



Motorola Quality Briefing:
“Stalking Six Sigma”

George Fisher Introduction to 1991 Quality Briefing

Good morning. I'm George Fisher. As Chairman of the Board and Chief Executive Officer of Motorola, it is my pleasure to welcome you here today.

As many of you know, these quality briefings were initiated when Motorola received the 1988 Malcolm Baldrige National Quality Award. They have been continued at the request of companies like yours, who want more information about Motorola's quality process.

You may also be looking for information on how to win the Baldrige award and you may find some of that information here. But quality improvement does not come from resting on past laurels, nor is it achieved by relying on yesterday's blueprint for success. Rather, it is the result of continually striving towards the goals of tomorrow.

So today's briefing is not about how to win awards, but how to improve the quality process itself. It is about making quality integral to the corporation's vision of itself, and the central goal of every activity at every level and function: from product design, development and manufacturing through marketing, administration, and above all, service.

Later, you will see a thirty minute videotape from the National Technological University, in which the Chairman of our Executive Committee, Bob Galvin, discusses Motorola's integrated approach to quality. Throughout the day, our presenters will brief you on how Motorola's Six Sigma process has become a driving force for our corporate culture. You will hear about our corporate vision, our progress and plans.

But our goal today is not to tell you how to run your business. We can only give you an overview of how we run ours. We hope that some of the ideas you carry away from this briefing will help you in your own quality efforts. Thank you for being here today, and for sharing our commitment to continual quality improvement.

"The Road to the Malcolm Baldrige Award"

National Technology University (NTU) Broadcast July 20, 1989

Presentation by Robert W. Galvin, Chairman of the Board, Motorola Inc.

Dr. Baldwin's, Founder and President of NTU, Introduction

What better way to lead off an executive forum than to focus on Motorola's process for managing quality in the Malcolm Baldrige Award. The national quality award is the United State's quest for excellence. Each of us must contribute to the long-term success in the global marketplace. But we will learn that a plan is essential for success.

During the last decade, Robert W. Galvin, the long-term Chairman of Motorola, masterminded one of the most sweeping transformations in modern times. It is my pleasure to introduce Mr. Galvin.

Robert W. Galvin's, Chairman of Executive Committee, Presentation

Thank you very much, Dr. Baldwin.

Ladies and gentlemen, our subject today is quality. It is, incidentally, the Malcolm Baldrige National Quality Award. Let us put that award in context, because you'll hear a little bit about it as we go through all of the presentation. But its significance is something that has yet to be appreciated.

Imagine if all of the companies in the United States went for the Baldrige Award (**Chart I**). It is our speculation if that were to occur, and that became a national policy, then the growth rate of the gross national product would rise by one half of one percent. Our natural growth rate is around three percent. That would be a tremendous base change in the rate of our gross national product. Why would that occur? Because, if all of us, in the course of the early nineties, were to do additional planning in our businesses (in our business we call that research and development) and change our processes,

and provide ourselves with tools and equipment (that's capital equipment), all of those are the multipliers that raise our economy.

Well, this is not an economics forum, but can you imagine if all of those around you were to go for the Baldrige Award? It would raise the level of the economy. Can you also imagine what would happen if you wouldn't have gone for it, and your competitors did? They would have become virtually perfect. Consider how much they would take as their share from you.

The Malcolm Baldrige standards are very high, but that makes them worth aspiring to. They are so high that when you finally do elect to compete for them, and I think all of you will eventually do so, you are going to be digging very deeply into the philosophy, as well as the practices, of quality. You are going to have to transmit that and communicate that to the Baldrige judges, who are people of immense credentials. If the Baldrige examiners are assured that all the information and written submissions pass the test, your application proceeds to the finals. Then the Baldrige people will send, as they did to us (if you are about our size), five examiners—peers—in the quality area. They will spend one week looking into all aspects of your company. They will enjoy talking to your people, people who you probably hadn't even put on the tour. They are going to be looking to see whether or not a true culture of quality has been embedded in your company.

The last thing I want to say formally about the award is the obligation. In fact I have crossed out the word obligation. It is a privilege. You are privileged to present yourselves to any audience who is interested in learning how the Baldrige award competition works, and what to do in order to participate in it. We consider it a privilege, and my associates and I are delighted to have the opportunity to share with you our experiences.

If there is any single message that I want to give to any audience about this subject, it is that quality is personal. By personal I mean that we're going to have to talk from time to time, in the first person—I did, we did.

Now that's not our nature. We frankly prefer to talk in "you" and "they" terms. But, as a matter of fact, in order for quality to come to life in your institution, it must be a personal commitment. I do contribute something. Each of my associates had to contribute so much. Thousands and thousands of our people did. So we are going to talk in first person terms from time to time.

How did we start? After we had been notified that we had won the award and the word got out, some of my very top associates were heard to say: "Weren't we lucky that we had in place the ingredients that permitted us to compete for this award?" Well, I am going to let you judge whether or not it was luck or just coincidence that Congress passed a bill in 1987, and that Motorola happened, by anticipation, to be ready.

It all started at an officers' meeting in 1979, eleven years ago. We had some problems, we always have problems, and these problems I felt would best yield if we, for the first time ever in our history, assembled all of our officers for a three-day weekend meeting. Incidentally, we have a lot of officers—we believe in promoting people deserving of officership regardless of the quantity. At that time, we had about eighty to eighty five officers. Now we have about two hundred and fifty.

The idea of having a meeting was both thought to be all right but was not so enthusiastically greeted, because it was going to take time and money, and those things are important. But I insisted that we would have this meeting as the means of getting at the problems that were then existent. The meeting was going along fine and we were halfway through. All of a sudden, in the spontaneity that is our normal nature, a gentleman by the name of Art Sundry stood up. He said: "Look, the agenda is going fine, and we seem to be getting to the subjects we want to talk about. As far as I am concerned, we are missing the most important subject of all. Let me put it to you from the heart—our quality stinks."

Now here was the man who was the National Sales Manager of our largest business which had about a sixty percent market share in the industry,

growing at double-digit profit, and he said our quality stank. With that one action he turned the meeting right side up and everything from that point forward was seeded with the subject of quality.

When we got back to work on Monday morning, we did not know exactly what to do. We said: "Let's start farming better." We had no program of any consequence, but an attitude had begun to be instilled and installed into the company. About the same time, the subject of competitiveness, which cycles through in terms of its importance of our consciousness, had peaked in terms of serious interest, and we were asking, in effect, the corollary question. "How do we become more competitive?" We might just as well have asked: "How do we become more quality-oriented?"

My father had so many witticisms that he passed down to us. He founded our company; he was our great leader. He said: "I do not mind a man who is dumb, but I can not stand a man who is numb." Well, I wasn't smart enough to know how to make us more competitive, other than to tick off all the normal checklist items that we think of. But I couldn't be numb. I could not give up searching for the "how to" that would make us more competitive. Finally, a simple proposition developed. That was: that I was going to have to be better than the best CEO in our industry. Our vice presidents had to match or beat vice presidents in other companies. Our factory folk had to be equal to or better than the best of our competition, and so on.

It is a terribly simple idea but it becomes very personal, because I recognized that I didn't know what I didn't know. So, I started to go to people and literally ask: "What do you suppose other people know that I need to know?"

You will notice on this chart that I put a couple of words in an asymmetrical way—humility and listening (**Chart II**). Art Sundry introduced to us the thesis that we had better be humble and recognize that we did not have all the answers on quality. I recognized that we had to listen to find out how we could do things better.

As a consequence of those two things, I went to my associates and said: "We are going to have to do more training." They said: "That is a good idea, Bob, we always need more training." They said, "Just be sure we don't do it on company time. Don't spend any money. Remember, we are a plain pipe rack organization. We have to keep overhead down." Again a first person involvement. I said no. We are going to do it. I am going to insist that we have a very extensive training program. I picked a number out of the air and said: "We are going to spend forty million in a couple of years. I don't know how we are going to account for it, but it is not going to cost us a net penny." We started the process very early on—about ten years ago. We put in place, what is today in our industry and for our size of company, the largest and most expansive training program that exists. It is essential so that each one of our people is the quality leader compared to their counterpart elsewhere.

Then we called in guests. Who were the guests? They were people like yourselves who had credentials in a given area. We asked them to come in and talk to our operating policy committee, or to a group of our foremen, or to a group of our engineers. We said: "Tell us what you know." We went to school on your and/or their kinds of thoughts. We formed a task force for a very special purpose and in a very special way. We learned this idea from Westinghouse, one of the other Baldrige Award winners in 1988. They (Westinghouse) set up task forces, where people are set aside from their jobs for two months or three months. They then go back to their jobs when it's over, but they focus on an issue.

Our task force went into these kinds of subjects with particular focus on our concern for our competitiveness with Japan, because that was our major focus. This task force discovered a lot of things by going around the world and asking: "What could we do in the area of quality and competitiveness?"

As you will note on a separate chart that I will show you in just a moment, one of the things they came back very excited about was benchmarking (**Chart III**). Again, this is a process of listening.

We went out in a very organized way over a period of a couple of years and checked with people who knew how to better warehouse, knew how to better handle receivables, payables, invoicing, order processing, and soft processes as well as hard processes of manufacture. Then we went to our people, which is our normal propensity anyway, since we are genuinely a participative management organization. (Incidentally, we started this concept well before we had ever heard of it from the Japanese back in the early sixties.) We went to our people.

Let me personalize that in a way and link it to one of my associates who is on this panel. I was sitting in my office one day very early in this program. My secretary said: "Bill Smith is calling." I knew Bill Smith was a top engineer in our communications business though I did not know Bill very well. I took his call and he said: "Bob, I have got an important idea and a concept I have got to express to you, and I think it is very important to the company. I would like to see you."

I don't know if we saw each other that same afternoon or not. I do know that it was very prompt. Bill came to my office and unfolded to me a thesis about latent defects. I am not an engineer, but I listen well. I have to admit I did not understand what Bill was talking about. I was sure as the devil I understood that he knew what he was talking about.

He was very sincere and must have been right. I asked him to come back a second time so that I would have a chance to better understand the concept. It became clearer and now I knew he had something worthwhile, and that those who would truly be able to grasp it should carry the ball. He went on to talk to my two associates in the Chief Executive Office, who were both engineers and top managers. They grasped the concept immediately, and then they began to develop the thesis.

The details are not significant in this particular broadcast. The significance is that the Bill Smiths of Motorola took ownership of what they saw going on and said: "The company needs to embrace an idea we have; and we think it will help the whole system." We listened and we accepted and we

implemented. At the later part of this program we began to involve our suppliers more. Among the things I would do differently, in retrospect, would be to involve our suppliers more aggressively early in the program. We are always out visiting with our suppliers. As a part of this whole process we did a lot of visiting out in the field. I am going to describe that, among other things, in this next section, which is a litany form of recitation of the things that we did from a policy and process standpoint.

It is not important that we will be able to convey to you a specific technique. Whatever your business, whatever your institution, it is my guess that we can supply to you analogs of what you are going to be able to use. I hope that you are beginning to catch the flavor that a considerable amount of leadership has to be taken—an interest, a sense of humility, a personal involvement, ownership in starting a process, and a set of policies, the nature of which would then be particularized to your institution.

I wish we would have thought of it right at the first tee, but I think it was about the third hole of an eighteen-hole game, that we finally came to a realization of the overall banner that would become the most enlightening to our people. Most inspiring to our people was a genuine understanding of what "Total Customer Satisfaction" was.

This came through to us so vividly fairly early in the program when I decided to go back to school on that simple process of very detailed customer visits. Don't we all make customer visits? I decided to go out and talk to ten customers that year; I did not want to see any big shots, I wanted to see the people who installed, who serviced, who wrote the checks to us, who received the material, who assembled it into their product, the purchasing people, and so on. Our people set it all up.

After four trips, I could have written every trip review I had wanted to. All of our customers said: "We like doing business with you." (I know all of your customers would say the same.) "But, we would do ten, or twenty, or thirty percent—maybe even three hundred percent more business with you—if you would just stop making so many mistakes. In the time it takes to correct

this invoice, look what happens when we get a dead-on-arrival radio, etc." Well, it started to really get into our hearts.

Total Customer Satisfaction became the overriding banner of the general objective of what we wanted to accomplish. We learned what it took as a function of that benchmarking that I spoke of, and all of our people participated. They took that sense of ownership in the accomplishment of that objective, but we had to have a considerable unity and communication and understanding with each other. Therefore, we went about the job of literally rewriting all of the critical and inspirational and informational documents of the corporation.

One of these is such a simple document. You can't read it, of course; all that you can see is that I am holding a small piece of paper about the size of a card out of a deck of cards. We were able to put on this card all of the critical factors that reinforce our key beliefs and key goals as well as our key initiatives, and we asked all of our people to carry it with them at all times as a unifying force. All of the other both critical and simple documents of the corporation, of which you have yours, would be an analog thereof. We went back to the drawing board and republished and re-promoted them throughout the corporation so that everyone had a common understanding of the strategy. A common understanding of this and the ultimate goal here (Total Customer Satisfaction) are also the processes themselves.

Now, we had to start doing some tangible things. These did not all occur exactly in the same order that I am describing to you here, but in a reasonable sequence. Early on we said that we had to have a corporate champion, in addition to those of us in the Chief Executive Office who championed it every day. We had to have an executive who would take very keen cognizance of this project, and we therefore established a Corporate Quality Officer.

We took one of the most experienced and finest line executives out of that same sector Art Sundry came from. We asked him to become the corporate quality officer. He became the facilitator and the organizer and the inspirer

of so many of the fine elements of our program. Under his tutelage, and with the involvement of many other people, we started to set goals.

We said to ourselves at first: "Why can't we improve ourselves five times in five years? What does five times mean? What if we had ten thousand defects per million, how about getting it down to two thousand defects per million." Now anything in the thousands sounds like a lot, but those are very high percentages if we're getting school grades, aren't they? I remember at Notre Dame I was a pretty good student, as far as grades were concerned. My father and mother were very proud that I was getting ninety five percent.

You've got to get away from those kinds of mindsets. So, we set goals. Goals that every department would go at simultaneously. Whatever their level of quality was, the goal was to improve it by five times. We discovered by the employment of very particular changes and processes—I will quickly list them here in a moment—that five times goal was readily achievable **(Chart III)**. We moved it up to ten times. We have moved it another one hundred times. Yes, it is this kind of quality change that is entirely doable in any departments—soft activity or hard activity—and our people have come to believe, because they are achieving that.

We set up councils. We got purchasing councils, and we got engineering councils, all communicating and exchanging ideas with each other. Then we had to have a metrics system, a way of understanding among us what we were achieving. We operate this quality system under the rubric of Six Sigma.

For now, let us very simply explain what Six Sigma is. Sigma from your statistics studies is a standard deviation. Essentially, we have learned that if we can contractually agree to accomplish within a norm of Six Sigma on the bell curve, we can produce products that in the ultimate measure of our customers will be literally perfect, or three point four defects per million. That is what Six Sigma statistically translates into. This system gives us a common language where everybody can be rated: four sigma, four point five sigma, five sigma. We already have a lot of departments who have already set Six Sigma goals for 1992. Very particular systems were engineered by the

gentlemen who are going to speak later on in this program. These gentlemen and many others have caused Six Sigma to come to life.

Another subject that we have taken major cognizance of is the cycle time it takes to do any job, any program, or any accomplishment in the system. Let me give you an example first of the kinds of things we have already accomplished. We have a plant in Florida. It has been a world-class plant for manufacturing pagers for as long as there have been pagers. We started the pager business; we were the quality leader. It was taking us about forty days to fill an order from order placement, checking the credit, going through the system, getting parts ready, putting it into production, various subassembly stages, then various work-in-process inventory stages. Finally, out of the test stage and repair, etc., it might have taken somewhere upwards to forty days. A lot of time to make mistakes—and a lot of mistakes were made.

Today, we have revitalized the entire system of design and manufacturing of pagers. At nine o'clock this morning, if our sales representatives logged an order in the sales office adjacent to your business, it would go through the complete system and land instantly on the factory floor and in one hour and forty minutes later, the product in a lot size of one would be in the shipping department ready to be shipped to you. Not much can happen wrong in that short space of time.

We integrate a lot of parts. We have learned that if a product has a cycle time of one hour and forty minutes, or four hours, or maybe as long as eight hours, if you discover a mistake a quarter of the way through, you've only got an hour or two hours' worth of mistakes. You do not have things hanging around. So, we match cycle time with Six Sigma quality. The two are literally synonymous.

We are a technology-driven company. We improved our technology reviews because we knew we had to achieve designs better for the manufacturing, and for processing of the paperwork that would go along with them. Our Corporate Quality Director put a quality system review program to work. It

meant that people with credentials, from throughout the corporation, would assemble every other year in a given division and take a very hard look at the total quality operation—the way of processing goods and the way to *measure* quality of the processing goods, the services of that organization. People got grades. Next year they had better get higher grades. Everyone now is getting high grades on the reviews of their quality systems. The Chief Executive Office gives out awards to those departments that are doing extraordinary things. We've got awards of all kinds. You know the motivational aspect of awards.

In the course of running our business we're always using resources **(Chart IV)**. The bottom line of strategy is the allocation of resources. Now, let me just touch on a couple of things we thought were significant. First off, ideas are resources. Among those ideas, we realized early on that if we don't make any mistakes, things come out faster. We get more, and we get them all at lower cost. We know what the cost of bad quality is.

Today in our company, we know that the cost is almost one quarter of a billion dollars, per quarter. In a seven or eight billion dollar corporation, that is the cost of not doing things right. That is where the cost is.

We reallocated time. Let me tell you about one meeting. The Chief Corporate Quality Officer was supposed to report to the operating committee every month. I was supposed to come into this meeting when he gave his report; otherwise I was not attending. I would wait, and wait, and the preceding operation review meeting was late. When the quality officer and I were called in, the others would say: "Jack, (Jack Germain, Corporate Director of Quality) sorry it took so long in operations, see if you can abbreviate your report. Give us a couple of charts. We know quality; we are all for quality." That went on for two months. Then finally, the third time around, I said: "Let's stop this. Quality is at the wrong end of the agenda. Put quality first on your agenda. At eight o'clock in the morning, Jack goes on and I will be here to hear his report." This was a personal sacrifice; I did not have to get in at eight o'clock those mornings.

Now quality comes first. Richard Buetow, who took Jack Germain's place, starts at eight in the morning. We can not get off the subject. Not because the quality is bad but because everyone is so excited about telling what they are doing to improve quality. Sometimes we don't have time to get around to the operations review! Do you know what? Quality takes care of the financial numbers.

Of course, we came up with many more tools, various kinds of equipment, various sophisticated items. We have revolutionized a lot of our processes. We've revolutionized our organization. Engineering departments are now, in some plants, located right in the factory, not a hallway away. There is tremendous communication between groups. Our training program, which I have already alluded to, is an immense allocation of resources and time, and we have gained so much back from it.

Our focus on waste—the waste of time, the waste of materials—has become very prominent. All those other processes that I referred to earlier were very much a part of our total program.

Then we communicated. Oh, how we have communicated—how we have rewarded. I will just give you a little litany of these things. I showed you the cards—we came up with common terms. We've had review after review of quality, always aimed at looking for the things that we can do differently and better. Other examples are incentives, exchanged trip reports, the CEO Awards, videos, our house organs, and our various papers. We have taken memberships in organizations, ads in newspapers, our annual report and long-range planning system—all have documented our quality story.

We tell success stories. Oh, how wonderful those are, how we learn from parables. We like to listen to each other's stories because we can borrow the message that comes from all of them. Finally, we recognized that we can believe in virtual perfection. I've had some peers in industry say: "Bob, you shouldn't use that word. To err is human." I say no, you can not get there if you do not believe in virtual perfection. You know what, a lot of our people are showing that it can be done. Thank you.

Charts Used During Robert W. Galvin's Presentation

Chart I:


- Quality
 - Baldrige
 - GNP
 - Standards
 - Obligation/Privilege
 - Personal
- 

Chart II:

Start

- Officers Meeting
- Competitiveness
- Training
- Guests
- Task Force
- Our People
- Suppliers

Humility

Listening

Chart III:

Policy Process

- Total Customer Satisfaction
- Benchmarked
- Participation
- Corporate Documents
- Quality Officer
- 5x 10x 100x
- Councils
- Metrics - System
- Cycle Time
- Technical Reviews
- Quality System Reviews
- Awards

Implement!

Chart IV:

Resource Allocation

- Quality vs/is Low Cost
- Quality vs/is Quantity
- Time (Operations Meeting)
- Tools
- Training
- Waste
- The Process
- Communicate - Reward

George Fisher Conclusion to 1991 Quality Briefing

Hello again. Earlier today, I expressed the hope that some of the ideas we shared today would help in your own quality efforts. I hope we have achieved that goal.

As the global business community becomes more and more interdependent, we are each, increasingly, the customer of the other. As we look toward the future, our greatest assurance of lasting individual success in the world market, may rest on our ability to work together to enable each of us to be the best in class.

As we move into the next century, it behooves us to view ourselves as Olympic athletes who are members of the same team. By competing to better each other's quality records, we can improve the overall performance of our team. By working together to outpace competing teams, we can each improve our individual performance.

In a very real sense, we are all partners in quality. If we all, individually and together, strive toward the goal of Total Customer Satisfaction, we will inevitably win a greater market presence for all of our products. That is why Congress established the Malcolm Baldrige National Quality Award. Not so a few of us could win bragging rights to a handsome display piece, but so all of us could be winners in the markets of the future. That is also why Motorola has continued its commitment to these quality briefings.

Thank you for attending today's program. We appreciate your participation and hope that each of you has come away with insights that will help you improve quality in your own organizations.