*Robert W. Galvin started his career at Motorola in 1940. He held the senior officership position in the company from 1959 until January 1990, when he became Chairman of the Executive Committee. Galvin continues to serve as a full-time officer of Motorola. Here, Galvin discusses how corporations can foster creativity among employees, improve the quality of their products, and become more competitive nationally and internationally. He relates his management philosophy, as expressed in his book The Idea of Ideas (Motorola University Press, 1991), to design and the process of team design. In 1989 Motorola was the first large company-wide winner of the Malcolm Baldridge National Quality Award.*
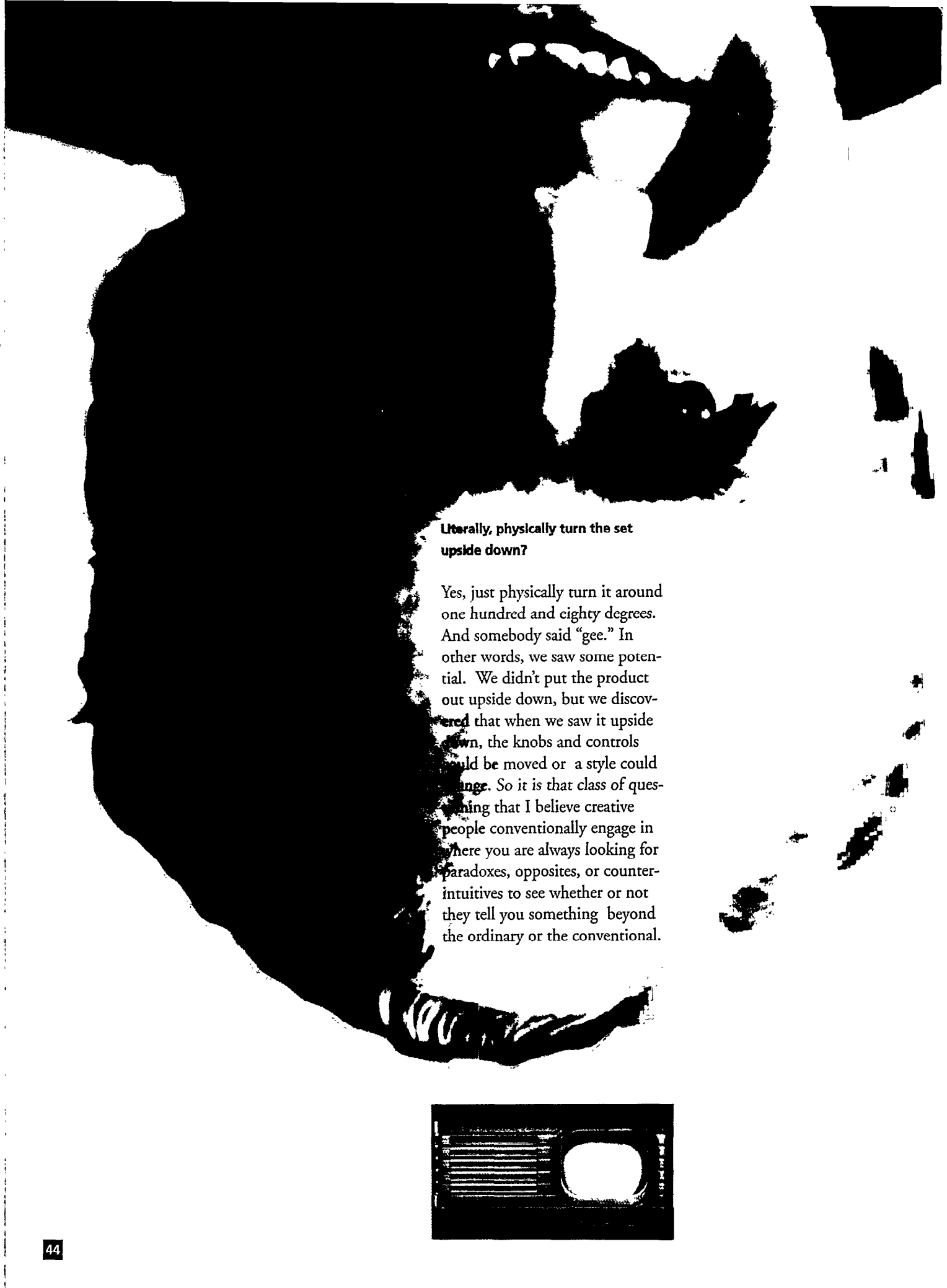
# A Conversation With Bob Galvin

**Karen Frenkel:** In your book, *The Idea of Ideas*, you talk about the idea of process. You said how important it is to ask endless questions and even crazy questions. Could you look back over the years and tell us what were the freshest questions or even, if you will, the craziest questions that you found yourself asking to guide Motorola to greater successes and product innovation.?

**Bob Galvin:** One principle is to seek a quantity of ideas before ever concerning oneself with quality. And in seeking a quantity of ideas, one has to raise all manner of conventional questions to come up with unconventional responses. The conventional questions are the who, what, when, where, why, how, and so on, as well as thinking in terms of combinations and opposites.

For example, early in the development of the design of the television receiver — when we were in that business — our designers presented us with a model of how the front panel of the set would look. There was a picture tube and there were knobs and controls and so on. And it was very nice. They showed it to us on a little stand and said, "How do you like it?"

I said, "Well, just turn it upside down." And they said, "But that's not how it works." I said, "I don't care how it works, just turn it upside down."

**Literally, physically turn the set upside down?**

Yes, just physically turn it around one hundred and eighty degrees. And somebody said "gee." In other words, we saw some potential. We didn't put the product out upside down, but we discovered that when we saw it upside down, the knobs and controls could be moved or a style could change. So it is that class of questioning that I believe creative people conventionally engage in where you are always looking for paradoxes, opposites, or counter-intuitives to see whether or not they tell you something beyond the ordinary or the conventional.
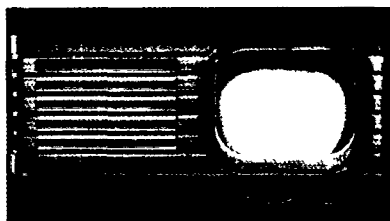
**I'm immediately relating this to writing. You know, sometimes the key sentence in a paragraph is at the end or a major thought is in the middle. And one has to move them around after the first-draft stage.**

Oh, that's an excellent example! And, obviously, writing is the most general way of trying to understand or converse with one's self or other people. All manner of contrasting or coordinated factors can help in design. And some people look at a design of something like a pager and say, "Well, let's make it a uniform color." And we did that for a long time. Finally somebody said, "Why don't we just put out a lot of funny looking colors." We did, and people liked it. That's an example of dealing with opposites and/or contrasts. It's a class of questioning that I think assists in designing the paragraph, the chapter, the product or the service that's being offered.

**In your book you say that creative power can be nurtured. Do you think there is one particular creative process?**

The process of creativity can be stated in a lot of different ways, but they all come around to about the same set of ten steps or factors. That's the process that is exemplified in the bookmark that comes with every copy of my book, *The Idea of Ideas.* The bookmark has the process of creative thinking delineated in idiomatic words. They involve such things as deciding what you want to create, teaming up, writing things down, adding, subtracting, multiplying, never making a judgement early on, all those kinds of things. Everyone knows some of those things, but not everyone knows everything. Those who don't can learn very simply.

**You write about running a business, managing a corporation, and leading an institution. Do you think that just as there are equal differences among those three activities, within them there are different ways of treating innovation and design that are particular to each task?**

Let me give you an example that is fundamental. I'm the chairman of the board of a university. We had an interim president, a wonderful man, who did us the favor of serving while we were finding a new president. The interim president came to my office with a series of problems. When we got to a certain problem, he said, "Bob, in this instance, I'm going to describe a problem where we have two alternatives, neither one of which is any good. As the interim president, I can't stand alone. You're going to have to stand shoulder to shoulder with me to get the faculty to accept this." I knew what my job was—to have a third idea. So while he began the process of explaining what the issue was, I started to go through the process outlined on the bookmark. And I started having ideas about the university. As it became clearer to me what the issue was, I realized, "Oh, my gosh, my ideas are in the wrong quadrant." He finally expressed the first option and then the second. And when he finished, I said, "Henry, those really are awful choices. Let's just set those off to one side and just for fun, let's you and I go through the creative process. I don't know where I'm going, I'm just going to get started. You and I will team up here." And I started to explain something that was related to this problem. And I knew that I was going to drive into an intellectual cul-de-sac. But I didn't care. I didn't worry about the judgement. I finished the inept statement and then I said, "You know, here's another one." Now, that became number four. Then I was in the middle of number five, and I could tell that Henry was getting anxious. He wanted to get in the act. So I stopped. He said, "Well, you mean like this." Now, he's in it and produces a sixth idea. See what's happening? At some point Henry said, "Thank you very much. I can handle the issue now. I know I will find the answer. I think we have pieces of the answer already, and I'll take care of it."

What happened was that someone said "use a process," demonstrated the process, was a role model for the process, and showed some productivity from the process. The man realized that when he searched for the maximum num-

*Set the idea target.*
*Set a time, place, quota.*
*Segment the subject.*
*Make a checklist.*
*Go for quantity.*

*Question. Question!*
*Combine, +, −, ÷, ×, adapt, etc.*

*Ignore quality. Don't judge 'til last.*

*Write it down.*
*Display, Illustrate, Associate.*
*Persevere.*
*Practice games, write.*
*Do it.*

*The bookmark in The Idea of Ideas delineates the process of creativity in idiomatic words.*

*If one is oriented towards purposeful, process-driven creativity, one instinctively is always doing it. The person who is instinctively drawn to dynamic processing creativity asks where else does this apply, what could it be combined with, why is it a good idea, why don't they stop it.*

ber of options, then it was easy to make the decision. Most people don't realize that and they say, "Well, my job was to make a decision." Making decisions is a snap if you have all the right options. But if somebody gives you two options you may not have the right combinations from which to make the decision. So the value of creativity in design or in writing or in anything else is the value of finally having all the valid options that can make sense and then almost any ordinary person can choose the right one from that point forward. I don't mean to say that there aren't some really complex problems in this world. But when we turned that television set upside down, we had another set of options from which to make a decision. And the upside down one had some values that were better, obvious to the eye of almost anybody. That's a nice little lesson. I'm always looking for all the options so that the decision making is a snap.

**Your process seems very dynamic with a lot of give and take.**

Oh, yes. And people who don't even know what they're engaged in can be very productive. They may not be able to lead it until they learn the ten steps, so to speak, until they practice it like you and I would learn to practice our skiing or tennis or golf or whatever we're facile at. The inexperienced, if drawn into the right atmosphere where the dynamic is taking place, will naturally flow to some degree with it.

**It also sounds like you're an advocate of interdisciplinary thinking. Do you feel that there should be a lot of overlap between disciplines?**

If one is oriented towards purposeful, process-driven creativity, one instinctively is always doing it. The person who is instinctively drawn to dynamic processing creativity asks where else does this apply, what could it be combined with, why is it a good idea, why don't they stop it? In other words, if you ask about four or five silly questions like that, they may not end up being so silly. They may be relevant in terms of their value. So it's constantly asking the question: What is relevant?

**What is Motorola's overall view of the design of a product and the strategy for bringing it to market? Do you see strategic thinking as a integral part of design?**

Well, one of the things that I'm a bit of a stickler on and about which we did do something about 20 or 25 years ago was to be disciplined with the use of the term "strategy." It's a beautiful word. It sounds intelligent every time anyone puts it into a sentence. It intensely suggests something important. We finally said, "Hey, let's understand what a strategy is." The bottom line of a strategy is the application of resources. We defined strategy:

"A strategy is the timely and effective application of available resources to provide a wanted benefit which, by the application of our resources, will generate a benefit that a competitor can't readily provide to that customer." There's got to be a customer. There's got to be a resource. There's got to be a benefit. And it's got to be available. It has to be something you can't just wish for. You must know you can finally put your hands on it and afford it, so to speak. And you must be able to do it in a timely fash-

ion. So all of those things have to be satisfied for there to be a strategy at Motorola. Whatever Intel does with their Pentium, whatever Motorola does with its PowerPC has to do with how we apply resources to generate a benefit to our customers that the other fellow can't do quite as well.

In the computer business, real strategic thinking is essential. But one of the things that probably is wrong in some computer companies is that they use the word "strategy" and say, "Well, my strategy is to be number one." That's not a strategy. That's just a statement of a goal or an intention or an objective. There's no process, no assignment, no tangibility in the whole situation. So my counsel is to really understand what a strategy is, and then go out and do what a strategy is. But don't pretend you're strategizing if you are not,

**What is the role of design in the application of resources?**

Let's start with whether or not the institution has the best tools for design. Have they got the right people? Have they gone out and talked to the customers and got the optimum information as to what the customers want? Have they got a quality control system that monitors their software designs? Are they rated as number one, two, three, four or five in their software capabilities? These are all little pieces of the resourcing that go into the design. But an intelligent analysis of the whole process is itself a resource. Organizational structure is a resource. All of us now talk about the fact that we design in teams. We don't throw things over the transom, so to speak. All of those pieces are part of the process

of design. But every one of them employs some resource.

**How do you get customers to participate in design and in helping hone a design?**

The best way is to go to the customer and ask the customer his or her opinion. And the best method in my estimation is to send the people who are the talents of the institution. I would guess if you were to ask the body politic of the engineers, or software and hardware designers how many of you have been out talking to customers, you'd be surprised at how few—those who go out and actually talk to the customers, not just over the telephone but those who immerse themselves in the details, and spend a whole day with that customer. That's an immensely educating and salutary experience. Or, bring the customer in. We have customers come in and sit with us in design sessions. We share a lot of advanced information, a few secrets with them.

**What do you say to managers who might be thinking quarter-to-quarter who say, "Well, that's a terribly expensive thing to do and we don't know if it will pay off in the long run."**

Our experience tells us that every time we do anything right, it saves money. Every time we do anything wrong, it costs money. But the question is relevant because somebody can say, "Yes, but I am accountable for those things and today I can't worry about anything other than what I look like by the end of June, by the second quarter of the year." I guess institutions just have to grow up. That's infantile. That's the

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Bob Galvin worked closely with his father and the latter's associates throughout the 1940s and 1950s. Robert W. Galvin (left) was named President of Motorola, Inc., in 1956. His father and Motorola's founder, Paul V. Galvin (1895-1959), became Chairman of the Board of Directors, and served as chief executive officer.

# Motorola

old way. You have to understand that if you want to be very, very good, you have to start on the first tee and be very, very good. And all of a sudden, you discover about the fifth hole, you're probably playing pretty good golf or whatever the game is that you're in. Do things right and you'll be in business a lot longer.

**Is there a set of products that you're particularly proud of having brought to market because of this way of thinking?**

There are quite a few. If you look at the history of our company, you can see that what we have basically been doing is creating industries. We're not just creating a few featured products to be slotted into a given price point. Let's take cellular telephones, for example. The concept of cellular telephones was conceived first by AT&T back in the 1950s. We weren't very far behind because the concept is elementary. Somebody creatively said, "We could geo-graphically share dispatch radios by having a police department use 150 MHz in Detroit. They could also use 150 MHz in Buffalo." Finally somebody said, "You know, we can do that with a telephone system also. And we could probably do it with much less spacing than we do in Buffalo and Detroit. How about half of Detroit or a quarter of Detroit or a hundredth—we could have these little cells." We conceived of that at about the same time as the telephone company did. And they went ahead and started to develop. We put resources into it and they put resources into it, and then we competed for about 15 years to come up with the system, not just the micro-t-a-c portable, which you see today. That's a derivation from the principle. And we've done that with paging. We did it with two way radios. We've done it with special mobile radio services My father did it by creating the automobile radio industry with a mass-produced car radio.

In 1930, all car radios were custom made. People took a Philco radio out of an old cabinet and adapted it and stuffed it somewhere under the dashboard, put a battery in there and worked out some kind of an antenna. Any individual could do that. But my father looked at that and said, "That's interesting, but isn't there a better way? Why doesn't somebody make a



(above) A Galvin Manufacturing Motorola brand auto radio installed in De Soto custom Dashboard, 1942. (inset) Advertisement for Motorola auto radio.
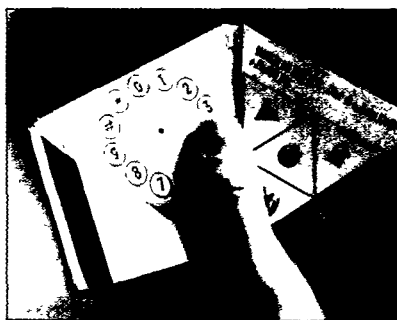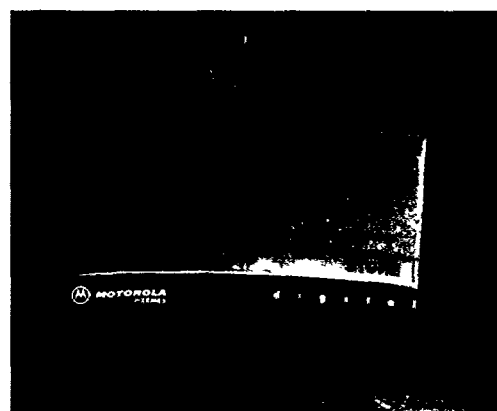
## MOTOROLA INC.

*Pagers of the future:* (right) *Pager as messenger to telecommunications and computer equipment.* (below left) *Triangular shaped miniature pager has a built-in telephone calling card, soft-touch LCD screen and pager interface.* (below right) *Child's pager utilizing a "house button" and automated dialer.*

radio that doesn't need to be taken out of an old Philco cabinet." So he came up with the mass produced model. Incidentally, at that time, my father couldn't afford it. His company was doing about a hundred thousand dollars in business. But there's a way whenever you have a will when you have the right kind of ideas. We've done it in virtually all the products we've gone into. Our 6800 and 68000 micro processors were done by semi-skunk works class of activities. People doing regular things had this additional idea and they'd go off and work on those kinds of things.

**Would Motorola consider returning to markets or product categories that have been abandoned, like TVs, for example? If so, how would you do it again in a new way?**

That is a subject for which I do not have an easy answer. Communications and information processing, which is the heart of the business, employ every media of sensing except smell. The written word, the mathematical expression, the still picture, the moving picture, and so on are all part of communicating whether you communicate over a wire or wireless. Our company is a communicator. As we expanded our wireless communications offerings, we discovered that it pulled us right back into the consumer market. A lot of children and mothers, and other citizens are carrying pagers. They have become consumer products. The pager has a display. How big should the display be? Other information devices tie into cellular. They have displays. Computer businesses are moving to wireless. More computing is being done on some of the equipment we set up. So there's a coming together. To what degree will

people be entertained as well as informed on some display device that they carry with them in a car, in a hotel, or have at home? I suppose we'll be in that business. At which point, somebody could say, "You've gone back into consumer electronics." But on the other hand the answer to your question is no, we're not planning to go back into the television receiver business. We'll eventually have products that can entertain as well as inform as a function of there having been first a professional information device.

**There's a lot of talk about which video systems will win out as the best way for us to watch full motion video and so forth. How might Motorola approach this in a new way in terms of design and innovation?**

As indicated, we have no intention of reentering television business. However, if you look inside these products, you'll discover that they use a substantial number of Motorola semiconductors. We are making the active elements for television receivers and/or information displays and products to a substantial degree. It is public knowledge that we are searching, as many people are searching, for improved methods of display, for example, the various kinds of flat panel classes of displays. Whether or not we will be successful, we don't know at this time. We are encouraged, but we don't know who's going to get the right answers. Now you start adding things up and you say, "Companies like Motorola may make displays, they may make wireless carriers, subscriber equipment systems, and they make all the interactive parts, and all the semiconductors. We make computers at this time. We can obviously buy some subsystems from somebody else and add to the total product." One could say, "It won't be long before you will have at least the operational capability of producing a product that will provide entertainment as well as the information. " The answer is yes, we're drifting in that direction, but if it ever happens it will be a derivative. Incidentally, in many of our businesses, and not just at Motorola, but in lots of com-
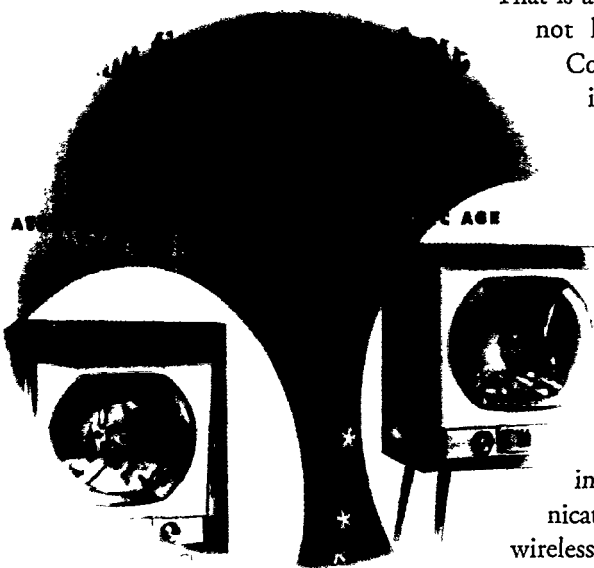
# atives of things that happened 20 years before . . .

panies, things that take place 20 years later are derivatives of things that happened 20 years before. And that's what seems to be happening at this time.

**How did Motorola recognized the quality assurance process and start the movement in that direction?**

We were achieving results that were generally considered successful through the 1970s yet had plenty of problems and put out plenty of fires. Finally one man who had remarkable credentials and was running the best business we had said in a meeting that our quality stunk. There were 88 officers sitting and listening to the various exchanges of ideas at this meeting in 1979. When that fellow said that quality was a problem, most people turned to each other and said, "If Art says that, it might be true." So we went back to work the next Monday and started to look in an untrained way at what we could do to start making our offerings less defect oriented, more practical, and more successful.

**Was this across all product lines?**

Across the board. Everybody went home thinking, "Maybe Art has an idea." Probably half the people began to get busy on something else and some of them attenuated their energy. But enough of us were sufficiently impressed with this challenge that we sustained as we looked into things and discovered that he was right. We went out and talked to customers, who said, "We'll buy your product, because you're the only company that's got something that will do almost what we want, but we aren't getting what we really want and we're having to fix two out of every 100 that you send to us before we can use them." We took that to heart and gradually started to learn the quality process. We called in a couple of experts and consultants. We read all the books. But most of our people came out of the woodwork and said, "If you're really interested in quality, I've always thought we should do such and such better." And final-

ly we conceived of this thing called 6 Sigma, which is an honest to goodness solid substantive program. We tied that in with the fact that we had simultaneously (but for different reasons) realized that we really needed to have much better education. So we were ready with a training institution to train our people to do quality processes and then our quality started to catch on. We kept deriving and improving and learning. Every time we tried something, we discovered we could do it better, so we put the new process to work. So it started in 1979 and is now 15 years old. It took on great maturity by the mid 1980s, and everybody's bought in. Now it's everybody's program. It isn't just in one or two divisions of the company.

**What do you think is the next comparable challenge that you might face?**
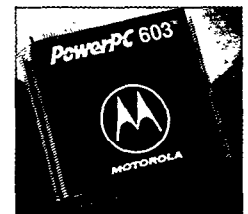
I think the next challenge is the challenge of thinking and it goes back to your creativity question. I've said that what really ought to happen is that we measure a leader's ability to anticipate and commit, not just measure whether or not the organization is producing a good product and sending out a good accounting report, or if the human relations department is handling the medical claims exactly right. Those are all processes. Eventually we'll get those perfect. The real place to improve quality is to improve the quality of thought.

**Do you think there are particular lessons that we can learn from the Japanese, such as the way that they go about design and getting new markets?**

Absolutely. They did a marvelous job on the quality issue. I think they do remarkable things regarding marketing as well. For example, Sony is outstanding in terms of thinking of derivative products and new applications of a solid principle. Their process of collective thinking is excellent, their teaming activities are very good. I think these are things that many American companies are learning now. But we'll always be learning from the Japanese. They will be
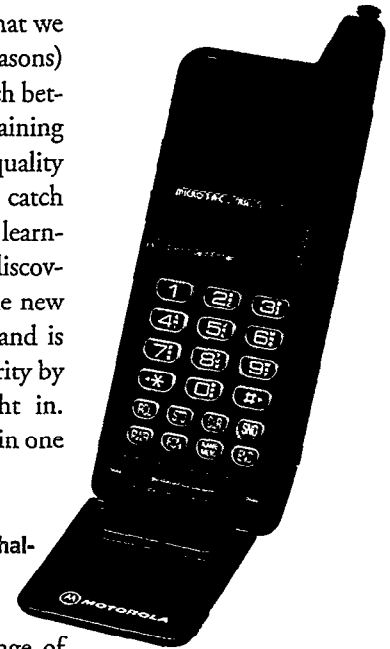


*Micro T-A-C cellular phone.*

# I think the next challenge is the challenge of thinking . . .

learning from us. We can cooperate with them on fundamental pre-competitive classes of principles and knowledge. So, yes, I think we should be studying the Japanese constantly.

**You know our readers are practitioners, and one question that is often asked is what do you do if you have a good innovative idea and you're worried that it won't be accepted maybe because it's ahead of its time? How do you go about convincing management that you're on the right track?**

I presume we've had that happen in our company. What we ought to do about it is to have enough people in these roles ready to roll the dice, to take a chance. Incidentally, most of the industries that we have formed have taken from five to ten years to gain acceptance. The paging business took almost a decade to popularize. Individual customers didn't know they needed it. A few hospitals knew they needed them to page doctors. But it took time for you and me to discover we could use one of those things too. If you're going to do what companies like ours do, you have to be willing to take a long time. We were at cellular technologies for almost twenty-five years. And as I said, we were at paging for ten. My father was making money after two or three years in the car radio business, but it wasn't really a very big secure business for ten years.

**To what extent did the design of a product help get it into the hands of the average customer?**

It was absolutely essential in every case, although the factors were always different. Our products have always been fundamentally a utility function for which there had to be an appealing package. Our car radios in 1930 had to work to the surprising satisfaction of the customer base that was really "gee whizzed" by the fact that they could listen to a ball game while driving in a car, but it had to work, and it had to work quite well.

**Do you think that the terminology and discussions that were used back then were substantively different from those we use today? For example, today we talk about a design team, usability, interfacing, and so forth. Are those just new buzzwords?**

The new language is a big improvement because it respects the fact that we are now dealing with much higher levels of satisfaction. If you went back and drew a process chart you'd find all of the elements were there in the 1930s and 1940s. We did use simplistic language at the time but the technology wasn't quite as complex. Today I think all the words that we're using are pretty good words. And they are respectful of the fact that technologies are more penetrating, more sophisticated. We could put a radio together with a soldering iron and a pair of pliers back 50 years ago and we were amazed at what that did. Today we have all kinds of instruments, machines, and simulators that are vital. Many of the principles are the same. The language is far more sophisticated because our tasks are more sophisticated.

**We talked about design in terms of getting a product into the hands of the average customer. How does design get a new technology into the hands of as many people as possible?**

By matching the interest of the customers with the potential of the technology. That's terribly elementary, isn't it? But I don't think it's more complex than that.

**What are the three or four most important innovations of Motorola's ways of working?**

I think we have been skilled in our people relationships. We have respect for our associates. Coincidentally, we have no unions. Secondly, Motorola has been alert to investing in and persevering in new things. Remember the companies that were our competitors back in 1940—I picked that date because the company was just ten plus years old and I was a kid. There were Philco, RCA, General Electric, Crosly, Atwater Kent, Majestic, the names go on and on. Well, none of them are in any of our businesses anymore. They didn't take best advantage of new ideas. For example, the transistor was invented. The vacuum tube makers who should have adapted to that product never succeeded. But we got into that business. So we saw these things, committed to them, and persevered in them. Finally, I think the fact that we embraced quality assurance is quite significant. One of the things that customers still say is, "You people are good at quality." ☺

Karen A. Frenkel, an author and science writer specializing in high technology, has written feature stories for a number of magazines including *Communications of the ACM.* Now, as Producer, ACM Special Projects, she is making a documentary on women and computing. email: frenkel@acm.org