiatives and STUniversity

To foster understanding of our worldwide initiatives, we formed STUniversity in 1994 to teach leadership development on a worldwide level. The curriculum was not out of a textbook; it was the way ST does finance, the way ST does management, the way we want to lead, and the way we want to empower.

We did benchmark Intel, Motorola, and Texas Instruments when we developed the curriculum at STUniversity, but one of the key differences for our university is the strong international presence in our training. Each STUniversity class has five managers from four different regions to foster cross-cultural exchange among the twenty participants. With classmates from all around the globe, individuals get a good understanding of what others are dealing with in their markets. And the coursework itself has been designed with consultants to provide a very strong international influence and global focus. Because we are a global industry, the cross-cultural exchange is very important for our future, and our focus is always on the international market.

Today STUniversity offers team training, methods and tools, LATCH training, and other types of TQM-oriented training. ST Region Americas started its own branch of the corporate university in Phoenix, Arizona, in 1997, and participation increased dramatically in 1999 as we increased team training.

Regional needs

To coordinate regional needs at the Region Americas level, we focus on company knowledge, diversity training, and skills improvement. To foster company knowledge, all sites provide orientation programs. Diversity training includes improving employee awareness to allow employees to better understand the cultural codes and diversity across the different cultures within the company.

And HR generalists from individual sites work with local universities and colleges to offer on-site training programs to help improve skills. As stated previously, team members within Manufacturing are responsible for their own training plans. However, the training plan for areas outside of manufacturing is included as a separate document in the employee’s annual performance review. The document, which is constructed by employees and their supervisors, is used to plan training for each site in the upcoming year, and performance against the training plan is measured as part of the individual’s annual performance review.

Site-specific training

Site-specific training includes job training, safety training, and skills improvement. Job training in our manufacturing functions is tracked by the percentage of operators certified to operate a piece of equipment (also known as the operator certification rate, or OCR). OCR1 means team members are certified on one operation or one piece of equipment. OCR4 means they can operate four pieces of equipment, so they are highly cross-trained. Much of our workforce is highly trained, with OCR4 for our manufacturing functions ranging from 72% to 85%. As we add new employees the percentages will change, but we try to maintain high levels of OCR3 and OCR4.
Employee safety and wellness

Employee safety is our highest concern. We spend hundreds of thousands of dollars on equipment to ensure that our people are in safe working conditions. Occupational health nurses at all sites treat minor discomforts at staffed health centers, and ergonomic specialists available to each site fit equipment or workstations to the employees to avoid repetitive motion problems and other kinds of problems. Volunteer employees in the active safety programs at each of our sites perform weekly and monthly workplace audits and send recommendations for corrective action to management, who add resources and dollars where needed to make sure things are safe. Active safety programs also include emergency response teams of volunteer employees to help us evacuate in the event of fire or chemical spill.

Our concern for our employees includes their wellness. We offer assistance for weight loss, smoke cessation, and stress management on site. We also provide annual preventive cancer screens, and annual flu shots for employees and their families.

Our attention to safety and wellness has impacted the number of days lost due to injuries. We’re very proud to say that our annual rate of lost days per 100 employees is less than half the rate for the semiconductor industry, which reflects our continued concern for employees.

Employee services and benefits

Our employee benefits and services are very comprehensive. Benefits include medical, dental, and vision benefits; a 401(k) plan; a defined benefit retirement plan; short-term and long-term disability plans; and flexible time off. Services include serving hot meals on both shifts in cafeterias at all our sites, and events to build camaraderie. An employee volunteer group called “Creating Harmony In People” (C.H.I.P.) sponsors employee and family events at all of our sites and in the field organizations to enhance company unity.

Diversity

Diversity in the work force is strongly promoted throughout our organization. For example, wheelchair-bound people and hearing-impaired people have traditionally been denied access to clean rooms, because of limited access or an inability to communicate in emergency situations that may occur. We’ve changed that to promote a diversification in our work force.

We attempt to promote international diversity in our organization as well. We’ve combined our holiday and vacation hours into a flexible time-off plan to allow employees to take time off for events that may be more important to them than traditional U.S. holidays. For example, it may be more important for an employee to be off for Bastille Day or Chinese New Year than to have a holiday on the Fourth of July. We let employees choose what days they want to be off, rather than force them to follow a preset holiday schedule.

Measuring employee satisfaction

We measure employee satisfaction in a number of ways. Site management and Human Resource teams schedule informal monthly meetings to talk to employees about anything on their minds. We’ve also incorporated an e-mail program at each
Measuring employee satisfaction, continued

of our sites that allows employees to mail a comment or question to the site managers and receive a response in two days. Other employees can log on to the site to see what is being asked and how it is being answered.

Every eighteen months, we use an outside consulting group to measure ten categories of employee satisfaction. The outside consultant is an international company with survey results from fifty-five countries around the world. The national norms for this climate survey represent over 250,000 Americans who complete the survey annually, providing a very broad base for comparison. The consultants also give us global norms and industry-specific high-tech norms.

In 1997, we surveyed our employees to compare ourselves against national norms in these categories and found that we only met or exceeded the national norms in two of the ten categories (Figure 10). When we received feedback from the employee surveys, managers wanted to know exactly what employees meant by their responses, so ST held focus group meetings with employees to review the different sections of the survey and to specify the problems. Then we worked with management and excellence teams to create solutions to the problems. Many of the ideas already mentioned—newsletters, the ability to ask questions to site managers online, and other communication activities we are using today at those sites—are action items that came from this program. When we ran the survey again eighteen months later, we exceeded or met the national norms in eight out of ten categories, a big improvement that we’re very proud of.

We believe our employee satisfaction is increasing every day. Our employee turnover rate has declined over 30% in the last four years, which we see as an indication of satisfaction. And we look at our employee referrals when we hire new employees. Employees don’t refer friends and neighbors to a company they are dissatisfied with. We’re proud to say that over 35% of new hires come from employee referrals.
Process Management

Jack Mendenhall—Process management at Region Americas includes design, manufacturing, support process management, and supplier management. Customer needs, manufacturability, and reliability are taken into consideration to ensure products meet customer expectations. A well-defined set of key processes for design, production, and delivery of products is documented in standard operating procedures, which outline the product life cycle. The major steps of the life cycle (Figure 11) are defined as “maturity levels” and range from Maturity 0 (a request for a new product) to Maturity 90 (defining a product as obsolete).

Maturity 0

Maturity 0—the New Product Request (NPR) phase—begins with an initial concept complete with a thorough product development plan containing business and technical details. The new product concept may be initiated through market
Maturity 0, continued

analysis, customer surveys, customer requests, internal innovation, or product evolution. A cross-functional team with representatives from Marketing, Planning, Design, Product and Test Engineering, Quality, and Manufacturing conducts a feasibility review to evaluate product potential and to determine justification to proceed. (Research and Development representatives are involved for new processes, and customers participate in feasibility reviews for custom products.)

The NPR process is controlled through an intranet-based project-control system, with published minutes and major milestone visibility for all stages of development. Ongoing customer input is formally captured as a required step in the design process and through customer involvement in the design. For more complex projects, the program manager chairs weekly status reviews with the customer to ensure all requirements are understood and have been incorporated. All requirements must be defined prior to the Maturity 10 design phase to ensure the feasibility review encompasses all aspects of product success.

Maturity 10

In the Maturity 10 phase, designers design new components to fulfill the customer’s specific requirements and identify reusable design components stored in our macro libraries to avoid redundant design efforts. Reliability is designed into the computer-aided design system through design rule methods and is also marked offline by stress testing. Maturity 10 is complete when the prototype is fully functioning in the application, and the team and the customer sign the design approval certificate (DAC).

Maturity 20

In the Maturity 20 phase, the designed product is vigorously reviewed for compatibility with high-volume manufacturing. Review follows a set of well-defined criteria and guidelines that are the “minimum” for the analysis of any product, but can be extended by the cross-functional team or customer for product-specific needs. Rigorous testing evaluates the product design across the full extent of process control limits. Once product qualification and the required supporting documentation are complete, group management must approve the product qualification certificate (PQC), which allows the product to proceed to Maturity 30.

Maturity 30

Maturity 30 is the production and delivery process (Figure 12 on the next page). Standards for manufacturing are determined and deployed annually through Policy Deployment. Performance to these indices is measured each shift, day, week, or month, depending upon the type of measure. Results are summarized and reported to executive management on a monthly basis. Process engineering ensures that fully documented process specifications are maintained in an electronic document control system that is also used by engineering change notices to control the release of new revisions.
Maturity 30, continued

Process One

Process One in Maturity 30 is the production of finished dye in wafer form by masking, etching, diffusion, and metalization. Process complexity ranges from nine to twenty-five masking levels, with each level requiring five operations in one to five days per level to complete.

Process control procedures regulate Process One processes. Standard operating procedures and Statistical Process Control (SPC) manuals lead to the principles and methods for applying SPC. SPC is extended beyond control to include prevention via Failure Mode and Effects Analysis (FMEA). Control charts predict the next data points in the processes so proactive steps can be taken to prevent out-of-control conditions. The capability of measurement equipment is determined by gauge reproduction and repeatability studies, and calibration systems are designed to meet the requirements of an international standard, such as ISO 10012. Significant cost savings are realized through reducing inventory levels, as measured by the number of inventory turns.

Process Two

Process Two is the electrical wafer sort operation, which is the first functional test of the product. Process Two provides critical data for improving the wafer fabrication process. Significant improvements to the wafer sort operation have resulted from instituting procedures and equipment to correct issues identified by gung-ho and excellence teams.

Process Three

Process Three is assembly and testing, which is performed by any U.S. operation other than those used for prototype development. The finished wafers are then shipped to one of our sister regions for assembly and final-test of the completed integrated circuit.

Process Four

Process Four is shipment to the customer. Completed orders for integrated circuits are packaged and shipped to a central warehouse for distribution to the end customer.
Maturity levels beyond Maturity 30 indicate that a product is phasing out. These maturity levels usually last quite a long time, and customers are notified to allow “last-time buying” before the product is terminated.

Key performance measures for Maturity 30 include cycle time, on-time delivery, process conformance to specification ($C_{PK}$), and manufacturing cost. Cycle time (line speed) is measured on a daily basis by inventory turns. On-time delivery is measured by a computer-aided manufacturing (CAM) system that reports delivery conformity, monitors movement of material against the commit date, and prioritizes lots based on the time limits to that commitment. Critical processes include an established improvement plan based on the Policy Deployment targets for $C_{PK}$. Manufacturing cost is measured and approved using a concept of variation, which is a major indicator of our cost performance to the standard. A financial model is used to forecast a level of variation and to drive actions, as a predictive approach to controlling cost.

Our primary process improvement method involves extensive benchmarking of key parameters. Cost, cycle time, process capability, and on-time delivery are collected from fourteen plants worldwide, and the worldwide corporate standard system establishes the best-known performance of our industry in service quality and manufacturing. With this information, gaps are analyzed, areas for improvement are determined, and action items resulting from this analysis are driven using Policy Deployment. Process flow, from feasibility through production, is accelerated by empowering the lowest level of the organization to make decisions within the framework of the process, ensuring the quality of the work and facilitating employee empowerment.

Control of our support processes is driven by Policy Deployment in a very similar fashion. Each key support process—human resources, business administration, quality and reliability, financial control, legal/intellectual property, TQM and business management, sales and marketing, and information technology—has an associated requirement for process measures, along with goals for those measures. The key requirements, measures, and goals support strategic planning and Policy Deployment with input gathered from internal and external audits, internal and external customer requirements, industry standards, government regulations, and employee suggestions. These requirements are translated annually into corporate-wide standards and deployed through Policy Deployment to ensure they receive the same focus and rigor as our production processes.

Partnership with suppliers is a key strategic element of our TQM philosophy. Performance in the quality of our products is directly correlated to supplier capability. We consider our suppliers a part of our company and a partner with whom we have a common goal to succeed, resulting in a partnership that includes openness of information and a shoulder-to-shoulder approach to solving problems.
Suppliers must meet expectations

Suppliers can be classified into three categories—materials, equipment, and service—but all key suppliers must have a quality system designed to ensure that products and services perform to and exceed expected results. Each type of supplier is given a performance standard requirement: a material attribute specification for materials, equipment performance requirements for manufacturing equipment, and a service agreement contract for services. These specifications and contract standards outline specific requirements that must be met during the ongoing partnership with ST.

Promoting certification to international standards

We promote quality system certification for both materials and equipment suppliers, resulting in a significant increase in the number of suppliers certified to QS-9000 or ISO 9000 quality systems over the last three years. There has also been an increase in the number of suppliers certified through third-party certification to ISO 14001, reflecting our company’s focus on environmental concerns. Because we are looking to saturate ISO 14001 throughout our supplier base, suppliers who are not yet certified to the environmental standards must report to us their plans to do so.

Managing material suppliers

Each type of supplier is judged by application-specific methods. Material suppliers (Figure 13) are judged first on material qualification and then assessed for their quality system using a Materials Supplier Quality Assurance (MSQA) questionnaire. This questionnaire is a set of compliance questions outlined after the QS-9000 automotive quality system requirement (the same standard we’re held to internally). After the satisfactory completion of these fundamental steps, the supplier is certified to supply specific material.

Figure 13. Material Supplier Management.
Managing material suppliers, continued

After identifying the SPC parameters that they agree to report to us quarterly, suppliers then engage in negotiations for a “ship-to-stock” certification program. The MSQA controls their ability to ship-to-stock but is also followed by a site audit of the supplier and a qualification of the material itself. If the incoming material quality, yield, and manufacturing are acceptable, the supplier co-signs an agreement with ST to supply materials on a ship-to-stock basis. The supplier then becomes a partner in our product quality and works with our engineers for product optimization.

Scoring material suppliers

Measurements for material suppliers include their quality system compliance to our MSQA, material quality, delivery, environmental compliance, and service quality. While each of these measures is collected from a different point, our system consolidates the measures into a total score for each key material supplier. Twice per year, the score is disseminated throughout our company to allow each site to review supplier performance. The score is also sent to each supplier, along with the anonymous scores of other suppliers, for their review.

Managing equipment suppliers

Equipment suppliers are selected based on equipment performance and their ability to respond to problems. Requirements are outlined in a very extensive set of performance, delivery, and support criteria. Suppliers are evaluated from the time equipment is ordered, through installation, and throughout the entire equipment life cycle. Key suppliers review their quality systems in quarterly meetings with ST Engineering and Purchasing functions and outline improvement activities based on equipment performance and benchmarking.

Managing service suppliers

Partnership with service suppliers is driven through service agreement contracts. Service suppliers are conceptually part of the company and are audited by our quality department just like our internal departments. Service suppliers report customer complaints to us, and cost improvements are passed on to ST.

Working with suppliers to reduce cost

We work with suppliers to reduce costs. These cost reduction programs do not just push down prices; they are internal changes in supplier processes to reduce their costs. For example, we are presently working with material suppliers to implement the same equipment improvement programs that we ourselves are working on as a result of our benchmarking programs. Improving the reliability of their equipment automatically reduces their cost, which can be passed on to their customers.

Suppliers as a true partner

Providing timely feedback, comparisons, and assistance in improvement programs has resulted in improved supplier performance over time. Several years ago we were less trusting of our suppliers; as a consequence, we did not treat them as a partner in our business. With our new process, we approach suppliers from a win/win perspective and treat them as a true partner.
Proven designs help keep us ahead of the curve

ST is fairly unique in that we have a very broad product portfolio that allows us to extend the life of our more mature factories quite readily. One of the reasons why we have such superior financial performance is that our older assets continue to work and provide a return for us. In an industry that changes overnight, we stay ahead of the curve and get new products to market defect-free by emphasizing the reuse of previous designs. By using something that is already proven, we eliminate risk and the time needed to verify that the design works. For example, one group recently designed a platform that took about nine months. From that project came a major derivative design that took about six months. Following that were five other major derivative products, each taking only two to three months. In addition, we had over twenty minor derivatives of these products that were introduced within a one-month time period. All of these products were created from one area as a result of reusing a proven design.

Managing the facility development processes

Although we don’t put the construction companies that create our facilities through the same rigors as our material and service suppliers, we still work together in a partnership. We audit supplier books, look at their invoices, and check the subcontractors they use, in an open-book process. We try to work with suppliers and construction companies that we have experience with and that we know have a good track record. ST has a very global plant infrastructure, so we have key suppliers we continue to return to. For example, the same engineering firm designs the majority of our facilities, and many of the subcontractors that they use have worked at our sites for ten years, so we have a very long, trusting relationship. We work together as a team, and we communicate constantly in a close partnership. While this supplier management doesn’t have the formalization the other supplier relationships have, it is equally effective and provides an advantage of speed, which is critical in our business.

Benchmarking

We invest quite a lot in benchmarking, both internally and externally. Our internal benchmarking includes a very specific list of industrial parameters. We compare these well-known parameters from site to site, and we have a very good system within ST for consolidating each plant’s performance. The performance of every plant within ST is reported weekly, allowing for comparison to performance in Asia and Europe. We also store best practices in a central technical library.

ST has an open-minded management system that is very willing to share. The ST system is a free flow of information, and any plant that has the best practices is more than willing to share that information.

Benchmarking with equipment suppliers

We also have a very structured best-in-class benchmarking program with our equipment suppliers. Suppliers collect data from all of our sites worldwide, as well as from their other top-performing customers. Data is normalized and provided to ST to help improve the performance of the equipment and allow comparisons with the best-in-class.
Benchmarking with equipment suppliers, continued

It was very difficult at first to bring equipment suppliers into this program. Benchmarking takes resources, and equipment suppliers would have to develop a process internally to determine how benchmarking was going to work: how they would collect data from their customers, normalize the data, distribute the results, and work with customers to develop recommendations to improve equipment performance. As we started to work with this worldwide program, many opportunities for improvements appeared, in both the supplier’s organization and at ST. Sometimes these improvements were simple, and sometimes they were complicated, but we could both improve to be best-in-class.

Once suppliers started seeing improvements, they provided the same data to their other customers (without identifying ST) so those customers could benefit as well. Suppliers benefited from more-satisfied customers, and the ST/supplier partnership was strengthened.

Journey to Performance Excellence and Lessons Learned

Robert L. Banks—In describing our journey toward winning the Malcolm Baldrige National Quality Award, I would ask you to think back to the children’s song about the ambitious bear, forever climbing the next mountain to see what he could see. Like the bear, every time we crested a mountain, we could see yet another mountain as our next challenge, often bigger and more challenging than the one we just climbed. Although we have crested this latest mountain by winning the Baldrige Award, in front of us is an entire range waiting to be climbed.

The beginning of our journey

STMicroelectronics was formed in 1987 by the merger of SGS Microelettronica and Thomson Semiconductor to become a worldwide manufacturer of semiconductor circuits. Both companies had previously used TQM philosophies, making integration easier. Beginning in 1988, many important steps were taken, including retraining employees in design of experiments (DOE), formal SPC, and FMEA, and introducing service training focused on customer inputs as the beginning of our customer service.

TQM as a top priority

In 1991 a significant milestone was achieved when our corporate CEO formally declared TQM a top priority. TQM was to be mandatory as a cultural way of life integral in the way we do business, not a specific department or program. With this declaration, he also formed the Executive Total Quality Council (ETQC), a steering committee of top management that included the Region Americas president. A new Vision and Mission were defined, and each site created its own committees and TQM champions to support the new cultural paradigm.

The learning and tools phase

In 1992, Policy Deployment was introduced, as our first self-assessments to the Baldrige and European Quality Award (EQA) Criteria were conducted. We initiated an employee suggestion system and piloted our employee climate survey. Of great
The learning and tools phase, continued

importance, we developed our Shared Values and introduced our annual company standards for quality, manufacturing, service, and human resources as the core of our Policy Deployment activities.

The highlight of this “learning and tools” phase was the rollout of our LATCH Cascade training. A turning point in our TQM journey, LATCH not only taught content but also drove commitment and accountability throughout the organization, as all employees were trained in the tools, Shared Values, and company philosophies.

Engaging employees and formalizing improvements

In 1993, we began to better engage our employees through an employee suggestion system and consolidated our Policy Deployment through all levels of the organization. We developed business process management and empowered teams, which have evolved into the team-based structure we have today. In 1994, STUniversity was formed with the concept that “ST teaches ST.”

A formalization phase ran in parallel to our employee engagement phase. We began to evaluate and improve our system through EQA self-assessments in support of our corporate application for the European Quality Award. Annual CEO TQM audits for all sites were launched, using EQA Criteria in those audits. Policy Deployment breakthrough goals were initiated, requiring significant levels of improvement, and by 1994, we had achieved ISO 9000 certification to all of our sites.

Long-term visioning and environmental commitment

In 1995 managers from all areas of the corporation participated in a long-term visioning session called Vision 2000. From this session came our new strategic objectives and a significant shift in the direction of our corporation and regions. By 1996 we had upgraded all sites to QS-9000 certification, for a stronger emphasis on continuous improvement.

While for many years our company had worked passionately to protect the environment, in 1995 this passion was formalized into a distinct priority, with rigorous measures and controls to ensure actions. We developed our environmental decalogue, and our TQM thrust was changed to be called TQEM (with the “E” standing for “environmental”). We began a corporate-wide focus on the importance of environmental commitment, building our Rancho Bernardo site in California with compliance in mind. This site became the first location of any U.S. company to receive certification to ISO 14001, followed quickly by our other sites.

Accomplishments and awards

In 1999, ST was recognized by the U.S. Environmental Protection Agency with the Climate Protection Award for outstanding accomplishment in protecting the environment. The Dow Jones Sustainability Index Group also named us a top performer worldwide for integration of environmental sustainability and economic business strategies. And, of course, Region Americas has the honor of having received the Malcolm Baldrige Award in 1999.
Lessons learned

Commitment to performance excellence and TQEM pay off in a big way. Our progressive partnering approach with our strategic customers has resulted in 190% growth in sales since 1994. In our quality improvement drive toward zero defects, process lot conformances were reduced by 78% since 1995, driven by root cause analysis and corrective actions. During tough economic times, we have performed much better than our competitors, resulting in a significant increase in market share. Recent climate surveys show that employee morale has improved significantly as employees become more empowered in their work. As a complement, the level of turnover in our company has decreased by 39% since 1995, while the average of our industry continues to rise. We have shown significant cost reductions with our suppliers and partners as the quality of their products (and thus ours) has improved consistently over time. In just a year and a half we’ve seen a 36% improvement in productivity, powered by gung-ho teams and empowered employees.

Nine areas important to our success

The key lesson that we’ve learned, however, is to know what is important to your own success and focus your energies in these areas. As Peter Drucker has said, “The pertinent question is not how to do things right, but to find the right things to do and concentrate your resources and efforts on them.”

We have focused our efforts on nine areas we believe to be important in ensuring our success. (1) Because we need to balance work among global operations, the company has developed a unique but very practical matrix management model that has served us very well as we continue to grow and expand. (2) To be a long-term leader in business, we must also be a leader in the care of the environment. Environmental protection is a passion for our company. (3) The company must have a strong, shared vision and a strategic plan for getting to that vision; reaching that vision must be an integral part of every employee’s job every day. Strategic planning and Policy Deployment allow us to follow a course toward our vision.

(4) We focus on the development of strong, long-term partnerships with our customers and our suppliers to ensure that we are all successful. Partnership goes beyond a mere handshake to a point where it is very difficult to determine where ST ends and the partner begins. Successful partnering is key to our success, now and in the future. (5) Data truly is power, so we have a great deal of automation and information sharing throughout our company to ensure that employees have the tools and the information they need to do their jobs. (6) Providing those tools and information to employees is a must to have an empowered work force. Empowered employees are central in today’s environment in our market. Our employees run the show because we’ve given them the tools, the training, and the information to do their jobs better than anyone else. (7) Equally important is a passion to grow and continue to learn. We pride ourselves on being a learning organization with a focus on gaining the skills and knowledge to be leaders now and in the future.

(8) Process management is important, not only in terms of defect prevention (which is vital to our high-technology business) but also in terms of increasing
productivity. As the complexity of our products grows and prices drop, we must be doing ever more with ever less. Process management has been and is the key ability to do more with less.

And finally, no one really knows what the future holds. Technology is changing so quickly in so many of our customer’s markets that we can barely see six months ahead, much less five or ten years. However, to ensure our future, we must keep our focus on areas of knowledge, skills, technology, investment, and marketing position. We are striving hard in all of these areas to ensure that our future will be successful, exciting, and bright.

Now that we’ve won the Malcolm Baldrige Award, what’s next? The answer is really quite simple. We pursued a journey to performance excellence since our founding because it makes us better and more competitive in every way. We will continue this journey, not to win another award, but because it is still the right thing to do. We are proud to be an ambassador of the Baldrige process. We know that we do not represent the accomplishment of perfection, but we now have confirmation that we are on the right road. Employee empowerment is the magic of STMicroelectronics, and building employee empowerment starts with a corporate attitude that respects and values the individual and continues with a willingness to seek to provide the greatest good for the greatest number of people. From our own self-assessment and from the feedback from the Baldrige examiners, we have discovered many areas that we must continue to improve. We see yet another mountain ahead, and we are ready to continue the climb.

Richard J. Pieranunzi was named President and CEO of Region Americas in 1996. His semiconductor industry career spans positions from engineering and sales to CEO. He received his bachelor’s degree in Electrical Engineering from the University of Rhode Island.

Angelo Uggé has been employed with STMicroelectronics since 1977. In 1995, he was appointed Group Vice President and General Manager of the TPA Operations in America. Angelo graduated in Physics from Milan’s Università degli Studi in 1974.

Tim Chambers joined Thomson Components in Carrollton, Texas, in 1987, which later merged with SGS Microellettronica to form STMicroelectronics. In 1998 Tim was appointed Vice President and General Manager of the Graphics Product Division. Tim graduated from Rugby College (now Coventry University) with a Bachelor of Science degree in Electrical Engineering in 1972.

Charles Zhang received his BBA degree in 1985 and earned two MBA degrees in 1990 at Paris-I University in Paris, France, before joining STMicroelectronics in 1995. In his current position, he is responsible for compliance auditing, management auditing, and consultancy auditing, covering all functions and activities in the Americas Region.

Bill Boyce joined STMicroelectronics in 1994 with 20 years of Human Resource experience in the semiconductor industry. In 1995 Bill was appointed Vice President of
Human Resources for Region Americas. Bill received his Bachelor of Science degree in Business Administration in 1971 from California Polytechnic State University, San Luis Obispo, California.

Jack Mendenhall joined the company in 1974 and has held various manufacturing positions. In his current position, he is responsible for the three wafer-fabrication manufacturing facilities in the United States. Jack received his BSEET degree in 1976 and an MBA degree from the University of Dallas.

Robert L. Banks received a Bachelor of Science degree in Electrical Engineering from Southern Methodist University and completed Master of Business Administration studies at the University of Dallas. Bob's career in engineering includes design of large-scale displays and semiconductor integrated circuits, which led to management positions at STMicroelectronics, Inc. In 1993, Bob was appointed Vice President of Quality for STMicroelectronics, Inc. – Region Americas.

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Editorial assistance for this article was provided by Daniel Picard.
The Ameritech Process for Designing High-Performance Change-Management Teams

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Editor’s note
This article was developed from a presentation made at The Best of Teams 2000 conference, presented by Linkage, Inc., with sponsorship by GOAL/QPC—Editor.

Background
Ameritech, a local-telephone-service proprietor, was recently purchased by SBC Communications. Ameritech has 75,000 employees; with this acquisition, SBC now has more than 204,000 employees and annual revenues of about $50 billion, making it the thirteenth largest employer in the United States. SBC’s business encompasses everything imaginable in the telecommunications industry, including local long-distance phone services; wireless data communications; and paging, satellite, and cable TV services.

The telecommunications industry has undergone a great deal of change recently, and Ameritech has been changing and evolving a lot as a result. To match Ameritech’s new business direction, we needed to put some flexible financial systems in place and to make the conversion from using legacy systems to using packaged software. The future was filled with many projects and transformation efforts, and we wanted to develop the capability to handle them in-house, without relying on outside consultants.

To help make this transition take place effectively and smoothly for everyone involved, we created and co-led a change-management organization (CMO), a task that included our participation on several project teams that were formed to make the necessary changes. We also worked to make our CMO a high-performance team (HPT) so these changes would happen successfully.

Effective teams vs. HPTs
What’s the difference between an effective team and an HPT? Effective project teams meet the results that they set out to achieve and come in on time and on budget. But HPTs obtain exceptional results within accelerated time frames.

The Ameritech CMO’s three major roles
To make change happen successfully, we concentrated all our CMO’s efforts on fulfilling the team’s three major roles.

1) Stakeholder management and communication. This refers to the way the
The Ameritech CMO’s three major roles, continued

CMO interacted with our target organizations, the people who were going to be important in enabling the changes our team created. Not only did we need to create the changes, but we had to communicate the changes to these people. We had to decide how we were going to engage and mobilize these individuals and how we would move them through the stages of awareness, engagement, and ultimate commitment. We took a good look at this group of people and asked, “What do we need from them at every stage of the process?”

2) HPT development. A great deal of the thinking that we did with our CMO came from the nine HPT principles outlined in Figure 1 below. In addition to leading the CMO, we were also assigned to project teams to help them become high-performing. Trying these principles ourselves with the project teams made us more skilled in helping the entire CMO become an HPT.

3) Organization design and transition planning. This refers to moving an organization from its current state to the state that will be most effective for it. It involves designing the process of getting the organization through change and then sustaining that change. Our ultimate mission was to make this change, no matter what it was, happen successfully.

An explanation of the nine HPT principles

The nine HPT principles make up the basis for transforming an effective team into a high-performance one.
1) Generating a stand. This refers to the ability and willingness of the team to commit itself to a compelling shared purpose. Make sure it’s something that hasn’t been done before—something that requires the team to behave or act differently than normal to achieve exceptional results.

2) Straight talk. This is simply saying what needs to be said in order to get the process moving forward.

3) Mutual support and coaching. Coaching and support are actively requested and offered among team members. This acts to improve both individual and team performance.

4) Managing through breakdowns. You should view any problems that arise within the team as ways of finding out what the team is missing rather than as reasons for individuals to point fingers and blame each other for what is or isn’t happening. With our CMO, we focused on the positive rather than the negative, viewing a team breakdown as an opportunity to create a breakthrough. Group breakdowns can thus become a rallying point for the team, resulting in innovation and increased teamwork. A breakdown should get you to a better place.

5) Alignment. This refers to the relationship a team has with a decision once it has been made. All team members, regardless of their individual agendas or team roles, must support the team’s decision and defend it as the process moves forward.

6) Accountability and responsibility. Team members are held accountable for the results of their actions as individuals, as well as for the results of the actions of the team. As a result, members have incentive not to overlook anything they notice during the change-management process that might cause the team not to achieve its intended results.

7) Possibility and enrollment. Team members continually work to enroll each other in new, innovative ways to break down any barriers that may exist so the desired results can be achieved.

8) Accomplishment. This is acknowledging efforts and small successes the team achieves as it works toward its goals. It’s a great way to maintain team enthusiasm and momentum. It’s also better than waiting to recognize successes until the end of the project, when team members might feel stressed after a tough effort.

9) Decisive, coordinated action. The team makes decisions first and then coordinates its actions around those decisions. We found that using an Action Register was a good way to accomplish this. The Register listed the tasks each team member was to do, as well as when each task was to be completed. This helped team members to stay informed about what everyone else on the team was doing throughout the process and to coordinate their actions.

Effective listening, managing conversations, effective speaking, and trusting relationships are basic competencies necessary to activate the HPT principles. They...
The four foundation elements are essential, continued

How to build a foundation for your team

If your team lacks one or more foundation elements, then it’s crucial to work on the relationships among team members. This might entail simply being aware of past experiences they have had and the resulting impact on, say, how one team member might listen to another. Then the team members can understand what the difficulties are and talk about them. It’s a great opportunity for realizing what areas your team needs to improve on or the things that your team members need awareness about. It’s also helpful to get support from a coach who can observe the group’s interactions; give you honest, open feedback; and help you work through any problems.

Ideally, when team members are using the nine principles, are feeling supported and coached, and have good relationships with each other, they feel better about the work they are doing. They also get a chance to improve their own performance, not just that of the team.

Ameritech’s five-step process for building a high-performance CMO

We used a five-step process to build our high-performance CMO project team at Ameritech. An explanation of these five steps follows.

The first step of the process was to build the case. We had to justify why the company needed an HPT to do change-management work. This step, which took us about two and a half months to complete, was comprised of three elements.

1) Establishing the goal. How would Ameritech benefit from what we were going to be doing and the results we were proposing? We wanted to reduce our company’s consulting expenses and develop an internal capability to do the work that had always been given to outside consultants. This included supporting multiyear transformation initiatives, which were big projects.

2) Determining internal resource needs. What were the costs associated with the project we were proposing? Our goal was to create a transition plan for our existing consultant resources and stop paying $650 an hour for consultant fees.

3) Generating support. It was easy to generate support for getting rid of expensive consultants and replacing them with internal resources. But we knew that outside consultants had a degree of credibility at Ameritech that internal resources didn’t have. An important part of generating support was determining how we could be viewed as credible change agents in the work that we were doing.

Step two: launch the team

After we had sold the company on our ideas and recruited some individuals for
Step two: launch the team, continued

our team, we looked at the next step: how to launch the team. We had a total of twelve people, which included internal team members and outside consultants. We had everybody on board from the beginning; it would have been difficult to have to bring in more people later in the process. It took two days for us to complete our team launch. A big part of that was just building up the relationship among team members—opening up, sharing information about each other, and getting a chance to know each other better.

Creating and aligning on a team purpose

Then we created and aligned on our team purpose. To do this, we broke up the team into small groups and asked each group to design an advertisement. We told them, “We need to sell our CMO’s services to one of the key project sponsors. What would an advertisement for that look like?” Then, as each group read their advertisement to the rest of the team, we wrote on a flip chart the key benefits they cited. We then took the information from the flip chart and put it all together to create our purpose statement: Enable our financial-transformation project to achieve sustainable results consistent with our vision by maximizing the effectiveness of individuals and teams, driving cultural change, and architecting the change process.

Establishing team operating principles

We then established team operating principles by getting team members’ responses to some key questions: How was our team going to make decisions? How were we going to hold each other accountable for the team’s shared purpose that we’d established? How were we going to work with the consultants? How were we all going to view ourselves as a team, rather than as the “Ameritech people” and the “outside consultant people”?

Introducing a methodology

Finally, we introduced a methodology. An important part of our vision at that time was to try to create sustainable capabilities within the organization. How would the twelve people on our team go about teaching the rest of the people in the company to implement change effectively? How could we get the rest of our organization committed to our team’s projects? How would we prepare our targets—the people who had to deal with the changes—ready for the change implementation? How could the entire organization operate as an HPT? We wanted to enable the whole company to do that without having to rely entirely on our team for guidance.

Initially we relied heavily on our consultants and their methodology. Then, gradually, the team developed processes and tools that were effective within our Ameritech culture.

Step three: define key competencies

We then looked at the team and assessed what competencies our members had. Each person on the team had some really good skills; we needed to find what was missing. We knew that we needed to have certain competencies to be a CMO. One of the things that we did to enable the people on our teams to own the skills that we
needed them to develop was to involve them in a brainstorming session. We looked at
the actual work the team would be doing and asked team members to imagine the
skills they would need to accomplish all those things. After a close inspection of
the list we compiled, we were able to define thirteen competency areas, which we
then put into a Competency Framework (see Figure 2 at right).

These thirteen key competencies were the ones that our team needed to perform
the three major roles mentioned earlier: stakeholder management, HPT development,
and organization design/transition planning. So, we knew what competencies team
members needed to perform our work satisfactorily. We were then left with the ques-
tion of how to help our team acquire those skills, which became the foundation for our
knowledge-transfer and coaching programs.

When we recruited people for our team, we didn’t search for top talent; we
brought in people with good skills and the right attitude, which would enable them
to grow. To do this, we established knowledge-transfer and coaching programs.
Designing these programs helped us take knowledge and experience from the
consultants who had been typically doing the work for our company and bring this
knowledge and experience in-house. Ameritech’s future was filled with many projects
and transformation efforts, and we wanted to develop the capability to implement
them internally.

The first step we took in designing our knowledge-transfer program was to
establish commitment through involvement. One of the primary ways we did that
was by involving people in the brainstorming session that resulted in our list of
thirteen competency areas that we needed to develop. This helped team members to
create ownership for those competencies. As mentioned earlier, we had made a
conscious decision to bring people in at lower skill or experience levels and then
Defining and assessing current skill levels

The second step was to define and assess team members’ current skill levels. Each person did a self-assessment and rated himself or herself on how he/she was doing in each of those competency areas. This way, they owned not only the competencies that we were developing, but also their personal development of those competencies, because they were the ones rating where they stood in terms of their own skill levels.

Levels of mastery

We broke down the process of assessing team members’ key competencies into the following four levels.

Level I. A person at this level grasps the fundamentals of a particular competency. We required everybody to have this basic level of mastery when they joined the team. We believed it was important for everyone to understand the work and the roles of the other team members but not to feel personally responsible for the success of the team. For instance, they could see if the team had a communication problem even if they weren’t skilled at a high level in the communication competency, and when such a situation arose they knew enough to find a fellow team member who was skilled in that area and who could figure out what to do.

Level II. A person at this level can serve as a co-leader and/or apprentice when the group is taught about a particular competency.

Level III. A person at this level can lead the group and/or coach others about a particular competency.

Level IV. A person at this level is known as a guru: he or she can lead a group, as well as teach others how to teach a particular competency. Most of the outside consultants on the team were at this level in various competency areas.

A good mix of competency skill levels is important

The entire team started at Level I in most competency areas. Three or four team members who were going to serve as the team’s communicators wanted to advance to a high skill level in that competency. Other team members who were going to play a role in the area of organization design needed to get to a high level in that competency. In addition, we wanted a lot of team members to be at Level III for facilitation. We had to have a good mix of people—some who were highly skilled in each competency, and others who could provide support for the people who were highly skilled.

Setting individual capability targets

The third step in designing our knowledge-transfer program was to set capability targets for each team member based on their role in the team projects: communication competency, organization design, or training competency. Based on these roles, we identified where team members needed to be in terms of skill level.
The classroom knowledge-transfer program

After assessing skill levels and setting capability targets, we then used that information to execute our knowledge-transfer program, which basically consisted of various classroom sessions that allowed team members to learn and practice their skills in a safe environment. We brought in a consultant who dedicated all their time to working on this program for about six months.

Having a consultant teach and train team members could bring them to Level I, and possibly up to Level II, but they couldn’t get to Level III just by sitting in a classroom and practicing. Progression to the higher levels couldn’t occur until the actual teamwork began.

It was harder once the teams were doing this actual teamwork to stay committed to this knowledge-transfer program because we had to devote a substantial amount of time to it; we spent at least four hours a week in the basic competency areas. And it was harder to devote a lot of time to training once we began working on teams.

The last step in the knowledge-transfer program was to create individual development plans. Because team members could get only as far as Level II by doing classroom work, at the conclusion of the program each person created his or her own development plan. These plans were similar to the capability self-assessments team members did at the beginning of the change-management process, when they said, “This is the capability we are trying to develop; what am I going to do to further enhance my development?”

While we had outside consultants working with us on the CMO, we got every bit of knowledge from them that we could. This gave our internal people the baseline they needed to work on personal development and successfully deliver the services required to achieve the goals we envisioned.

The goal of our coaching program was to create a team-support structure. Two key questions that we asked ourselves were “How are we going to keep our group members learning and building their skills?” and “How can we support each other through the tough times?” We put together a coaching program that enabled us to share experiences and key lessons we learned, as well as provide our team members continued capability development and growth.

Because the two of us served as both coaches and members of the project teams, we were learning and doing at the same time, which is kind of scary. We served as coaches for our teams, but we also had to serve as coaches for ourselves. We wanted to be seen as valuable team members contributing to our teams’ results, not merely as people who had been assigned to the teams. We also wanted to be seen as people who modeled HPT behaviors: commitment, quality of work, being able to
Three coaching opportunities, continued

engage in straight talk, and being able to align with the team. Three specific coaching opportunities arose for us and other team members during the change-management process.

CMO team meetings

Our first opportunity was coaching our weekly CMO team meetings, during which we shared what we were doing with the individual project teams. These meetings involved sharing knowledge that we learned while working with the teams, as well as capitalizing on each other’s experiences and getting advice. Team meetings are very important for doing this type of sharing.

As coaches, during the first weekly meeting we had to build a relationship with the team and share our expectations. We also set our coaching goal—the things that we wanted to work on over the next few months—as well as the meeting frequency.

Knowing how hard it is to launch anything, we provided the initial topic for the group to discuss: “We’ve been a CMO now for a couple of months; let’s talk about what’s working and what’s not working with our team.” It could be a little intimidating for team members to say, “I need coaching in this area,” so we gave them a very “safe” topic, which was our group.

This formal coaching structure gave us the practice we needed to play the role of a coach. It also helped us to learn to be “coachable”: being able to request and accept feedback from others in a constructive way to move forward. This was important because a good coach can also take good coaching. We also assigned coaching partners within the team, which gave every team member an opportunity to learn to play the role of a coach as well as to become a coachable person.

Supervisor coaching

A second opportunity was supervisor coaching, or one-on-one coaching, which the two of us did with various team members. This had two advantages: one, when a team member couldn’t wait for a weekly team meeting to get some coaching or to hear another person’s perspective, they knew they could go to one of us individually to get input. Two, members could discuss sensitive issues privately rather than bringing them up in a group environment. Even though our group had a high-confidentiality policy, there were certain issues that, the fewer people who knew about them, the better. Supervisor coaching enabled that to happen.

Consultant coaching

Third, we had consultant coaching. Team members were encouraged to work one-on-one with the outside consultants. This way, they could learn from the consultants’ experience and use this new knowledge to come up with solutions and recommendations. This allowed them to take full advantage of the time the consultants were there and tap into their knowledge.

Step five: measure performance

We then put together a program to measure our progress and enable team
Step five: measure performance, continued

members to continue to learn. Two tools we used to measure the progress team members made throughout the program were the Skill-Level Matrix and the Capability Assessment.

The Skill-Level Matrix

For each of the thirteen competency areas that we identified, we put together a Skill-Level Matrix (see Figure 3 below). In the leftmost column of each Matrix, we listed what we considered to be the characteristics of a person who is good in that particular competency area. To the right of that list, we indicated the behaviors that a person would exhibit at each skill level. Using this Matrix enabled team members to understand what behaviors we were specifically looking for at each level for a particular competency area. It also enabled us to see, for instance, that someone had progressed from Level I to Level II in a particular skill.

It can be difficult for people to fill in this Matrix. It was hard for us to get team members to really look at themselves and bluntly admit to their own weaknesses. It took a lot of trust on the part of our team members to do those things. As coaches,

### Figure 3. The Skill-Level Matrix.

<table>
<thead>
<tr>
<th>Competency: Coaching</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level I</strong></td>
</tr>
<tr>
<td>Empowers People to Act</td>
</tr>
<tr>
<td>Understands that coaching doesn’t mean giving advice and listens in a way that supports others to uncover their own answers.</td>
</tr>
<tr>
<td>Is able to ask probing questions to uncover others’ values and commitments; can co-create a plan of action based on them.</td>
</tr>
<tr>
<td>Is able to illuminate for others their self-limiting thoughts and behaviors; supports them in moving beyond them.</td>
</tr>
<tr>
<td>Is able to develop (i.e., design programs, train, coach) other coaches and/or groups in coaching for action.</td>
</tr>
<tr>
<td>Develops Individuals’ Potential</td>
</tr>
<tr>
<td>Identifies and suggests learning opportunities for others.</td>
</tr>
<tr>
<td>Co-creates growth assignments with people supported by shared understanding of what it will take, in both skills and behavior, to succeed.</td>
</tr>
<tr>
<td>Champions others in their ability to achieve their ideals and challenges them to continually raise the bar for themselves.</td>
</tr>
<tr>
<td>Is able to teach other coaches ways to develop their coachees.</td>
</tr>
<tr>
<td>Is “Coachable”</td>
</tr>
<tr>
<td>Seeks people out for coaching and accepts it during difficult times.</td>
</tr>
<tr>
<td>Is open to coaching at any time and actively requests coaching from colleagues.</td>
</tr>
<tr>
<td>Is able to engage in self-coaching.</td>
</tr>
<tr>
<td>Requests coaching from anyone and teaches other coaches how to work with people to be more coachable.</td>
</tr>
<tr>
<td>Establishes Collaborative Relationships</td>
</tr>
<tr>
<td>Is known as a collaborative partner in his/her workgroup; others can count on his/her willingness to be straight with others.</td>
</tr>
<tr>
<td>Seeks and is sought out for coaching by peers.</td>
</tr>
<tr>
<td>Seeks and is sought out for coaching by people he/she reports to and/or with groups of people.</td>
</tr>
<tr>
<td>Is able to work with other coaches on how to establish collaborative relationships.</td>
</tr>
<tr>
<td>Listens for Other Persons’ Reality and Is Committed to Their Success</td>
</tr>
<tr>
<td>Is able to actively listen to others so they feel heard; is able to distinguish between what happened (i.e., fact) and interpretation.</td>
</tr>
<tr>
<td>Is able to discern, underneath what is being said, others’ values/commitments and gets coachee(s) to distinguish between fact and interpretation.</td>
</tr>
<tr>
<td>Is able to get other people to see their own values/commitments and co-design with them more empowering actions and interpretations.</td>
</tr>
<tr>
<td>Is able to teach others to listen for someone else’s reality.</td>
</tr>
</tbody>
</table>
The Skill-Level Matrix, continued

we tried to help by telling them, “Understand where you are and make the most of the program that we are about to share with you.”

The Capability Assessment (see Figure 4 below) took the information from the Skill-Level Matrix and put it into a tool that team members could fill out to rate themselves on how capable they were in the skills related to a particular competency. We used a simple rating scale. A C indicated they felt they were capable, which meant they had practiced the skill over time and had consistently produced results. A D meant they were developing and practicing the competency. And an S meant the skill was a stretch for them; they had very little training in this area, and a gap clearly existed.

This tool served as an extension of the self-assessment that team members did earlier in the process. It enabled them to see where they were at in terms of these ratings and determine what they believed they were capable of doing.

Figure 4. The Capability Assessment.

<table>
<thead>
<tr>
<th>Competency: Coaching</th>
<th>Anne</th>
<th>Joe</th>
<th>Pat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMPowers PEOPLE TO ACT</strong></td>
<td></td>
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<tr>
<td>1. Understands that coaching doesn’t mean giving advice and listens in a way that supports others to uncover their own answers.</td>
<td>C</td>
<td>C</td>
<td>D</td>
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<tr>
<td>2. Is able to ask probing questions to uncover others’ values and commitments; can co-create a plan of action based on them.</td>
<td>C</td>
<td>D</td>
<td>D</td>
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<tr>
<td>3. Is able to illuminate for others their self-limiting thoughts and behaviors; supports them in moving beyond them.</td>
<td>C</td>
<td>D</td>
<td>D</td>
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<tr>
<td>4. Is able to develop (i.e., design programs, train, coach) other coaches and/or groups in coaching for action.</td>
<td>D</td>
<td></td>
<td>S</td>
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<tr>
<td><strong>DEvelops IndivIDUAlS’ POTENTIAL</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Identifies and suggests learning opportunities for others.</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>2. Co-creates growth assignments with people supported by shared understanding of what it will take in both skills and behavior to succeed.</td>
<td>C</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>3. Champions others in their ability to achieve their ideals and challenges them to continually raise the bar for themselves.</td>
<td>C</td>
<td>S</td>
<td>D</td>
</tr>
<tr>
<td>4. Is able to teach other coaches ways to develop their coachees.</td>
<td>C</td>
<td></td>
<td>S</td>
</tr>
</tbody>
</table>

Rating Scale
C = Capable: has practiced the skill over time and consistently produces the result.
D = Developing Competency: has been trained and has practiced the skill.
S = Stretch: has little or no training in this area; a development gap clearly exists.

Because we wanted the change-management process to take place in a very safe environment, we did not use this assessment for performance measurement or as part of team members’ annual performance reviews. Instead, we used it during training to identify and create our knowledge-transfer program, and the team members used it to create their individual development plans.
The Capability Assessment, continued

As we went through the process, we measured the progress that had been made. After our initial assessment, we did another progress assessment about two-thirds of the way through the program so that everybody had a chance to see how much they had developed. It also gave us a chance to determine how we needed to modify the program and identify the areas that we still needed to cover. At the conclusion of the program, each person had their own development plan that identified the capabilities they wanted to develop and the actions they planned to take to further enhance their development.

Measuring the CMO’s performance

We initiated the performance measurement process (see Figure 5 below) about a year after we launched the CMO. Work by the project teams had been progressing for a while, and this process served as a way for us to measure our teams’ performance, identify what wasn’t working, and make sure the CMO was being recognized for the work that it was doing.

Using the Feedback Tool to get input from project managers

First we devised a Feedback Tool (see Figure 6 on the next page) that enabled the project managers to give team members feedback by identifying how they thought the CMO was performing. We could then take action to improve those areas that the project managers said needed it. We took the information from the Feedback Tool and incorporated it into team members’ personal development plans and our coaching structure to help our group continue skill-building.

For the first round of evaluations, we had a consultant interview each of the project managers to get feedback on what they thought of the work our teams were doing. This consultant also compiled the data from the completed Feedback Tool and gave us a view of how the entire CMO, as well as each team member, was being
Using the Feedback Tool to get input from project managers, continued

perceived. The consultant then shared that feedback with the individual team members and helped them work through what it meant and what actions they needed to take.

Team members then built their individual development plans using the responses their teams got from the Feedback Tool. After going over the feedback they received from the consultant, they then decided on the one or two skills they needed to work on over the next three months. They shared this with us and the project managers, and then they were able to go back to the project managers after those three months and say, “Here are the things I said I was going to do. I’d like to get your feedback on how I’m doing now. What improvements have you seen?”

Then, during the next round of evaluations, we had the team members go to the project managers themselves. The initial feedback they had received during the first round gave them something to take back to the managers three months later and ask, “Have you seen improvements in my work?” Now it felt a little bit safer for them because they had that initial feedback and could go back and ask, “I understand you were concerned about this; how am I doing now?”

The Feedback Tool’s rating scale

The “What You Should See” column in the Feedback Tool lists behaviors that the project managers should observe on the team, not necessarily specific competencies or skills that individual team members have.
The Feedback Tool’s rating scale, continued

The Feedback Tool has a simple rating scale. A 5 means that the team exceeds the standard for the observed behavior; a 3 means it meets the standard for the observed behavior; a 1 means that the team is not meeting the standards for a certain behavior; and NE, which stands for “not evident,” means that the project manager isn’t observing that behavior from the team. So, when that is circled, for that line the project manager is saying, “I can’t even rate that skill because I haven’t seen it.”

Whenever a project manager circled NE, the two of us would go back to the team and ask, “Have you not had the opportunity to demonstrate this behavior? If not, then let’s look for opportunities, because the project manager isn’t even seeing the work.” Again, this feedback is not used as part of the team members’ performance reviews; it’s just a part of our change-management process.

Results of using the Feedback Tool

When we first implemented the Feedback Tool, we were still struggling a bit with project managers’ not understanding the roles of the CMO completely. This tool served as a way to make our HPT principles tangible to both the team members and the project managers. It was also a way for us to give the project managers a common framework for understanding what behaviors they should see our team members exhibiting.

We made the Feedback Tool as uncomplicated as possible, using fairly simple language. We attempted to make it correspond closely to the actual behaviors the project managers would see while observing the teams at work. Making such observations did not necessarily enable them to understand the specific expertise of the individuals on the team.

Our change-management process wouldn’t have worked if the team members hadn’t gotten some tough feedback from the project managers. And the Feedback Tool made it okay for the managers to give that kind of feedback. After team members were informed about where they stood, we made the situation less threatening for them by helping them see that this was going to help them get to a better place. It could be a bit awkward at times, but we focused on helping team members work through the process.

Challenges we encountered during this process

The five steps of the CMO-building/change-management process presented us with various challenges. The major ones that we encountered were the following:

1) We faced two challenges while we were building the case. One was determining the level of expertise we wanted to bring to our team. This is critical when you are building any HPT—not just a CMO. The other was establishing credibility with the company sponsors and the project managers. They knew what their goals were, and they had a desired outcome in mind. We needed to be able to make them see that our CMO was going to help them get there.

2) When we launched the CMO, we first had to make sure that we defined
Challenges we encountered during this process, continued

clear roles and responsibilities for everyone on the team. Failure to do so would have resulted in confusion. Second, establishing our team purpose involved a lot of wordsmithing. Even though we tried to do this creatively, we had team members who disagreed over which words to use in the purpose statement. We had to get people past that and looking at the statement as a whole. At one point we said, “We’re kind of wordsmithing here. Does it really matter if the word we use here is a or the?” And the team members realized that it didn’t matter that much after all. Third, we had to make the outside consultants feel that they were an integral part of the team. That was always a challenge. We had to get everyone to group together, rather than viewing the project teams as “us versus them.”

3) We first tried to define the thirteen key competencies as a collective effort, but involving everyone on the team in this process did not work. Finally, the two of us and a few of the consultants took all the ideas and input we had collected thus far from team members, and worked with it on our own. That allowed us to focus on a manageable number of competencies and then roll out the program.

4) While designing our knowledge-transfer and coaching programs, the biggest challenge was committing the time needed to transfer the knowledge. Team members all devoted a minimum of four hours a week to this, spending time together in a classroom setting to get everyone to the basic level of competency mastery.

On top of that, if members were trying to reach a higher competency level, we and those members put in another four to eight hours a week for that, depending on how many levels they needed to go up, in a separate session. That was a lot of time for us to spend away from the project teams, who were counting on us.

Finally, assessing individual capabilities for all the team members required a lot of our time. Team members filled out the Capability Assessment charts a couple of times, and then we had to review them and spend time as necessary with team members after we came up with such questions as “Do we need to have a conversation with someone about not doing what they should?” or “Those team members aren’t giving themselves enough credit; let’s tell them they’re doing a great job and to focus on the next level.” When you’re working with thirteen competencies and twelve team members, that requires a lot of time.

5) When measuring performance, a difficult aspect was getting honest feedback from the project managers. They always had a crisis to deal with—trying to do a deliverable or meeting with sponsors. It was probably not their top priority to give us feedback. We had to make sure we got into their offices, engaged them in some productive dialogue, and got them to actually say, “Yes, the teams are doing this,” or “No, they’re not doing this.”

Becoming self-reliant was a second challenge. We made a promise to our sponsors that we were going to stop paying outside consulting fees and that we were going to develop in-house capability. We needed to trust that, through our leader-
Challenges we encountered, continued

Learning to partner as co-leaders of the CMO was the single biggest challenge the two of us faced. As coaches of two separate project teams that specialized in two different areas, we had to constantly consult with each other and communicate what was going on with everyone on both teams. And we had to try to model our own partnership positively because our team members weren’t going to partner that way and benefit from each others’ experiences if we weren’t doing it, too.

Our biggest challenge as leaders of this project

A proud moment for us was whenever we heard someone in the Ameritech organization say, “A person from the CMO taught me this, and this is why I’m doing it now.” That not only freed us up as coaches to work on something else or to help another person, but it showed confidence from members of the organization in the work being done by the CMO.

It was also rewarding to observe individuals who had initially doubted the validity of the change-management process change their minds and say things like “You know, I wasn’t a believer in this stuff at first, but it really helps. We can’t have an effective implementation without it.” That kind of feedback assured us that our CMO was doing what it was supposed to be doing.

Rewarding aspects of this project

If we weren’t getting phone calls at least once a week from project managers complaining about the actions of our team members, we knew that we weren’t pushing the teams hard enough. We used those phone calls as a way to measure how the change-management process was going. When we got those calls, we knew we were pushing team members out of their comfort zone and making them do things they didn’t want to do to get the team to the HPT stage.

Our role at that point was to help the project managers to recognize the benefits of the work we were doing. We would act as a buffer and explain, “We know it’s not really comfortable, but these are the things that we need to do.” As a result, team members felt that it was okay when the project managers made those telephone calls, which, though seemingly negative, were indicators that positive things were happening.

“Negative” phone calls served as a positive monitor of progress

The ultimate goal of our CMO was to implement changes in the organization’s decision-support and financial-systems areas that would result in $20 million in savings. We got about half of our planned projects completed successfully; among these were the implementation of a shared-services organization and getting one of SBC’s business units up on a new decision-support system. We had plans to roll out that system to more business units.

Project results and future plans

ship and with the team that we built, we could become the effective internal group that we wanted to be.

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Project results and future plans, continued

But then change happened to us, so to speak: the remainder of the projects that we had planned were scheduled to happen right at the time of the SBC merger, so we had to cancel them.

Now we are learning to deal with the changes that have occurred because of the merger. Karen recently made a presentation to a group of the organization’s financial controllers about change-management work. We are trying to show our partners at SBC the benefits of continuing to have a CMO in the organization.

For further reading


Author information

Karen D’Amico is the owner of KD Consulting, an independent consulting firm based in Streamwood, Illinois. While serving as Director of Change Management at Ameritech Corporate Finance Operations, she was responsible for accelerating the implementation of large-scale change initiatives at Ameritech through HPT development, stakeholder management and communication, and organization-transition planning.

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Editorial assistance for this article was provided by Cathy Kingery.