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7th Annual NASA/Contractors Conference on Quality and Productivity

"Total Quality Leadership"

SUMMARY REPORT

NASA

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SUMMARY REPORT OF THE SEVENTH ANNUAL NASA/CONTRACTORS CONFERENCE ON QUALITY AND PRODUCTIVITY

"TOTAL QUALITY LEADERSHIP"

HOSTED BY:
NASA JOHN F. KENNEDY SPACE CENTER
GRENELEFE, FLORIDA
OCTOBER 24-25, 1990

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THE WHITE HOUSE

WASHINGTON

September 28, 1990

I am delighted to send warm greetings to Admiral Truly and to all those gathered in Grenelefe for the Seventh Annual NASA/Contractors Conference. My congratulations to the nine finalists for this year's NASA Excellence Award.

Being first in space is not just America's dream: it is our destiny. In order to ensure our leadership position, we need strategies that will produce timely, cost-effective, quality products and services for our space program. That's why cooperative efforts among NASA, universities, and private industry are so important.

Our goal, to explore Mars and beyond, can only become a reality through innovative teamwork. I have every confidence that your dedication and commitment to excellence will guide our Nation to a golden age of technological achievement.

Barbara joins me in sending you our best wishes for a productive and informative conference. God bless you.

FOREWORD

President Bush has defined our destiny: to be first in space, to explore Mars and beyond, and to guide America in becoming a leader in the global marketplace. We are entering a new age of space exploration where we will find countless doors of opportunity. Continuous improvement strategies and techniques, implemented through cooperative efforts of NASA, industry, and academia, will allow us to take advantage of these opportunities and ensure America's leadership in space exploration. Furthermore, these strategies, coupled with innovative teamwork, produce positive changes that benefit employees, organizations, customers, and the nation. Leadership, quality, and excellence will be the keys to this new age. The strategies, techniques, and accomplishments presented at the Seventh Annual NASA/Contractors Conference provide a basis for making the improvements necessary to excel in the 21st Century and beyond.

At this conference, I announced the renaming of the NASA Excellence Award for Quality and Productivity. The George M. Low Trophy: NASA's Quality and Excellence Award, honors a man who represented quality and excellence in all he did, and who implemented the principles of total quality management long before TQM became the benchmark for American management. George Low served as manager of the Apollo Spacecraft Program Office, Deputy Administrator, and Acting Administrator. He was directly involved in nearly every success America's space program saw during the 1960's and 1970's, and he inspired a generation to reach for the stars.

Total quality management demands the personal dedication of America's top leaders to continuous quality and performance improvement. You have my unyielding support in this quest for excellence.

Richard H. Truly
Administrator

INTRODUCTION

More than 750 NASA, government, contractor, and academic representatives attended the Seventh Annual NASA/Contractors Conference on Quality and Productivity on October 12-13, 1990, in Grenelefe, Florida. The panel presentations and keynote speeches revolving around the theme of "Total Quality Leadership" provided a solid base of understanding of the importance, benefits, and principles of total quality management. The implementation of these strategies is critical if we are to effectively pursue our mission of continuous quality improvement and reliability in our products, processess, and services. The annual NASA/contractors conferences serve as catalysts for achieving success in this mission.

The conference was highlighted by the announcement of the first recipients of the George M. Low Trophy: NASA's Quality and Excellence Award. My congratulations go out to all nine finalist organizations and to the two recipients of this prestigious honor: Rockwell Space Systems Division and Marotta Scientific Controls, Inc. (the first small business to achieve this honor). These organizations have demonstrated a commitment to quality that is unsurpassed in the aerospace industry.

This report summarizes the presentations and is not intended to be a verbatim proceedings document. You are encouraged to contact the speakers with any requests for further information.

George A. Rodney
Associate Administrator for
Safety and Mission Quality

Opening Address--
"Excellence, How to Strive For It and How to Gain It."

Admiral Richard H. Truly
Administrator
National Aeronautics and Space Administration

We're here to discuss excellence in America's space program. This conference will provide a forum for the exchange of ideas that work and do not work in the pursuit of quality and excellence. When I think of excellence, in NASA and in the American space program, one name repeatedly comes to my mind.

Admiral Richard H. Truly

I would like to reflect briefly about a man that I associate most with quality and excellence in the space program. His name is George Low. In 1938, George Michael Low immigrated to the United States and studied aeronautical engineering at Rensselar Polytechnic Institute. After earning his Bachelor and Master degrees at RPI, he joined the National Advisory Committee for Aeronautics. He was a research scientist in the flight propulsion laboratory at the Lewis Research Center in Cleveland. Thus began an NACA and NASA association with aeronautics research and space flight that would last for nearly three decades.

During those years of service, George Low was involved in every success the American space program had. He helped to organize NASA, and worked on the Mercury and the Gemini programs. George was then named manager of the Apollo Spacecraft Program Office, and saw eight of the successful Apollo flights to the moon. His personal commitment to quality and to excellence was the driving force behind the historic lunar landing just 27 months after the fire aboard Apollo 204. Later, as acting NASA administrator at headquarters, he laid the foundation for the Apollo-Soyeuz flight in 1975.

When George Low roamed the halls and the centers of NASA, his favorite saying was, "Without risks, there are no gains." He practiced TQM long before it became the management buzzword. If NASA is synonymous with excellence, George Low is synonymous with NASA.

Our charter for the next two days is to discuss ways to build upon the legacy that George Low left us. We are entering a new age of space exploration, where we will find countless doors of opportunity to learn more about this precious planet that we live on, about our neighboring planets, and about what lies beyond our solar system. The President's Space Exploration Initiative is a dramatic and ambitious undertaking. Whether or not America actually chooses to pursue this effort will depend, in part, on the people in this room.

We, as individuals, will have to be leaders in our own right, in order to assure that we retain our aerospace leadership in the world. As leaders in these efforts, and as leaders within your own organizations, you are in a position to ensure the success of America's future in space. Space is a harsh, unforgiving expanse that will not tolerate error. Our vehicles, our equipment, our processes must be as perfect as humanly possible. Anything less is simply unacceptable.

Since 1958, our contractors have been partners as an integral part of NASA and our stunning successes. No nation has ever before recorded such a level of success in such daring ventures. But with that pride must come a commitment to continued excellence in the great challenges that lay ahead. We must remember and build upon the commitment to excellence that George Low brought to this team. If we mutually commit to continue Total Quality excellence as a management philosophy, as a way of doing our daily business, there will be no limit to our achievements.

We must share our best ideas and our worst mistakes, and acknowledge our errors, not just today, but everyday. Space Station Freedom - Mission to Planet Earth - Lunar Outpost - Mars exploration. These are heady ideas. They excite us and they dare us, much as President Kennedy did when he challenged us to place a man on the moon and return him safely to earth, and as President Bush has again. If we are to realize these goals, we must demand the best from ourselves and those in our charge. Every member of our team must demand excellence, must be personally committed to it, and must get it.

Tonight, J.R. Thompson will announce the 1990 recipients. This year, in recognition of the tremendous contributions made by smaller businesses, I established a Small Business Category for the Award. My message is simple: large or small, customer satisfaction is met through quality products and services.

Also, in recognition of the commitment to quality and excellence demonstrated by George Low, I have directed that this prestigious award be renamed in his honor. This year's recipients will be awarded the George M. Low Trophy: NASA's Quality and Excellence Award. I hope that the memory of George Low will inspire all of you as it does me. Let me take this opportunity to thank you for your continued efforts in this daring and wonderful business that is ours together. I wish you the best success in your future endeavors, and commit to you my unwavering support for teamwork, for quality, for excellence. And remember, "Without risks, there are no gains."

Conference Overview--

Joyce R. Jarrett
Director, NASA Quality and Productivity Improvement Programs
Conference General Chairperson

Joyce R. Jarrett

Despite the current budget situation, we have over 800 attendees with us today and 220 organizations represented. This gathering is the culmination of the efforts of many people, many teams of individuals both from industry, academia and NASA, and I would like to thank all of you who have participated in making this conference possible.

The planning of this conference has taken place over many months, and the theme—Total Quality Leadership—is certainly appropriate, as we enter the decade of the 90's. It is a decade that promises to be one of the most challenging of our time—one where strong team work and leadership are crucial. As you heard from President Bush's letter this morning, it is efforts such as these—represented by all of you in this room—that foster the action we need to take in order to succeed, to strengthen our organizations and our nation's future performance. In putting this conference together, the conference director and the planning team worked to orchestrate presentations that would best communicate the urgency and vitality of effective leadership, and how to integrate total quality management principals which cultivate organizational excellence.

In looking at this year's agenda, you will see that the next two days offer us many opportunities to share ideas and new information from a wide range of top leaders in government, industry, and education regarding the critical role of leadership in shaping this nation's future. We are now in the new decade of the 90's; for many years, many of you/us have been preparing to meet the challenges of this decade. We are looking forward to broadening our foundation of resources to include our global neighbors. Our national priorities are becoming inclusive of these neighbors, in order to meet our mutual goals.

As we look to the international symposium in 1993, we realize how far we have come since 1982, when NASA first launched its quality and productivity efforts. Total quality was not

the vision then that it is today. Continuous improvement and world class excellence is now a vision that we all share and work together to achieve.

During our NASA awards sessions later this morning, you will hear from the nine companies that are finalists for the newly-named 1990 George M. Low Trophy: NASA's Quality and Excellence Award. These companies are the leading edge of what we all strive to be. The leadership and teamwork in these organizations have brought them to high and sustained levels of excellence to become leaders in their industries. We can learn much from their methodologies and cultures. As you attend these sessions, you will learn first hand how they have used the George M. Low Trophy criteria as a stimulant and a standard.

Our luncheon speaker today is Edwin Garrison, President and Chief Executive Officer of the Thiokol Corporation, who has made much progress using the principles of TQM. On hand this evening to narrate the latest film on space is astronaut William Sheppard. Tonight we will hear the announcement of the best of the best--the recipient or recipients of this year's award. For the next year, this company or companies will share their lessons learned, as have prior recipients. You will hear shortly from Robert Young, Jr., President and CEO of Lockheed Sciences and Engineering, last year's recipient and first Service Support Organization to win a major award of this type. Bob has personally given over 200 presentations, both nationally and internationally, since receiving the award.

Along with the George M. Low Trophy presentations, you will have the opportunity today and tomorrow to attend panels built on total quality management tenets, on strategic planning, on employee development and empowerment, teamwork, quality assurance, measurement and customer satisfaction. These are the topics your representatives wanted us to address at this Conference.

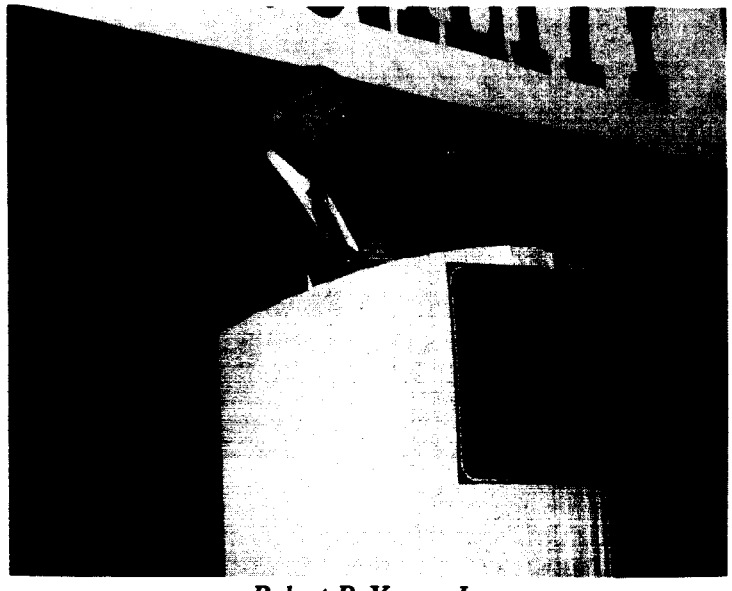
Regardless of which presentations you attend, we hope you will find them informative, and that you're able to take ideas back to your own organizations and apply them. You will find survey forms to assess what you've heard, and I encourage you to fill these out. You will also find a post-conference TQM assessment. All of these are important to us, in helping us plan for future conferences.

Finally, I would like to thank all of you for returning your TQM assessment prior to this conference. We received 519 responses, and an early analysis indicates that the highest mean was customer satisfaction, at about 3; the lowest was employee empowerment and teamwork at 2. As you will recall, we were scoring on a scale of 1 to 5, so that should tell us that we do have a lot of room for improvement. I think it's exciting that you have taken the time to complete the assessment. I hope that over the next two days, we share ideas that will help us improve.

Before we begin our first conference panel, I would like to acknowledge those in this room who attended the first conference in 1984. Welcome back. To those who have attended all the conferences--you deserve a hand. And finally, a special welcome to all the first time attendees.

Keynote Address--
Profile of a Quality Organization -- "Building the Foundation for a Total Quality Culture"

Robert B. Young
President and CEO
Lockheed Engineering and Sciences Company



Robert B. Young, Jr.

This is a very special time for us at the Lockheed Engineering and Sciences Company. It completes the year when we've had the opportunity to tell the firsthand story of what our people have accomplished.

We were a finalist three times before we were selected to win the NASA Excellence Award. It's been important to us to be a finalist, because it recognized our people. However, it's been even more important to be a participant, because participating in the Excellence Award process has increased our focus on quality and productivity, and led us to develop, to grow, and to find out what we can really accomplish. A major contribution to our success was the support and encouragement we received from NASA at all levels.

One of the things that has made us an Excellence Award winner, is that we've made a paradigm shift from control to empowerment of our people. We paid attention to control and empowerment before, and we pay attention to it now; but we used to work to empower people in a context of controlling them, and now we work to control people in a context of empowering them. We've made a basic change in our values. Making empowerment the senior concern has altered the decisions we make. It has altered the relationships between our management, our employees, and our customers.

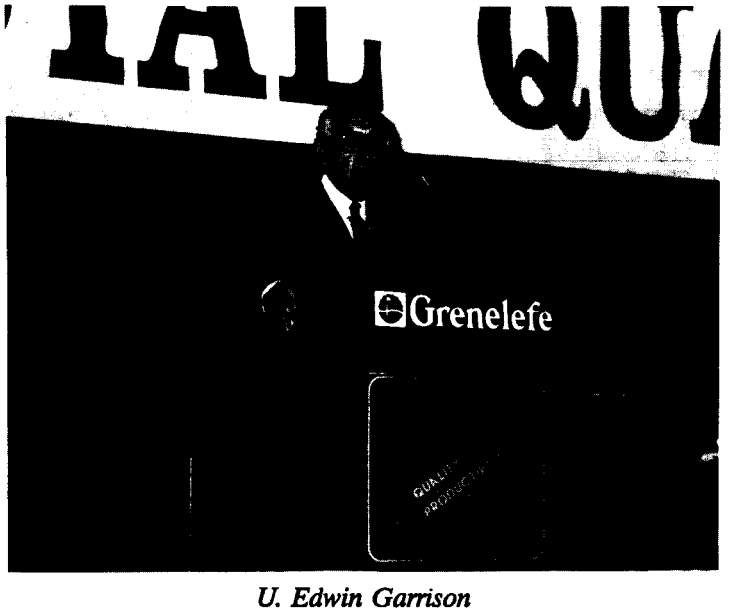
The commitment and performance that our people have shown has gone far beyond anything we expected. We've made the commitment to bet on people instead of on systems. Anyone in our organization can make improvements in our systems by simply being able to show that they add value to the process and value to our customers. We made a leap of

faith that this would actually lead to some kind of improvement in how we operate in our processes, and to an improvement in customer satisfaction.

It's been our privilege to carry the banner for the NASA Excellence Award for the past year, and I wish the finalists this year the best of luck. It was tremendously valuable for us to participate in the award process. Thank you very much. I've enjoyed the opportunity to be here.

Keynote Address-- "Total Quality Leadership--The Foundation for Our Future"

U. Edwin Garrison
President and CEO
Thiokol Corporation



U. Edwin Garrison

Last year Thiokol spun off the non-aerospace side of the business, while retaining our traditional space DOD activity. The split made Thiokol a pure aerospace company, which allowed us to better serve our customers, while challenging our ability to lead the company through this transition.

In our first year of business, we met or exceeded every objective we set for ourselves, with an emphasis on safety, quality, and productivity. We are confident about the future, because we take our business very seriously, and know that it all depends on our people. Understanding and practicing Total Quality leadership has become an essential part of our day-to-day business. We're also confident because our employees and suppliers have responded to our new commitment in a very positive manner.

Since our return to flight, the improvement in our rocket motor quality performance has been tremendous. We have seen a 70% reduction in workmanship non-conformance, and a 93% reduction in problem reports written on our motors. As our quality goes up, our cost goes down. Our scrap rework and repair cost per motor have been reduced by 49%. Our

overtime has been reduced to less than 8%. It's performance like this that is enabling us to receive awards and recognition from our customers.

My emphasis today is on three points: NASA's role, Thiokol's role, and our people's response to this renewed process. We've been a charter member of the NASA contractor team since its inception. Thiokol has participated in every manned space flight program. From day one, NASA has demonstrated its leadership and longstanding commitment to the pursuit of quality and productivity. Today's environment can be put in perspective by looking back about 30 years, when programs were developed on a "test it and fix it approach". Costs were comparatively low, and the vehicles were unmanned. The transition to manned flight vehicles, billion dollar payloads, and national pride has driven our requirements to the point of being "unforgiving".

We have benefited greatly throughout this evolution. The most recent element of NASA's leadership has been the creation of the George M. Low Trophy: NASA's Quality and Excellence Award. When we baseline our performance to the criteria of the Award, good things start to happen. Then, when we compare and measure our performance to standards we know are achievable, the rate of progress increases. Our awareness of supplier and customer problems and needs has been strengthened because of our participation in the Excellence Award process.

I would like to take a minute and talk about the leadership changes we've been making and how it's involved our employees. When we split off the non-aerospace side of the business, we became more focused and better able to respond to our customers. Instead of one large organization, we are now decentralized into four smaller autonomous business units. These operating level changes are allowing our employees to assume more active roles in solving problems and making decisions that affect our commitments to the customer. I personally hold each vice-president responsible for assuring that safety, quality, and productivity are an integral part of each organization's objectives.

Because of the Challenger experience, Thiokol understands better than most the importance and significance of safety in the quality of our products. We've initiated an effort to enhance our total operations in parallel with the redesign program. The plan gives our first-line employees the resources they need to achieve higher levels of quality and productivity. NASA teams from Marshall participated in the development and approval of this plan. With their help and input, we developed a quality improvement program that will generate greater solid rocket motor reliability, and a safer, more productive manufacturing environment.

As part of this plan, our employees are now working in five unique manufacturing work centers. All technical and support disciplines for a specific manufacturing process are co-located within each work center. A work center Director runs each one as a small business within our space operations. And we have a central production control that integrates the planning and schedule of the total operation. After 15 months of operations, our employees have responded to this new way of doing business in an extremely positive manner. They have taken on a much stronger ownership for planning and completing their work. They are

taking the initiative for making needed changes. They know what to do and when to ask questions.

One of the more challenging aspects of the plan is the computer integration of the manufacturing operation. This network will enable people to improve quality and reliability through statistical process control right at the shop floor level. These changes are improving the ability and willingness of our employees to get involved and achieve successes where they work. Thiokol employees company-wide are responsible for maintaining a safety management system which is based on three premises: 1) operating safety is the highest priority of our business; 2) working safely is the responsibility of each employee; 3) implementing and maintaining safe operating practices is an integral part of our management responsibilities.

Our 460 suppliers have recently received a new "suppliers guide", which helps them understand our quality requirements. Regular symposiums, workshops, and other awareness events provide leadership and motivation to our suppliers. These and other initiatives have resulted in an 80% reduction in supplier non-conformances per motor in the last three years.

I'm convinced that the whole spirit of continuous improvement is teaching us that ownership and accountability grow as employees are allowed to genuinely think and contribute to the company goals. We're seeing tremendous participation, with improvements in all areas of the operation. We are realizing capabilities that we had never seen before.

Let me emphasize again: there's no doubt in my mind that all these successes have come about because of our uncompromising commitment to quality and productivity. Total Quality must begin with each of us; it is truly the foundation for our future.

Keynote Address--
"Total Quality in Maryland Education"

Dr. Joseph L. Shilling
State Superintendent of Schools
Maryland State Department of Education

Dr. Joseph L. Shilling

In Maryland, we have only 24 school systems in the whole state. So, in one sense, if we want to change something, we have a tremendous advantage, because we only have 24 school systems to change. The difficulty is that 5 of the 15 largest school systems in the United States are located in Maryland.

If you look at our standardized achievement test scores at the third grade, we rank about three to five months ahead of the national norm; at the fifth grade, we are about six to nine months ahead of the national norm; at the eighth grade level, we are about one and a half years ahead of the national norm group. In SAT scores, we ranked third in the country two years ago; this year, we rank second in the country. So, if you use the things people traditionally use to judge the worth of a school system, ours is pretty good.

Our question is not "Do we stay good, and make 'good' a little better?" The question for us, as for all of American education is: "How do we strive for a level of excellence in public education that we had previously not even thought about in this country?"

We've adopted a very simple mission for public education in Maryland—to have Maryland in a national and international leadership position in public education. We adopted very straight-forward goals. They are very atypical for educators, because we made them quantifiable, so we would know if we were achieving them.

Goal #1: That 95% of our students be ready to learn when they enter first grade. Twenty percent of our first graders aren't ready to learn, because of nutritional problems, health problems, learning disabilities, or poverty.

Goal #2: That Maryland rank in the top five states in the nation on measures of student achievement and other student outcomes. We don't know where we stand in this respect. SAT scores tell us very little about our student population; they reflect only 59% of our students, because they are the only ones who take the SAT's. We don't have a good base in how we compare nationally and internationally. We are looking at the National Assessment of Educational Progress and its international counterpart to give us that baseline data and enable us to track ourselves as we move toward that goal.

Goal #3: That 100% of our students be functionally literate. When I say functionally literate, I'm not talking about a very high level of achievement. We have four tests in Maryland, one in reading, one in mathematics, one in writing, and one in language arts. 67% of our ninth graders can pass the functional mathematics test, 82% can pass our functional writing test, and 73% can pass our functional citizen test. So, just at the functional level for our ninth graders, we are not nearly as successful as we need to be.

Goal #4: That 95% of our students achieve at a satisfactory level on our state measures for student achievement in mathematics, science, reading, social studies, and writing and language arts. That "satisfactory" level is considerably above a functional level; it means that students are able to enter our college and university system, and perform well. We have a crisis in Maryland and, I suspect, across this country. Of all the kids we graduate from our schools (about 48,000 from our public school system) who go on to Maryland's college and university system, 1% are majoring in mathematics, and 4% are majoring in all the sciences combined.

Goal #5: That 95% of our students graduate from high school and be prepared for post-secondary education, meaningful employment, or both. Currently, only 75% of our kids graduate from high school, which is about average for the nation. About 22% of our kids are not preparing to go on to post-secondary education, and are not in a vocational educational program preparing for meaningful employment. They cannot get into our colleges and universities; they are not prepared for any job that demands any kind of technical skill. Industry looks back at us and says, "What in the world are you producing? These people are not prepared to go to work."

Goal #6: That Maryland schools be free of drugs and alcohol, and provide a safe environment conducive to learning. Some people say we can't do that. My response to that is very simple: "Yes, we can, because if we cannot achieve that goal, we can't achieve *any* of the goals that we have established for ourselves." About 27% of our high school seniors report a serious involvement with drugs or alcohol some time during their school experience. Our suspensions, expulsions, and referrals for medical treatment for drugs and alcohol would astound you. They astound me, and I'm talking about 12 and 13 year old middle school kids.

How are we going to achieve these goals?

We've laid out 15 strategies. They are not designed to tell people how they are going to teach in the classroom; rather, they are designed to make us look at ourselves differently, from a structural perspective. We established a set of state-level standards. As a state, and in each school system and school, we hold ourselves accountable for reaching these

standards. We are developing a School Improvement Challenge Grant Program for schools that are not meeting the standards. An individual school will have three years to make significant progress toward meeting the standards, or funding will be terminated and the school system will be called in.

Coupled with this, is a strong emphasis on quality teaching and school-based leadership. Although we currently allow people to enter the teaching profession based on paper credentials, we are moving toward a performance assessment process in conjunction with the paper credentials. A second perspective is the need for a strong educational training program at the local level. This will be accomplished through both Total Quality Management and site-based management.

Next, we are proposing a comprehensive early childhood intervention program for children up to age 3, to prepare them to enter school. We are proposing that every disadvantaged kid will attend a pre-kindergarten program for 4-year-olds. We are suggesting that kindergarten be mandatory for all our students.

We are in the process of revising our high school graduation requirements. To graduate, a student has either met the core credits required by our college and university system, or has come through an approved vocational educational program. There will be no more general curriculum programs for graduation.

We are proposing raising the compulsory attendance age from 16 to 18. Here, I'm getting a lot of flack, because people are saying, "You need to develop alternative programs that will make those kids want to stay in school." I am convinced the only way develop the programs we need is to say to teachers, principals and superintendents that the kids are going to be there. Period. Once we do that, I feel we will develop alternative evening programs for those kids who can't be in school during the day, and will devise work-study programs with business and industry to get those kids into a meaningful learning environment.

We are also proposing extending the school year from 180 days to 200 days. In Japan, Germany, Korea, and all the industrialized nations of the world who are taking over our share of the marketplace, they go about the business of schooling much differently than we do. They value education much more highly than we do, and their kids spend a lot more time in school than ours do. A Japanese student, from kindergarten to grade 12, spends 4 1/4 more years in school than his counterpart in the United States.

Although we are learning a lot about how we can enhance the education, we haven't even begun to approach how to use technology in our schools. We are proposing that we have one computer available for every 10 students in the state.

Our teachers are not prepared, particularly in our elementary and middle schools. We are asking teachers in the elementary school to begin to teach algebraic and geometric concepts, and they are scared to death. They don't even know what we are talking about. So, we have set up what we call the Governor 's Academy in Mathematics, Science, and Technology,

and are going about a very intensive retraining program for our elementary, middle, and high school teachers.

Finally, we have a tremendous disparity in terms of how we fund education in Maryland. We have to come to grips with this disparity, because the places where we spend the least are the places where we have the greatest number of disadvantaged kids in trouble.

That's what we want to do, and where we want to go. But, we need a management process which gives those goals and strategies a soul, a reason for being. We have begun to focus on Total Quality as the driving force for the State Department of Education. We have entered a partnership with Westinghouse Corporation through which they have dedicated tremendous resources and time to come in and work with us to help us develop a Total Quality culture within our organization. We want to have one central theme as we look at this management process, and the theme is very simple: Meeting customer requirements by doing the right things right the first time. But, truthfully, we don't even know who the customer is. People in education think that the customer is the student. The customer is *not* the student. The student is the product that we are attempting to produce. We've got to figure out who our customers are and how to meet their expectations.

We are looking at the degree to which our employees participate in establishing and achieving our Total Quality improvement goals. We are looking at our products and services to see if they are appropriately innovative, and if there is a process of verification and a control mechanism that allow us to know whether or not we are meeting our customer requirements. We're in the process of removing the rules and regulations, so that we're not left in a position of either having services to sell or going out of business. That's a very new concept for our people, because they are used to rules and regulations selling their services for them.

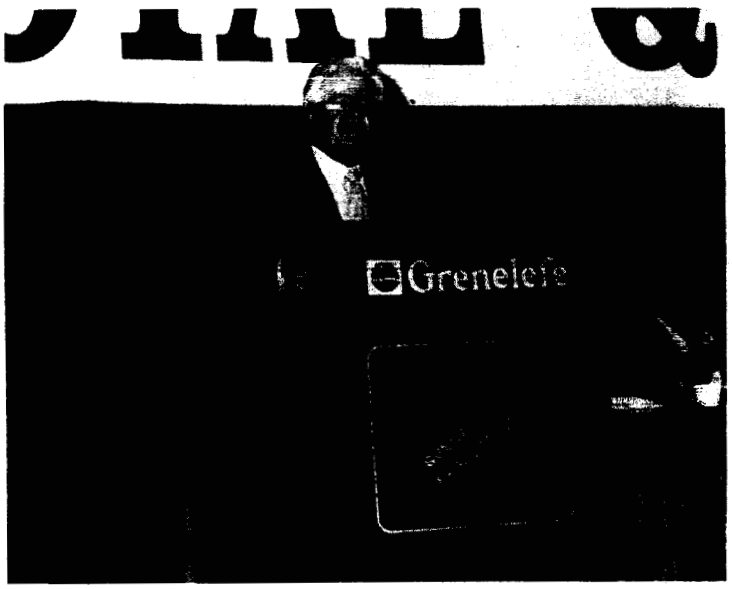
We are looking at our suppliers as partners in the process. Conversely, we are determining if the same suppliers, textbook companies, equipment companies, are producing what we need. We are putting accountability measures in place for ourselves, because we can't hold school systems accountable unless we're willing to hold ourselves accountable.

But, we are fortunate. We have an extremely well-educated, well-informed group of employees. We have a real opportunity to build a Total Quality culture in the Maryland State Department of Education.

I want you to remember just one thing. We're your farm system. You're the major leagues. We want to prepare a product that can make it in your work force. We've got our mission. We've got our goal which is success for all of our students. We've got our process: Total Quality. I would remind you that I have 49 counterparts across this country. They need your help. So I encourage you not to be reticent about walking in and volunteering to be a part of that effort. We need your experience, we need your expertise. We used to talk about needing your money. That's the last thing we need. We need more resources, but we need your experience and expertise much more.

Keynote Address--
"Answering Industry's Question: How Can I Help?"

Elmer B. Kaelin
Retired President
Potomac Edison Company



Elmer B. Kaelin

Assume that you have just joined a new organization with overall responsibility for manufacturing and quality control. This organization has plants throughout the United States and you produce millions of complex parts per year. This is a finishing operation. The parts are produced elsewhere by many small suppliers. Many plants do not have incoming material specifications for the parts entering the plant. But it doesn't matter, because all incoming parts are accepted anyway. All plants process in small batches of 20 to 30, and there are 13 major steps in the process. The process itself is 150 years old and is obsolete. In fact, your process is so inflexible that at every one of the 13 steps you give each part the same finishing treatment, ignoring both the incoming characteristics of the part, and the external specifications that the part is capable of achieving. Overall process yields are between 65 and 75 percent. All parts coming out of step 13 are shipped. You can do this because you are a monopoly and you don't have in-house government inspectors. Your customers are screaming about the quality of your parts. They have told you that only about 5% of your parts are equal in quality to those produced in every other industrialized nation in the world.

After several weeks on the job, you have reached two conclusions. First, you have stumbled into the worst mess you've ever seen. Second, you can make no significant improvement in the end product until you have a modern, flexible process that can apply a finishing treatment to each individual part that best matches the characteristics of the incoming material. Unfortunately, as you look around, you find there is no such process. Every plant in every country in the world processes these parts in batches. Then a staggering thought hits you, just as it hit the inventors of continuous casting steel many years ago. You realize

that if you could develop a process and make it work, your organization could leapfrog every nation on earth in the quality of its output.

I am talking about K through 12 education in the United States, a catastrophic failure that has put our nation at risk. How do we change this? We have a national blueprint for making the transition from the obsolete blackboard classroom to the sophisticated computer classroom, where every child is individually tutored using the feedback from continuous monitoring. The name of this blueprint is *Transforming American Education: Reducing the Risk to the Nation*. My message is a call to action—a call to carry out the mission and vision set forth in this report, to implement the recommendations, to reach our national goal of making a total transition by the year 2001. Unfortunately, the task force report which I refer to has been largely ignored by both educators and the press—despite the fact that it was the follow up to the *Nation at Risk* study, which awakened all of us to the plight of K through 12 education in this country.

As an example, several months ago I sat at the same table for dinner with the Undersecretary of Education, and I asked his opinion of *Transforming American Education*. He could not recall ever having read it. Yet this document has provided the insight into what we must do as a nation to meet the challenges of today's global society. The path to excellence requires that we replace our obsolete tools with new ones based upon technology. New tools that will recreate, rekindle, and renew the kind of thinking necessary to produce the quantity and quality of students this nation will need to succeed in today's competitive world. Reforms predicated on more time in the classroom, revised course content, and stricter discipline will not by themselves produce the desired results, unless we give the teachers the tools to assist each student to reach his or her full potential.

The success of an individually tutored classroom depends on good hardware and software, a well-trained teacher and strong support from principals and superintendents. The classroom is configured with the teacher behind the students, with a one-to-one teacher to student ratio. The computer is the instructor. In these classrooms, students move at their own pace. In a given 4th grade math class, for example, students are scattered from grade 3 to grade 7 or 8. Students do not have to skip grades or be held back if they are weak or strong in just one subject. They can stay with their peers in these classrooms.

Who is tutoring these students? The finest teachers in America, who have developed curriculum in software form. Why do we want teachers to write our software? Because the concepts of teaching and learning don't change significantly from the blackboard to the computer classroom. The only thing that changes is the delivery system. Teachers have noted significant changes in their students in the computer classroom. They say that students concentrate harder, complete more work, have a greater attention span, are better behaved, have a better attitude toward school, and improve their attendance, compared to the blackboard classroom.

Cooperative learning is another dynamic of the computer classroom. Teachers report that when students get stuck, they first try to solve the problem by themselves. If that fails, they turn to the student on their right, then to the student on the left. If all else fails, they ask the teacher for help. Cooperative learning has several benefits. It fosters problem solving

skills. It creates the environment of group problem solving that the student will eventually meet in industry. The teacher now has more free time, because he or she is not delivering the lesson. S/he can give more time to the students who need it most.

In this Network Classroom, the teacher is able to generate a management report monitoring each student's progress status. Every response that a student makes on a computer is recorded by the management system that resides on the network. This enables the teacher to create and adjust individual learning plans for each student on a daily or weekly basis. But, we are already going beyond this. We are developing software that will respond automatically and make the adjustments so that the teacher doesn't have to intervene. It will use criteria that the teacher can enter easily into the software.

How did Potomac Edison get started in this? A resolution was adopted by the Virginia General Assembly in April 1986, giving the State Department of Education 200 days to develop a plan for financing and installing technology in the public schools. The Virginia Resolution and a copy of *Transforming American Education* crossed my desk within a week of each other. They both had noble goals. We saw an extraordinary opportunity to speed up the process. We immediately begin donating computers by the thousands to the schools in our service territory. We were able to quickly form a partnership with the Virginia Department of Education, and we established similar partnerships in our Maryland and West Virginia territories.

Over the past four years, Potomac Edison has spent $7 million to place technology-based classrooms in the 23 school districts that we serve. Our partners provided an additional $6 million. Today, we have approximately 6,400 computers installed in 250 locations. Every school in our service territory has at least one classroom.

In the first year, a sixth grade mathematics class in Rapahannock County was taught by computers. There was a dramatic improvement over the average of the previous five years.

	5 Year Average Score -- Traditional	1st Year Computer	Percent
Mathematics Concepts	56.4	73	29.4%
Mathematics Computation	57	65	14 %
Mathematics Problem Solving	53.4	74	38.5%
Mathematics Total	56.4	72	27.6%

Results like these are representative of what we are now seeing in elementary school mathematics, where the teachers use the management system and permit the students to progress at their own pace. This result in no way represents the end of the story. We are only in the beginning stages of an evolutionary process that will continually improve our ability to use technology as a teaching tool, to raise our standards from functional or satisfactory in order to achieve academic excellence.

We at Potomac Edison are particularly concerned about the teaching of science. *Transforming American Education* recommends that research partnerships be formed with colleges and universities. We chose as our research partner Western Maryland College, a small rural college in Westminster, Maryland. We placed $300,000 worth of very sophisticated computer equipment in that school three years ago and asked them to find a better way to teach science. Today, embryology is taught in a computerized classroom at Western Maryland College. Potomac Edison has adopted this classroom for teaching high school science. This year, we have installed six of these classrooms on a test basis in six high schools in Washington County, Maryland. These classrooms are built around enormous data bases containing thousands of digitized pictures, birds, fossils, mammals, anatomy, etc., anything relating to science. Many of these techniques have unlimited potential for easy application to the industrial process.

The Network Classroom is a revolutionary new process. Educators are just beginning to see the enormous potential of this product. But, because education is a monopoly, with a culture highly resistant to change, getting where we need to be will take pressure from groups outside education. Pressure must come from legislators, from governors, from business leaders, and from parents. Business people should get involved in any innovative way they can think of. Don't throw your obsolete computers away. Give them to your local school district if they can function on the network. At Potomac Edison we funded our program for about 1/2% of retail revenues, which cost the average residential customer less than a penny a day.

There is one more element that is critical to this program, and that's teacher training. Training funds should be distributed through the State Department of Education, and designated for the sole purpose of training teachers. At Potomac Edison, we went a step further. We built a training center at our corporate headquarters in Hagerstown, Maryland. The center has tested every major piece of computer equipment in the computer network. It contains thousands of pieces of educational software. Formal training has been conducted for several thousand teachers in our three state area. But, we found that this is not enough, so we've equipped a mobile van with a 30 station computer classroom that can be set up in minutes, for PTA meetings, for training, for demonstration purposes, for introducing technology, even for country music festivals. Slowly, as more and more people see computers, the pressure develops that is necessary for change. In my opinion, very few of the superintendents wanted the first classrooms we donated, thinking it was just another industry gimmick. But, public pressure grew to a point where they had to accept them, and people started to use them. To support this effort, we also hired a full time educator in each state, to travel to the schools and provide instant support when a teacher needed it.

America now has before it an historic opportunity to leapfrog the world in educational quality. Because of the widespread penetration of computers in our society, we are the only nation with the capability to quickly make the transition from group teaching to individualized tutoring. If we don't seize this opportunity, it will be gone forever.

1.0 Top Leadership Panel

Government and industry top leadership discuss the importance of commitment and leadership in implementing Total Quality.

1.1 Introduction

Admiral Richard H. Truly, Administrator, National Aeronautics and Space Administration, Chairman

We've been up here at the front table talking about the U.S. space program, and the international program. It has been a very interesting education for me, during the last few months, as I've traveled to Japan and also to the Soviet Union to take another look at the Soviet program.

It's a privilege to have two distinguished gentlemen like Tom Murrin and Dan Tellep join me this morning. So—since you've already heard from me—without any further adieu, I'm going to let them make a few comments, and then we'll join you in a round table discussion.

1.2 Panel Presentation

The Honorable Thomas J. Murrin, Deputy Secretary, U.S. Department of Commerce

As a team, the coalition of government and industry has created a truly elite organization. Together, government and industry have accomplished several of the most extraordinary feats in the history of the world.

Recently, however, you, in industry, have suffered some conspicuous setbacks. Your costly programs are constrained by federal budget limitations and you are often confronted with attitudes ranging from indifferent to critical.

Happily, we no longer consider quality and productivity to be competing concepts. Rather, quality improvement—properly defined and implemented—can be the single most effective means for productivity improvement. An excellent definition, in my view, is "doing the right things right the first time." Although it sounds simple, this definition—at least in the organization I was involved with for many years—took quite a few years to develop. We started with the commitment to doing things right, which we saw as a pretty major undertaking, in itself.

After awhile, largely inspired by the Japanese and certain studies we'd been making there, we added the first *time* requirement, which—if you really think it through in a quantitative way—adds a major challenge.

Next, we asked a small group of our brightest and best to spend some time seeing if our initial concept should be refined; that's when they added that "the right things be done right *the first time.*" What strikes me as significant about this is that though it can be applied to everyone in an organization, it is particularly challenging to those in senior positions. The implications of doing the right thing right the first time, present a challenge that we have not always fully undertaken before and have not always been fully committed to.

After 36 years in American industry, I've concluded that quality improvement is the *only* business activity that simultaneously satisfies customers, motivates employees, comforts investors, teams suppliers and wins media and public approval. That's quite a sweeping assertion. So I ask you to think about it. Think about what you can do with joint ventures and de-acquisitions and cost reductions and more R&D and the myriad of other things that you get involved in. Then ask, "What *other* effort might simultaneously gain the same results?"

After my recent months in government, I believe that similar judgments are appropriate for this key segment of our society. Your numerous customers —among them the Congress, the citizenry and numerous other countries—are like industrial customers: increasingly demanding higher quality and greater reliability in the goods and services that they support or procure. Answering their demands can only be beneficial.

Congress and the general public can be considered your investors. Increasingly, they're coming to realize that poor quality and non-conformance are enormously expensive. As Fred Smith, the Chairman of Federal Express, the first winner of a Baldrige Award in the service category, recently observed, "At least 15 percent of the cost of any product or service is spent on rework or repair." So quality improvement is a comfort to your investors.

As to establishing a team-like relationship between government and industry, you've done this wonderfully well on many programs. Increased emphasis on quality improvement can only enhance this relationship and serve to more effectively team NASA and its contractors.

Finally, effective quality improvement should win media and public approval in a unique, world-wide way. Therefore, your future performance can help enhance the prestige and influence of the United States in the world community.

In industry, like it or not, one of the most powerful factors forcing executives to become world class practitioners of quality improvement is foreign competition from the Japanese and others. I think this will continue for some time. During the past year, I have spent much effort attempting to monitor and interpret technology changes. I am really startled by the many competitive advances that have surfaced.

For example, Japan and Western Europe are now equal to or are gaining on the United States in several major technology sectors, such as advanced materials, semi-conductors, opto-electronics, aircraft and space and advanced manufacturing. Western European gains are strong in aerospace-related technologies, and Western Europe has technology parity with the United States in most civil aircraft technologies. The Europeans have caught up in aerodynamics and structures and are slightly ahead of the United States in a few advanced materials applications. Europe is also at parity in propulsion and only slightly behind in avionics.

The U.S. maintains an overall lead in space technology, primarily because of our manned space program. However, if we include the U.S.S.R. in our comparisons, we find that they are ahead of us in some important aspects of space. Both Europe and Japan will also soon achieve parity with the United States in expendable launch vehicle technology unless new, significant U.S. developments appear.

Japan's growing capabilities are most evident in electronics. Japan is the world leader in semi-conductor memory technology, non-silicone material and devices, and semi-conductor manufacturing of all kinds. The Japanese supplier base for semi-conductor materials, manufacturing equipment, and related technologies is rapidly improving. Japanese strength in semi-conductor manufacturing equipment, particularly in lithography, means that U.S. semi-conductor production capabilities will be determined, at least in part, by the quality and the timeliness of materials and production equipment exported by Japan. The Japanese are using their superiority in semi-conductor components to help them pull even in computer hardware. Their next generation of super computers will probably have performance levels close to those of the best U.S. machines, and they are using their access to U.S. technology to overcome deficiencies in software and microprocessors.

Another worrisome competitive factor is the superior capability—particularly of the Japanese —in such significant techniques as design-for-manufacture, concurrent engineering, just-in-time production and continuous quality improvement. One is struck by such specific examples as the ECC's successful entry into the commercial rocket launch business, and the prospective entry—via Cape York, Australia—of the U.S.S.R. into this sophisticated marketplace. Another, is the proposed joint venture of one of our aerospace companies with the Soviets to rapidly develop a supersonic executive jet, with considerable know-how coming from the Soviet side.

It has been suggested that the four factors that will most determine the overall outcome of such competitions among nations are: national will, available capital, leading technology and world class education. In all four areas, we appear to be wanting and, if we compare ourselves with our leading competitors—particularly Japan and Germany—one has to conclude that the competitive challenges we face will definitely increase.

In order to meet such increased challenges, we must make quality improvement a top priority goal. There are no great mysteries about quality improvements. The so-called "secrets to success" have been captured in the Malcolm Baldrige National Quality Awards process which is coordinated by the Department of Commerce, and consists of seven criteria.

The first criterion is executive leadership, i.e., senior executive success in creating and sustaining a quality culture. Others include strategic quality planning and human resource utilization. The seventh criterion, and the most important, is the effectiveness of company systems in determining customer requirements and demonstrating success in achieving customer satisfaction.

All of this is described in a booklet, "The 1990 National Quality Award Guidelines". You can contact the National Institute of Standards and Technology in Gaithersburg, Maryland for a copy.

Two years ago, Commerce received requests for about 12,000 of these guidelines. Last year this increased to 65,000. So far this year, we've had requests for about 175,000 copies. We're quite certain that organizations are not just asking for copies for copies' sake, but are really getting involved in the process.

Nine National Quality Award winners, along with our folks at Commerce, are anxious to help you with your commitment to achieving world class quality. For example, Motorola, who was selected in the first round of these awards in 1988, is often asked what they believe to be key ingredients for an organization to renew itself, to change or refine its culture, to strive to be best in the world and to truly approach the goal of total customer satisfaction. Their reply is that the basic ingredients are six in number: Top-down commitment and involvement, a comprehensive, quantitative measurement system to track progress, tough goal setting, providing the required education, spreading the success stories, and sharing financial improvement gains with those who contribute to them.

To date, of the nine Malcolm Baldrige National Quality Award winners, no aerospace or defense contractor has won. This seems like a surprising and somewhat worrisome situation for such a crucially important segment of our society. Hopefully, you'll change this and commit fully to the Baldrige process and apply at the appropriate time for the award.

1.3 Panel Presentation

Daniel M. Tellep, Chairman of the Board and Chief Executive Officer, Lockheed Corporation

Over the past year I've learned that not all quality efforts are created equal. At Lockheed we have some marvelous efforts going on in "Continuous Quality Improvement" or CQI. Yet there remain a few spots where the message hasn't quite got across in its entirety.

For example, I asked a supervisor at one of our companies: "Do you have CQI here?" "Sure I do", he said. I asked him to tell me about it. He said, "It's over there", and pointed to the suggestion box. I asked him if he got many suggestions. "No", he said. "That shows what a good program I've got." We need to improve the process for CQI.

I confess that when I heard about CQI, I was skeptical. It was my experience that effective management practice had led to some outstanding missile and space products whose inherent objective had always been high quality and high reliability.

Yet, at the same time, I also had to recognize some very critical differences in the CQI program: the idea of empowerment of a work force, of cross-functional teams, metrics, and a new view of what is meant by "the customer".

On the strength of these fresh distinctions, we decided that we would initiate Continuous Quality Improvement, but in a way that was consistent with our decentralized operating style. I also made it my personal business to squelch anything that would cast the CQI initiative as merely buzz words or sloganeering. I am absolutely committed to making the CQI philosophy integral to everything we do, not superimposing it on a pattern of "business as usual".

Good Managment Practice (GMP) gave us top quality product, but at a premium in time and cost. With CQI's focus on process, we can eliminate that premium. With GMP, if we had trouble with a product, we formed tiger teams. With CQI we can minimize trouble from the outset by establishing cross-functional teams to simplify processes and head off problems. With GMP we understood the imperative of customer satisfaction and service *externally*. But with CQI, we clearly understand that we must apply this imperative *internally* throughout our organization and among our suppliers.

We have had continuous improvement in the past, but, in many ways, it was technology driven. We've exploited technology to improve processes, productivity and quality. Although CQI retains this technology driven component, its emphasis on people and their empowerment adds powerful leverage and is a powerful amplifier to the system of continuous improvement.

The way by which CQI makes its way into any large multi-operational, rules-and-procedures encrusted organization, which is resistant to change, is through a process of personal conversion. It is usually the best managers—those who have the least to lose—who are in the forefront of continuous improvement. They make themselves agents of change. We find that our best-managed organizations are taking a leading role in becoming better managed and retaining their edge. The critical role of management in facilitating CQI is to become personally involved and to personally create the climate that permits CQI to take root and to flourish across all functions and across all disciplines. The true power of CQI is its ability to

transform people's work and, thereby, the fortunes of whole enterprises.

When Bob Young took over at Lockheed a decade ago, he began to change the culture of the company. The odyssey culminated in his winning the NASA Excellence Award last year. It is an odyssey that will continue. Bob learned that successful organizations recognize the inevitability of change in markets, technology, and people. He also learned to deal with the continuous process of change by training and empowering every one of his people to recognize and capitalize on the opportunities which change presents. He was willing to bet on his people and take the necessary leap of faith that, given the opportunity, his people would do not just good, but consistently excellent work.

What I have learned over this past year, is that this leap of faith is the fundamental act of commitment and leadership in implementing Total Quality.

Top Leadership Panel (seated from left to right): Admiral Richard H. Truly, NASA Administrator/Panel Chairman; Honorable Thomas J. Murrin, Deputy Secretary, U.S. Department of Commerce; Daniel M. Tellep, Chairman of the Board and Chief Executive Officer, Lockheed Corporation; Joyce R. Jarrett, Director, NASA Quality and Productivity Improvement Programs Division, NASA Headquarters

2.0 George M. Low Trophy: NASA's Quality and Excellence Award Session - Total Quality Leadership

Highlighting the George M. Low Trophy Criteria, these panels of 1990 finalists discuss the necessity for top management commitment and leadership methods to achieve performance excellence.

2.1 1990 George M. Low Trophy Finalists (Small Business/ Subcontractor)

2.1.1 Introduction

Robert D. Paster, President, Rocketdyne Division, Rockwell International Corporation, Chairman

The one constant in successful world-class companies is the recognition that total customer satisfaction—both internal and external—is the key to success. This is best accomplished through an absolute emphasis on and delivery of the highest quality product or service. The emphasis must come from the top, from the company leadership.

This morning we have three individuals who, through their leadership and emphasis on quality, have seen their companies nominated for the prestigious George M. Low Trophy. All three emphasize the need for top management commitment and total employee involvement.

2.1.2 Commitment to Quality

Wiley E. Williams, President, Grumman Technical Services Division

At Grumman, we've been involved in TQM for two years. The first year it wasn't altogether clear whether we were making progress. We lacked a set of measurements by which to gauge improvements. By the second year, we've defined weaknesses, incorporated improvements, and are seeing a very clear trend in the right direction.

Total Quality Management has two basic differences from what we've had in the past. First, it provides a focus for continued improvement. Second—unlike quality circles—it's not limited to the average working-level person; in fact, it starts with the management.

Our employees are motivated, and our management is motivated to provide an environment in which the employees can participate in an atmosphere that is open and dedicated to process improvement. Since communication is so important to this process, we've established two techniques that have been very effective in communicating with our workforce, both vertically and horizontally. One, we call "dialogue"; the other, "job shadowing."

With "dialogue", senior management, at the director or manager level, goes down into the work place, has meetings with small groups, and listens to their problems. With "job shadowing", a director goes into the workplace each month and works four hours along side his employees, doing what they are doing. This achieves two things. It creates another form of communication, and it enables the director to understand the work that's actually being done and the environment in which it's being done.

Employee recognition is also vital. It isn't enough to pay people, or give them bonuses or raises. You also need other forms of recognition. We have a very visible recognition program, for both individuals and teams. We give recognition for outstanding accomplishments, sustained superior results, and even more mundane things, like perfect attendance—not taking a sick day in two or three years. Community service is recognized. We even let our employees recognize their peers. And certainly, we recognize outstanding contributions to the Grumman quality process.

As we had hoped, training each employee in the Total Quality process has resulted in team thinking throughout the organization. Secondly, we firmly believe that quality is self-perpetuating. Once you get it started, once you get enough people believing it, it's contagious. Effective improvements in the workplace result in a dedicated workforce that wants to do the "right thing right the first time".

Let me say a few words about small business and subcontractors. Quality initiatives need to be instituted by small businesses and subcontractors that are involved in the program, to insure that we complement the efforts of the primes and NASA. Subcontractors and small businesses have a very important role to play in ensuring the success of the NASA programs. It is true that small businesses and subcontractors will find it more difficult to achieve the level of savings that primes do, principally because we don't control the entire process. But, I firmly believe that there are many opportunities for subcontractors and small businesses to improve the part of the process which they do own.

Grumman participates in the George M. Low Trophy process not to win a plaque and not to be chosen the recipient, even though we're very pleased to be one of the finalists and would be even more pleased to receive the award. We're involved because it gives us an objective analysis of our performance against a set of criteria, a standard. We're not competing with other companies, we're being measured against a set of standards.

In addition, we get independent feedback, an appraisal of how we're doing measured against that set of standards. If you are a participant, you get a debriefing at the end of the award process. In this way, you learn what your strengths and weaknesses are. You can then sustain the strengths and improve the weaknesses.

2.1.3 Building in Quality and Performance

H. Ray Barrett, Chairman of the Board and Chief Executive Officer, Barrios Technology, Inc.

At Barrios, the thing we all have to ask ourselves when starting a program is, "What is quality?" There are two aspects to quality. The first is a measurable aspect. You need a reference number that you can quantitatively identify. The second—which is the most important—is the attitude and morale of your people. There are all kinds of abstract words for quality, but real quality comes down to something very basic—your people. If you can achieve that—the positive attitude and the good morale—the other is an add-on. But to have a thorough program, you can't have one without the other.

At Barrios we've given them a title. We call them the "Building Blocks to Quality and Performance". We believe that the first thing that you ought to do when you start a program of building quality and performance into your organization, is to start at the beginning, with the employee when he walks through the door of your operation the first day. If you don't start him off on the right track—by instilling quality philosophy, performance, goals, objectives, involvement—right up front—then you'll have to catch up with him later and try it then.

One of the things that you won't hear me say during this session is communication. I don't even know what communication means. To me, communication is understanding. If you can't get understanding, you haven't communicated. The employee's understanding of his place in the organization and what you're trying to achieve becomes vitally important; it has become one of our building blocks.

The second building block is sustainability. You can't achieve anything unless you can sustain a process over time. And there's only one way to truly sustain a group of objectives: let them become the employees' objectives.

Another other major building block is training. What do you expect from your people? Where do you want the corporation to go and what are the strategies to get there. You have to build training programs into your organization that are geared toward certain objectives. The objectives fall into three categories:

goals. Since markets change and competitors improve, a philosophy of total continuous improvement is necessary if Marotta is to compete in tomorrow's marketplace.

Marotta's continuous improvement efforts have also been directed towards total integration of all company functions. Integration at Marotta means that we have a common database. We do not have to regenerate information among various departments. All tooling information concerning geometry comes directly from engineering. What used to take days now takes hours or just minutes. The machinist on the shop floor now has the ability, training and information to make decisions to produce a part to the right specifications the first time.

The next steps include further advances in computer-aided engineering and computer-aided process planning. The efficient production of the highest quality products will necessitate the effective use of computers to eliminate paper on the shop floor and in all of the manufacturing processes. Top management at Marotta believes that, by the end of this decade, we can establish global quality leadership on the strength of a truly integrated manufacturing organization focused on the high pressure custom hydraulic and pneumatic controls marketplace. Computer Integrated Manufacturing (CIM) and other advanced technologies enhance the capabilities of the empowered employee to help us achieve global quality leadership.

Human resources are the greatest asset top management can develop. Our employees have the control—as well as the responsibility and pride of ownership—of the manufacture of each part or each process. This is the essence of the term "employee empowerment".

Investment in education and training, motivating and challenging our people precedes everything else. At Marotta, we foster individual innovation and creativity. To accomplish this, we work in small teams on most of our development programs. The teams usually include one representative from marketing, engineering, manufacturing and each test areas. These small groups are empowered by top management to apply the sum total of their creative energies to each project, while making sure the development of the product or system stays on course and in line with our customer's needs.

Successful aerospace programs have an incredibly long life. Products we designed and qualified 25 years ago are still being used to launch and fly successful missions today. I fully expect that the products we are designing today will be around for the next 25 years.

***Panel 1 - 1990 NASA Excellence Award Finalists** (Small Business/Subcontractor) (from left to right): Robert D. Paster, President, Rocketdyne Division, Rockwell International Corporation; Wiley E. Williams, President, Grumman Technical Services Division; Thomas S. Marotta, Chairman and President, Marotta Scientific Controls, Inc.; H. Ray Barrett, Chairman of the Board and Chief Executive Officer, Barrios Technology, Inc.; Imants (Monte) Krauze, Director, Quality and Productivity, Bendix Field Engineering Corporation.*

2.2 1990 George M. Low Trophy: NASA's Quality and Excellence Award Finalists (Hardware/Mission Support Contractors)

2.2.1 Introduction

Arnold D. Aldrich, Associate Administrator for Aeronautics, Exploration and Technology, NASA Headquarters, Chairman

I strongly believe that the Total Quality Management process is essential to the success of our future programs and mission. As you know, this is one of three concurrent panels to talk about the 1990 George M. Low Trophy. This panel will discuss the necessity for top management commitment and will share experiences in leadership methods in achieving performance and excellence.

2.2.2 Continuous Total Performance Improvement at Rockwell/Space Systems Division

Robert G. Minor, President, Space Systems Division, Rockwell International Corporation

There is no question that the leadership in your organization has to be focused on continuous total performance management. First, by providing a vision, direction and guidance for the organization. Second, by creating an atmosphere that creates and encourages team building, and by simultaneously stimulating a process-improvement situation.

It should be clear to everyone that this has to be a top-down, bottom-up type process. We have more than 160 formal teams at our division and over 2,000 plus people are involved. Most of those teams are cross-functional. One of the purposes is to make sure that there is a continuous exchange of ideas at the improvement councils, at our employee action circles, and our individual employee suggestion programs.

We use computer tracking. We think it helps us eliminate errors, and simplify the way we do business. It also helps us make sure we keep records, so that we can recognize the appropriate people that have been involved in these programs. And it also gives us statistics on how well we're doing, and on the level of participation throughout the division.

Communication--honest, open, two-way communication—started this program. We let our people know that we were very much interested in improving their overall working conditions. We also made it very clear to them that there was an element called "competitive positioning," that says that you cannot stand on your laurels in this business; that you have to continue to improve, or someone is going to take it away from you. Finally, we described our business pursuits—our targets, the specific programs we're implementing, and the specific markets we're going after.

Periodically, we have employee surveys. The surveys are strictly voluntary, but participation is quite high—generally in the 80%+ range. In addition, employee groups talk about our strengths and weaknesses. From our employees, we learned that we needed to simplify our overall processes and ways of doing business. We needed to eliminate steps and paper, and streamline our organization. We found that every additional level of management made it more difficult to communicate to the troops on the line.

If you're going to ask your people to change, you owe them a very comprehensive training program. You can't ask them to do business a different way without showing them how.

We have "design for competitiveness" workshops. One example involves the system that is being designed to allow the orbiter and the Space Station to dock with one another. Specifically, we looked at the docking mechanism capture latch. We involved 30 teams and 5 working groups in the study. The results were astounding. They came up with 20 separate ideas that reduced the part count and overall processes by 50%, and increased the reliability of the system. We then implemented this technique throughout all of our docking system studies.

We created something called "Centers of Excellence." We found that we were duplicating services and capabilities, and that meant a higher cost to the government. Now, as an example, our Rockwell Operational Software Engineering System, or ROSES, does software for some of our other divisions.

We try to make sure that our suppliers and subcontractors are an integral part of our activity. Sometimes, we tend to focus too much on what we're doing in-house, but, in reality, nearly 50% of our hardware work is done with our subcontractors.

We believe our program supports the Rockwell Corporation objectives. We think it strengthens our competitive position. It certainly helps harness our

total force capabilities, and goes a long way in assuring that we're meeting our present and future customer expectations.

2.2.3 Total Quality Leadership: Top Management's Role

Carl L. Vignali, Vice President and Group Executive, Honeywell Space Systems Group

The first requirement in bringing about a Total Quality initiative culture is defining the vision. To lead an organization toward a goal, you've got to explain what the goal is. We developed a TQM vision. What the specific vision *is*, is not as important as that it be developed by the people who will lead the way toward the vision.

We came up with a set of vision statements that are meaningful to our people. These statements were developed by the management staff after a lot of discussion. I think the way you get ownership is to have debate about the right thing to say and the right thing to do; then you arrive at an answer. Next, you make the decision to *do it*. You've got to have an agreement among management that this is something that they really want to do. That's not always easy to obtain. People have differing viewpoints; but, it's important to reach consensus. It's not always possible to define and identify what the benefits are going to be. You do it because you believe it's the right thing, and that it's going to pay off.

Our goal was two-fold. First, to produce a clear picture for everyone in the organization. We were striving for mastery in every category. Second, once we had the matrix developed, we used it as a measurement tool to find out where we were along the road; where were we falling down, and where were we doing well.

We had a lot of problems describing the process to our employees. After we told them what we wanted to do, they said, "Fine, but what do you want *us* to do?" When you've got 3,000 people, and they all have different jobs, you can't sit down with each one and say, "This is what this specifically means to you." Being an engineering organization, we came up with an engineering solution. We created a flowchart. Now, when people say, "What do you want me to do?", we can refer to the chart. We created one of these for the organization, and one for individuals.

Once we had all of the tools in place, we again needed to demonstrate the top management team's commitment to Total Quality. The executives serve on TQM teams. I'm on two teams. Every one of the top managers is on one or more teams. We talk about TQM; it gets infused into everything we do. You can't paint TQM onto your organization and expect to have it stick. You have to weave it into the fabric of the organization.

We've embedded this continual improvement into people's individual goals and objectives, and into departmental goals and objectives, so that is a part of everybody's job. I think a lot of managers felt that just turning out the product was their job. What we're trying to convince them is that the manager's job is *improving the process* by which the work is done.

It's important to continually monitor results. Either I or one of my direct reports has a sensing session with a group of managers to find out what the obstacles are to getting this culture embedded. And, *that* gets reported back to the staff, so that we can keep the loop closed, and don't let process wander off.

The final thing, of course, is to keep the momentum going. My staff and I meet bi-weekly as the TQM executive council, to look at where the process is, and what we have to do to keep it going. On a quarterly basis, we get together with the management team and talk about what's happening on Total Quality, what progress we've made, and what the priorities are going to be for the next quarter. We have a continual series of articles in our in-house newspaper to keep the work force informed on what's happening.

2.2.4 Quality Leadership— Vision for Excellence

H. Joseph Engle, Chairman of the Board and President, Bendix Field Engineering Corporation

Quality is the key to corporate survivability. This means ensuring that we have leadership commitment, sense of direction, and the resources and processes to achieve customer satisfaction.
Quality is the key to expanded corporate opportunities. This means ensuring that strategic goals are achieved in response to our plans, changing economic opportunities or customer requirements.

Quality is the key to growth and achievement potential for our employees. We ensure that our employees remain committed to BFEC, by creating an environment which permits personal and professional growth.

Quality is the key to achieving end-to-end excellence. We constantly get a report card from our customers on how well we're doing, and how well we meet their requirements. This means that we must be willing to set the standards for others to follow. We developed a support structure that maintains and refines our internal measurement system and regularly monitors our quality status.

Our PIQE (Productivity Improvement and Quality Enhancement) program got started back in 1984. It is now evolving into SPQ: Service-Performance-Quality. SPQ is our definition of Total Quality Management, as it applies to the service industry, and our growth and experience in continuous improvement methods. But, TQM is not a dogma. Management is responsible for finding the right TQM fit for its respective needs and its customers. Furthermore, we assist our subcontractors in embracing a quality-oriented philosophy.

Management of our SPQ process is done through an executive committee composed of a senior manager, two senior vice-presidents, and myself. The BFEC quality assurance department and quality enhancement process is administered and directed by the senior manager, assisted by several key managers who are a part of what we call "The SPQ Council."

Key points that this team was asked to consider, include:

- What events must occur for BFEC to move toward a participative management style of decision making and problem solving?
- How do leaders re-educate middle managers to foster teamwork at all levels?
- What action needs to occur for us to wipe out "turf barriers" among departments and individuals?

In addition, I chartered another team to recommend methods for increasing the effectiveness of communications at all levels throughout the organization. This communications team is composed of senior management and technical communications experts. The team was asked to consider the following:

- How can we develop effective communications among employees, internal customers, and contractors?
- What method or vehicles of communication are we presently using? What methods of communication should we consider adding to those now in use, or what vehicles should be discontinued?

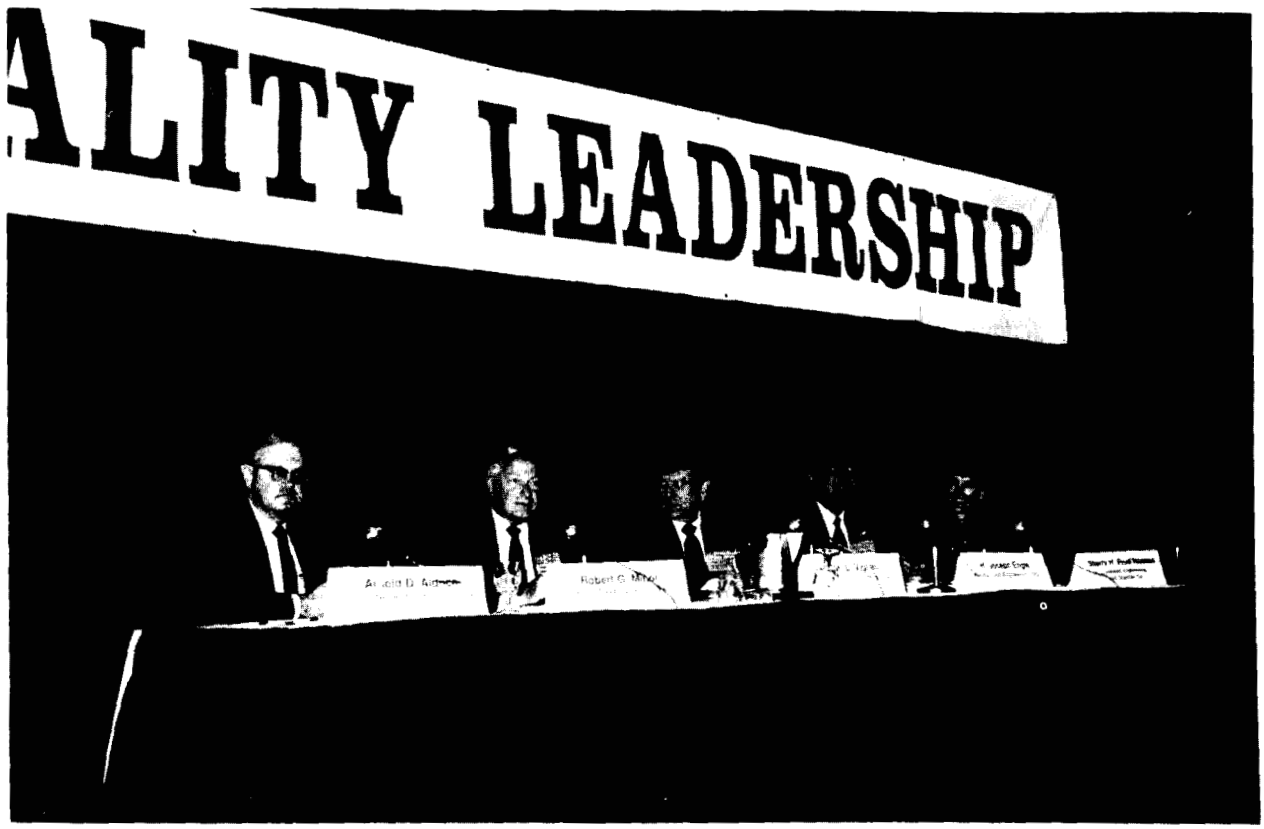
We reorganized the company to provide short, direct lines of communications with our customers and our employees. We developed a flat organization that reduces unnecessary management review, and provides an effective management span of control. We established a decentralized management authority and accountability approach to business. We have positioned our organization to be very flexible, adaptive and totally responsive to our customer's needs.

We recognize that leaders need to re-educate the middle manager and foster teamwork at all levels. This commitment to teamwork and customer satisfaction needs constant nurturing and attention and support by management until it becomes a way of life in the organization.

To give our PIQE program a little more impetus, we implemented a Chuck Rounds Award. The Rounds Award is the highest honor given for accomplishments made under the BFEC PIQE program. It's presented annually to the deserving individual, group or department that produces measurable and verifiable results in the achievement of excellence in quality and productivity.

BFEC exudes a management philosophy that places major emphasis on striving for customer satisfaction, by tailoring our services to our customer's needs, putting high value on our employees, fostering individual innovation, and establishing teamwork approaches to assure quality performance at competitive prices. BFEC does not merely speak or write about quality and performance improvement, we take action, commit resources to achieve end-to-end excellence, and are committed to continuous process improvement.

Somebody once said to me, "What's the difference between involvement and commitment?" And I said, "Well, I guess the best way I can answer that is, it's like a plate of ham and eggs: the chicken was involved—the pig was committed."



Panel 2 - 1990 NASA Excellence Award Finalists *(Hardware/Mission Support Contractors) (from left to right): Arnold D. Aldrich, Associate Administrator for Aeronautics, Exploration and Technology, NASA Headquarters; Robert G. Minor, President, Space Systems Division, Rockwell International Corporation; Carl L. Vignali, Vice President and Group Executive, Honeywell Space Systems Group; H. Joseph Engle, Chairman of the Board and President, Bendix Field Engineering Corporation; Sherry H. Prud'homme, Manager, Total Quality Management, Lockheed Engineering and Sciences Company.*

2.3 1990 George M. Low Trophy: NASA Quality and Excellence Award Finalists (Service Support/ Mission Support Contractors)

2.3.1 Achieving Excellence in a Diverse Organization

James R. Dubay, President and General Manager, EG&G Florida, Inc.

Excellence is not a goal on a milestone chart, and it's not a finite objective in time. Excellence is a culture, a quality of being, a value, a virtue. It is an inherent part of the individual. You're not excellent at work, and something else at home. You're excellent because it is part of the fabric of your being.

The base operations work at Kennedy provided a particular challenge for us. We were the first contractor after the consolidation of 14 contractors. We were given very little time to start up, and we had virtually no identity. We had less than three months to get started and to hire close to 2,000 employees. How does one do that? First of all, you establish an identity. You tell other people who you are, where you've been, and what you believe. Then you establish credibility. You tell them about your corporate history. You tell them that you've been in the business and that you know something about it. Then you set a vision of what you really believe; you affirm that the importance of that vision is that it include everybody.

The employee, after all, is the only asset in a service company. I don't have to tell you where we have drifted over the last 40 years in terms of labor and management. The "we" and the "they", the "us" and the "them" have probably cost more in terms of national asset and national progress than anything else. It's not "we" and "they", it's "*us*", and when we finally realize what the proper equation is in terms of teamwork, we'll be on the right track. Pay attention, if you will, to what GM is doing in their new Saturn plant. Innovations in labor were absolutely unheard of in the automotive industry. And innovations similar to that are going on in industries where the union and management essentially have been unable to talk for years.

The equilibrium between labor and management does, in fact, involve a culture shift. Top-down management is absolutely a thing of the past. In the past, you had the employee taking direction—regardless of his position in the company, or his expertise—from a management which, by no stretch of the imagination, was qualified to do the work. The management training that all of us had undergone for the last four decades taught us "control, and control, and more control," usually for the sake of control itself, or for the sake of a bottom-line. We lost sight of the fact that the people who cause these bottom-lines to happen, are the only asset we've got. You must protect, advance, and nurture them, if they're going to continue to perform.

So, our mission at Kennedy has been simply to set a vision in which people are the asset, people do count, in which we are going to listen, and then listen some more. And, before we take any overt action, we're going to go back and ask questions, to make sure we understood what we thought we heard. The people know what to do. When *we* are challenged by opportunity, we are challenged because we are insatiable in our desire to improve and progress in what we do and what we know. The employee is no different. The employee responds spontaneously to these opportunities.

In any change situation, the biggest problem you're going to have is with your managers. Letting go of control is difficult. We just recently did an employee opinion survey. What got our attention was that, while we're doing a lot of good things, the one shortfall was management. Management was having a really difficult time letting go. So, what we're going to do is dramatically increase our internal educational training to really get the team coalesced.

Are we there? Certainly not, but we're well on our way. And, since excellence is a process, I submit that you never get there. It's a day-to-day thing, because it's a people equation. We know the vagaries of ourselves, and we know the tendencies we have to forget, if we're not focused. But we've learned to play together. We've learned to work together. We've learned to support the community together. We've learned to share. The empowerment of people is an awesome dynamic—and, it's your only option.

2.3.2 Success Through Partnerships

Paul J. Holyoak, Program Manager, Integrated Information Services, Boeing Computer Support Services

The key to our success are two specific partnerships. When we began the PSC contract in 1985, the spirit of partnership was established between NASA and Boeing. We shared a common goal: to implement a nationwide world class telecommunications network in one year. This professional partnership with NASA has continued, and has provided an environment which has allowed us to develop the second partnership. That partnership is the internal partnership between leaders, between leaders and their people, and among all the people.

During the implementation of the Program Support Communications network, the goal was clear. Completing the detailed network implementation plan provided the incentive that people needed, to work 60 to 80 hours a week in pursuit of that goal. During this period, everyone expected that, once the network was implemented, we'd have a lull period in which to refocus our efforts for sustaining operations. No one projected that user acceptance of PSC services would be so great that the requirements would literally double by the time the network was operational. It was critical that we establish new visions and new goals. We had to tap the ideas and knowledge of everyone in the organization. We had to create an environment where everyone could contribute, not just a key 15 or 20 people, as it was during implementation.

We began that change with education. The team was composed a lot of different people from very diverse backgrounds, and we needed to establish a common base. We developed that base through two types of training: quality basics, and leadership development. We chose the idea of CQI: "Continuous Quality Improvement."

The next step was developing the leadership team. With more effective leadership, communication with all of our people was developed, partnerships were formed, and the sense of trust was expanded.

Once we had the basics of leadership and quality training, we began the strategic planning process. We established a vision of missions and goals, and a partnership and trust among the key leaders. Then we cascaded this trust and understanding and goals throughout the entire organization. We printed a card with the vision, mission, goals, and objectives on it, so that everyone in the organization could always have a reminder with them. We established the target symbol as a constant reminder to our commitment to quality that exceeds customer expectation. In addition, we linked every PSC person's job goals to a higher goal: that of NASA's major goal of launching the Space Shuttle. For example, a finance clerk, who might not think he was associated with the mission, was taught that even a mistake on payroll or benefits of someone who was in direct mission support, could impair that person's ability to work and thus impact the mission. Through a series of meetings and rallies, we gave all the employees an emotional investment in the program. We showed them that success would come through partnership. The promotion of the target and the return to flight poster and astronaut visits got everyone emotionally involved.

Because of the people's ownership in all these processes, *they* began to drive the continuous quality improvement. Without realizing it, we had created a new culture within our organization. We moved from controlling and directing from the top, to a culture of participative leadership and involvement of every member of the team. This creates an excitement in people about their task, and their investment in the goals. Our people began to see and understand how their daily tasks supported the entire mission. Through understanding comes commitment. Through commitment comes quality.

Leadership is partnership. The success of PSC is a result of clearly defined goals, and the establishment of an environment where everyone could make a maximum contribution. Then, once the momentum was established, the wisdom of the leaders was to step back and get out of the way, and let people be successful.

2.3.3 The Quest for Excellence

John B. Munson, Vice President and General Manager, Space Systems Division, Unisys Defense Systems

I'd like to focus on just three points, that are the key elements in this whole quality process: management commitment, employee involvement, and metrics and measurement. I grew up in a culture where management commitment was what you got from the boss when he didn't give you money or people to do a job. That's changing now. Without the leadership involvement and the commitment, a quality program will fail. If you don't know where you're going, any direction is OK.

The leader must have the vision. He must be able to relate that vision to others and inspire others. He's the one that sets the goal, the objective. The manager must demonstrate commitment through his actions. I like the expression, "Walk like you talk." Involvement by the leader and the manager is what proves his commitment to the program. We had an extensive quality education program, and I personally started and finished each one of those 20-hour sessions, so I could tell the people what I felt the vision was, and discuss with them what happened after the program.

It took us a year to come to an agreement about the goals for our policy development. We decided that our policy had to be clear, concise, and actionable; it had to be understandable by our people. Our policy says that *our goal is error free products and services*. We're going to accomplish this by: 1) understanding the requirements before we start the work; 2) having documented procedures and processes to do our production or manufacturing activities; 3) when we get done, testing again to the original requirements; 4) using the corrective action review process to continuously improve the program we have in process.

The toughest sell in this whole process is the first level managers. Quality is a little ambiguous; but, they eventually begin to get the word that quality is first, and cost and schedule come second, in order to achieve quality.

The second element in the quality process is employee involvement. The quality program can't simply be a management program. It's got to have ownership by the employees; you do this by creating teams. The employees have to be responsible for their own work processes, and they have to have the authority and responsibility to change them. They develop charts and metrics to track the program. We have quantitative tracking—things like number of errors per month, or the number of days to fix something. We have analytic tracking: why did the errors occur, what systems generated the errors? And we record improvement in the various teams.

Lord Kelvin said there's no science without measurement. Measurement is the key element in being able to track success. The essential steps include evaluating where you are today, deciding where you want to go, implementing a plan of action, and measuring your progress toward meeting that plan. You've got to identify your trends and the risks; and, in our case, we chart our progress. Our goal is to create, track, and plan significant improvements in quality and productivity.

Panel 3 - 1990 NASA Excellence Award Finalists *(Service Support/Mission Support Contractors) (from left to right): Jeffrey M. Corbin, Manager, Total Quality Management, Martin Marietta Manned Space Systems; John B. Munson, Vice President and General Manager, Space Systems Division, Unisys Defense Systems; Paul J. Holyoak, Program Manager, Integrated Information Services, Boeing Computer Support Services; James R. Dubay, President and General Manager, EG&G Florida, Inc.; Richard M. Davis, President, Martin Marietta Manned Space Systems.*

3.0 Building on Strategic Planning to Advance TQM

A focus on strategic planning as the foundation for tactical implementation of continuous improvement throughout the organization. How do we integrate the strategic business plan and the quality strategic plan?

3.1 Creating the Vision

Understanding the process that an organization must undergo to develop its vision statement: what it is, what it wants to be, and what it can be. How the vision integrates the continuous improvement process throughout the operating levels, including labor/management relations.

3.1.1 Introduction

Dr. Harriett G. Jenkins, Assistant Administrator for Equal Opportunity Programs, NASA Headquarters, Chairman

I'm sure that most of you are already aware of what has been said and written on the topic of strategic planning for excellence and continuing quality. You are also very much aware of the usual steps that are identified, or the processes that are talked about. These include creating a vision, determining one's customers or stakeholders, and determining the environment in which you've got to work. This afternoon we're going to be concentrating, in particular, on the importance of the first step—creating the vision—but you're going to hear more than just a theoretical presentation. You're going to hear what it's like to work with these ideas in two very real, and significant firms.

3.1.2 Boeing Commercial Airplane, Continuous Quality Improvement (CQI)—Vision to Reality

James A. Blue, Vice President/General Manager, Materiel Division, Boeing Commercial Airplane Group

We've always prided ourselves on designing technically excellent products, and delivering quality products on time to our customers. But, about five years ago, the lights suddenly came on, and we realized that we had to really concentrate on continuously improving quality and productivity to satisfy our customers and remain competitive.

The business environment has changed, and the key to the whole thing is "satisfy your customer." You can get all the awards in the world but they don't mean a thing unless your customer is satisfied with the product that you're delivering to them. Our airline customers no longer have a brand preference. They're looking for the best deal for the money.

I had the responsibility of bringing CQI to the forefront of everybody's thinking in the Boeing Commercial Company in early 1985. At that time, I was chagrined to hear Dr. Deming and Bill Conway say, "If you're going to really change the management culture in your organization, it's going to take you eight to ten years."

When we started looking into how we were going to change the way we operated and get everybody thinking about everything they do every day, it began

to look like an almost impossible task. We started educating our top management in January of 1986. We used all the gurus we could get our hands on through there. We ran over 4,500 managers through two and three day seminars. We got into statistical process control in 1988, and we started incorporating the CQI principals into our mission. When we started this process, we were only averaging about five hours per employee per year for this type of training. Last year we averaged 50 hours per employee, and it will be over 60 this year.

To ensure success, everyone has to be involved in the CQI process. Our goals support the corporate objectives of delivering defect free products and services to our customers on schedule and at competitive prices; reducing waste; developing a motivated and skilled work force; and incorporating the principles of continuous improvement into our relationship with our supplier.

One of the things we have done is to go from an adversarial relationship with our suppliers to a partnering technique. We want to work *with* suppliers to help them with the implementation of continuous productivity and quality improvement. Our goal is to not have to reinspect anything when it comes into Boeing. We know that each of us as individuals is important; we also know that each one of the people that work for our suppliers is important. And we've found that if we treat each other as we like to be treated, we get fantastic results.

An important factor in being successful in CQI is communication. In addition to the various papers and newsletters and annual performance objective reports, we have executive meetings, division quality meetings, quality teams and circles, all-employee meetings and rap sessions, and supplier symposiums. But, the key is the daily interface with all the people. The essential tools for CQI education are planning and reporting. Communication is at the top of the list in importance.

We hadn't done a very good job training our managers. We made them managers, then left them to sink or swim. So Performance Management was implemented. It's a tool for increasing individual and organizational effectiveness. It's absolutely the best tool I've seen implemented in the 40 years I've worked for the company.

At Boeing, we've implemented CQI, and we're seeing results. We've been working very diligently for over five years. Our people are excited. *They* know that *we* know that they're the experts. They know that we're giving them the credit for the input we get from them. It ain't easy folks, but the rewards are there. We've had all our suppliers in, on at least three occasions. We're bringing them back again. They're with the program. Productivity is improving.

But remember, CQI requires a clear vision, and it must be integrated throughout all operating levels. It needs to be started and supported from the top, but it has to go all the way down to the person on the floor. The idea of improvement doesn't have to be gigantic. Fantastic improvement can be just little bits and pieces, but that's the way you get to there from here. All of this takes time, education, good communication, teamwork, and perseverance.

3.1.3 From Breakdown to Breakthrough—Role of Vision as a Catalyst for Total Quality

David Clark, President and Chief Executive Officer, Campbell Soup Company, Ltd.

Like many organizations, we have been through a round of downsizing. In the 7 1/2 years I've been involved, we've cut back from 11 plants and 4 farms to a core of three plants. In the period from '84 til '90 inclusive, we have been relatively successful at turning the business around.

The real trigger to it all occurred in January, 1989, and the period leading up to it, when the Canada-U.S. Free Trade Act was passed. We woke up one morning and found that all of a sudden we no longer lived in a Canadian environment. We were now in a North American environment, and our plants were at a 37% cost disadvantage, on average, in relation to the best U.S. plants. There was an alliance among my management group, myself, and our employees to keep plants in Canada. Employees cared, because of the jobs involved, and from a management perspective, we wanted to be something more than warehouse managers or distribution experts.

I'd like to make a distinction between what I'm going to call "normal incremental" management and "breakthrough" management. They both start from an assessment of a problem, from an opportunity, from a threat. You do a feasibility assessment. You say, "OK, we know what the objective is. Do we know how to do it? Is it possible?" That feasibility assessment, naturally, is based on your history. It's based on what you know, and on the facts as you see them.

If the answer to that question is, "Yes, we can do it," you move into the "normal incremental improvement" mode, which is very simple. You have objectives; you have methods of attacking those

objectives; you line up resources; and so forth. When it works, you are have an outcome which I would certainly characterize as improvement.

However, what do you do if, through force of circumstance or by force of your own will, you find yourself in a situation where you are driven to do something, but you don't know how to do it. You are driven toward an objective or a goal which appears impossible at the time. That's the situation that drives to breakthrough, or transformation, as we call it. The process of managing breakthrough in a systematic way, so that it can be replicated any time you need it, and wherever you need it, is what my organization has been engaged in for the last year and a half.

The first step in managing breakthrough is to enroll yourself and some people in the "possibility". Now, "possibility" is nothing more than an opening for future action or a future outcome that may not appear. In fact, you do not know how to achieve it right now, but you are willing to commit yourself to make it happen. It's an image in your mind of what *could* be. It's the leap of faith.

That brings me to the second step—commitment. Getting commitment to a possibility is very tough, both within yourself and within your organization. Often you have to be cornered. You have to be in a situation which is so distasteful and inevitable that you simply must create your way out of it. Or you may be enrolled in this possibility by colleagues, or by a leader, or by a group within the organization. That is somebody else's commitment that has become contagious. And, indeed, a strong, supportive team is immense leverage to have going for you because, somehow, it doesn't feel quite so lonely to be taking that first gut-wrenching step toward something that you don't know how to do. The key here is to focus in on uncharacteristic action or extraordinary action that will dramatically change the rules of the game, not only for yourself, but ultimately for your competitors. That focus on the extraordinary is consistent with possibility.

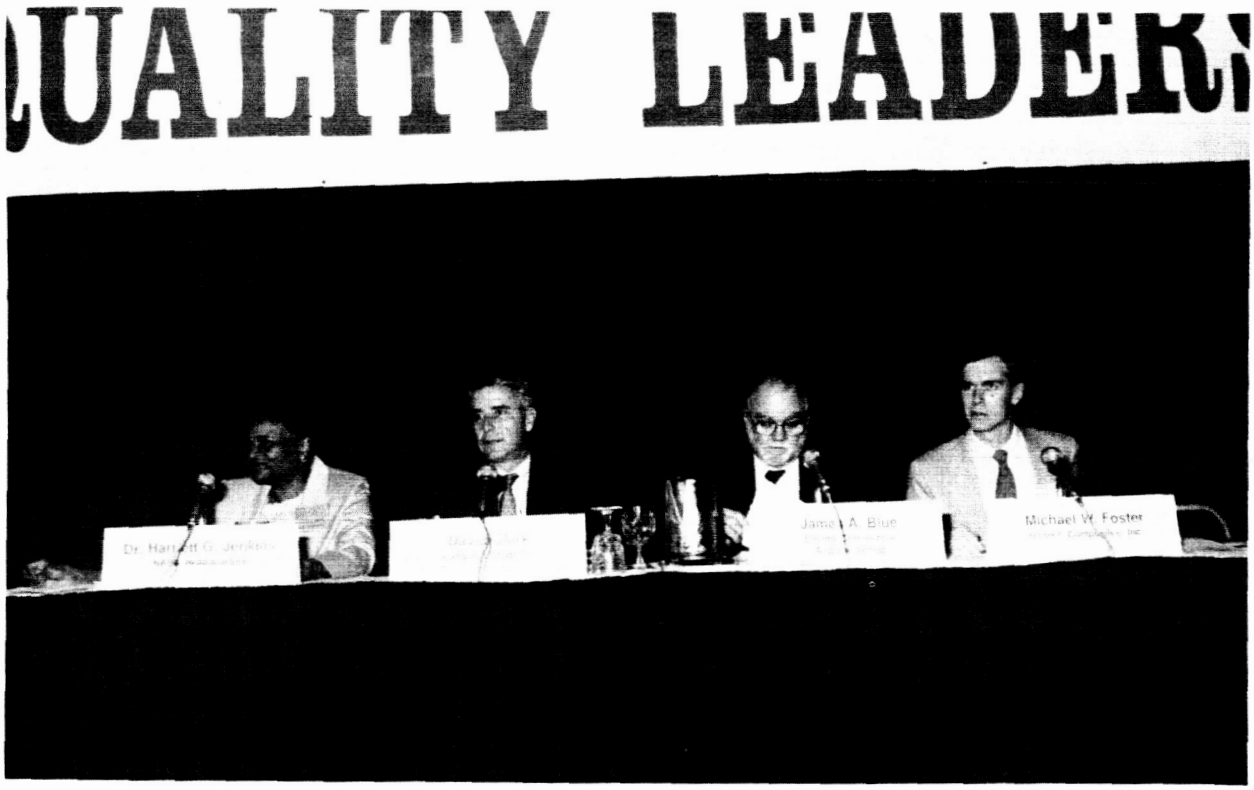
Let's talk about what actually happened at Campbell-Canada. First, we settled on the "possibility" that we're committed to being the best food company in North America; to providing products of superior value and quality, through implementation of the "fastest gate-to-plate" strategy. The thing about that vision is that it's probably never achievable. We'll never get there, because, no sooner will we have achieved it in some dimension, than someone will come along and challenge us in another dimension. But, that's the beauty of it. It's infinitely expandible.

We have three strategic areas that we are focusing on right now. The first is superior brand powering. Our objective here is to dominate every category; we want to have three times the share of the nearest competitor. It's as simple as that.

Our second strategic area is embodied in the phrase, "fastest gate-to-plate". That refers to competing in time—from the farmer's gate to the consumer's plate. The total food chain becomes our playground. We are accountable for only several links, but we are inextricably tied to both ends.

The last part is the "turned on" organization, where the empowerment of individuals and teams comes in. Because the magnitude of our stated vision, "the best food company", is beyond our grasp, the thing that will power us through this is what we call "breakthrough power", or "business as unusual".

These are some of the results: the frozen food plant was restructured into self-managed work teams, which eliminated three levels of management within six months. Our soup plant reduced "held" product—that's any product that needs reworking—from 120,000 cases to 20,000 cases within five months. These results were achieved by people who, on their own time and over an extended period of time, have taken extra instruction in the technique of breakthrough management, until they are now trained coaches who themselves coach the breakthrough teams. This also allows us to phase out most of the consultants. As a result, it looks like we are going to achieve our objective of remaining an independent, integrated, fully sustainable company in Canada.



Panel A1 -- Creating the Vision (from left to right): Dr. Harriett G. Jenkins, Assistant Administrator for Equal Opportunity Programs, NASA Headquarters; David Clark, President and Chief Executive Officer, Campbell Soup Company; James A. Blue, Vice President/General Manager, Materiel Division, Boeing Commercial Airplane Group; Michael W. Foster, Chief Financial Officer, Unitech Composites, Inc.

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Appendix C – Acknowledgments

The papers, graphics, audio presentations, and panel notes from the conference were used as the basis for writing this report.

Many individuals deserve recognition for their work in organizing the Seventh Annual NASA/Contractors Conference: **Geoffrey B. Templeton**, NASA Headquarters, Conference Director; **Margaret A. (Peggy) Wilson**, Kennedy Space Center, and **Lynne M. Stewart**, Futron Corporation, Assistant Conference Directors; **Warren L. Camp**, Kennedy Space Center, Conference Liaison Officer; The Conference Panel Directors: **Dr. Joe E. Sparks**, Teledyne Brown Engineering, and **William L. Williams**, George Washington University *(Panel A – Building on Strategic Planning to Advance TQM);* **Sally L. Stohler**, Rocketdyne, and **Larry E. Lechner**, NASA Marshall Space Flight Center *(Panel B – Continuous Employee Development for Total Quality);* **Jessica R. Wilkes**, Grumman Corporation, and **Gail R. Harleston**, NASA Headquarters *(Panel C – Employee Empowerment and Teamwork);* **Tina M. Doty**, Leach Corporation, and **Willis E. Chapman**, Jet Propulsion Laboratory *(Panel D – Quality Assurance's Role in Total Quality Management);* **Dr. Ronald A. Luhks**, Ford Aerospace Corporation, and **Wanda M. Thrower**, NASA Johnson Space Center *(Panel E – No Measurement – No Progress);* and **Linda A. Marvin**, Lockheed Engineering and Sciences Company, and **John L. Reiss**, NASA Ames Research Center *(Panel F – Customer Focus – Practice or Preach);* the Conference Panel Managers: **Imants (Monte) Krauze**, Bendix Field Engineering Corporation *(Panel 1 – 1990 George M. Low Trophy Finalists – Small Business/ Subcontractor);* **Sherry H. Prud'homme**, Lockheed Engineering and Sciences Company *(Panel 2 – 1990 George M. Low Trophy Finalists – Hardware/Mission Support Contractors);* **Jeffrey M. Corbin**, Martin Marietta Manned Space Systems *(Panel 3 – 1990 George M. Low Trophy Finalists – Service Support/Mission Support Contractors);* **Michael W. Foster**, Unitech Composites, Inc. *(Panel A1 – Creating the Vision);* **Joe E. Alcala**, General Dynamics Corporation *(Panel A2 – Organization for Planning and Implementation);* **George B. Nelson**, Sverdrup Technology, Inc. *(Panel A3 – Winning Strategies for Total Quality);* **Charles Zimmerman**, Westinghouse Electric Corporation *(Panel B1 – Are You Ready?);* **Leroy A. Mendenhall**, Unisys Defense Systems *(Panel B2 – Tools and Techniques for Total Quality Training);* **Richard D. Clapper**, NASA Lewis Research Center *(Panel B3 – Recognition Adds Value);* **Robert P. Hessler**, McDonnell Douglas Space Systems Company, and **S. D. (Skip) Montagna**, Boeing Aerospace Operations, Inc. *(Panel C1 – Prerequisites for Empowering Employees);* **Dr. Dean R. Lee**, Unisys Defense Systems *(Panel C2 – The Changing Role of Management);* **Dr. Robert A. Emry**, California State University at Fullerton, and **G. William Kuhfuss**, General Electric Corporation *(Panel C3 – Making Teams Work);* **Donald O. Atkins**, ILC Dover, Inc., and **Robert A. Horrigan** and **Thomas H. Forbes**, Electronic Data Systems Corporation *(Panel D1 – The Changing Role of Quality Assurance in a TQM Environment);* **Tina M. Doty**, Leach Corporation, and **Robert D. Hammond**, Rockwell Space Systems Division *(Panel D2 – Quality Assurance Standards versus TQM);* **Dr. Karen K. Whitney**, Rockwell Space Operations Company *(Panel E1 – Measuring TQM in the Real World);* **R. Ross Bowman**, Thiokol Corporation *(Panel E2 – Case Study: Measurements in Action);* **John S. Welzyn**, NASA Marshall Space Flight Center *(Panel F1 – Customer Expectations – Everybody's Business);* and **Bradley A. Johnson**, CTA, Inc. *(Panel F2 – Will the Real*

Customer Please Stand Up!); members of the Seventh Annual NASA/ Contractors Conference Planning Committee not previously mentioned: **Peter M. Alex,** The Osterland Company; **Charles P. Boyle,** NASA Headquarters; **Alfred O. Brouillet,** Hamilton Standard, United Technologies Corporation; **Jerry R. Dangler,** Honeywell, Inc.; **J. Jeannette Eads,** EG&G Florida, Inc.; **Nancy A. Falk,** Barrios Technology, Inc.; **Dr. Neil W. Haars,** Sverdrup Technology, Inc.; **Johnnie A. Henderson,** IBM Corporation; **James F. Holloway,** Pratt & Whitney, United Technologies Corporation; **Richard D. Lander,** Marotta Scientific Controls, Inc.; **Don C. McAvin,** Wyle Laboratories; **William R. McMurry,** Unisys Defense Systems; **Jarvis L. (Skip) Olson,** Grumman Technical Services Division; **Nickee R. Reynolds,** McDonnell Douglas Space Systems Company; and **Marshall L. Seymour,** Sverdrup Technology, Inc.; members of the NASA Kennedy Space Center/Contractor Support Team: **Jonathon L. Bradley, Thomas R. Braxton, Karen F. Bridges, Regina M. Capraro, Christie L. Connor, Linda T. Coon, Sally A. Hencin, James D. Horton, Ann K. Hunt, Brian T. Knipfing, Thomas (Rick) F. Landers, Jean C. Lewandowski, Lou Ann Linton, Donna M. Lucas, Sheryl C. Marshall, Joanne T. Muncey, Juan M. Ramirez, Linda A. Ranow, Patricia E. Robinette, William H. Rogers, Robert S. Sabljak, Ameen Y. Sarkees, Maureen A. Simmons, Marlene K. Squires, David A. Stanley, Terry A. Stefanovic, Leila G. Taylor, Irma J. Tirro, David A. Tucker, Dennis A. Weatherby, Susan L. Woodard, Paul F. Giusti, Norman N. Jacobson, Paul E. Joas, Joe W. Calderone, Chip Knudsen,** and **Nancy E. Pope;** and members of the NASA Headquarters/Contractor Support Team: **Cathy L. Horton, Marsha B. Rubin, Darron K. Fuller, Delora H. Maiden, Kimberly B. Muratore, Eric C. Raynor, Mary Jane Sanzo,** and **Betty P. Tai.**

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"Extending the Boundaries of Total Quality Management"

Eighth Annual NASA/Contractors Conference and National Symposium

November 6-7, 1991

George R. Brown Convention Center, Houston, Texas

Hosted by the Lyndon B. Johnson Space Center

Sponsored by the NASA Office of Safety and Mission Quality, NASA Quality and Productivity Improvement Programs Division

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NASA Quality and Productivity Improvement Programs Division
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National Aeronautics and Space Administration
Washington, DC 20546

EIGHTH ANNUAL NASA/CONTRACTORS CONFERENCE AND
1991 NATIONAL SYMPOSIUM
HOTEL INFORMATION

***Doubletree at Allen Center (* Conference Headquarters)**
400 Dallas Street
Houston, TX 77002

713/759-0202

Rates:	**$62 + tax**	**Government (Single)**
	$77 + tax	**Government (Double)**
	$94 + tax	**Corporate (Single)**
	$104 + tax	**Corporate (Double)**

Reservations must be made by October 6, 1991, to receive conference rates. Identify yourself as attending the Eighth Annual NASA/Contractors Conference.

Days Inn - Downtown Houston
801 Calhoun Street
Houston, TX 77002

713/659-2222

Rates:	**$50 + tax**	**Single**
	$60 + tax	**Double**
	$70 + tax	**Triple**
	$80 + tax	**Quads**

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1300 Lamar Street
Houston, TX 77010

713/650-1300

Rates:	**$95 + tax**	**(Superior, Single and Double)**
	$115 + tax	**(Executive Suite, Single and Double)**
	$400 + tax	**(Parlor Suite, 1 bedroom)**
	$495 + tax	**(Parlor Suite, 2 bedroom)**

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EIGHTH ANNUAL NASA/CONTRACTORS CONFERENCE AND 1991 NATIONAL SYMPOSIUM HOTEL INFORMATION

The Wyndham Warwick
5701 Main Street
Houston, TX 77005

713/526-1991

Rates:	**$66 + tax**	**Government (Single)**
	$89 + tax	**Government (Double)**
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2121 Allen Parkway
Houston, TX 77019

713/521-9321

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Appendix E - Summary Report Survey

Seventh Annual NASA/Contractors Conference Proceedings Customer Survey

1. **Did you attend the Seventh Annual NASA/Contractors Conference?**

   Yes _____ **No** _____

2. **How much of the proceedings did you read? (Circle one)**

   A. None
   B. Skimmed sections of document
   C. Skimmed whole document
   D. Read portions of document
   E. Read most/whole document

3. **How valuable are the proceedings to you and/or your organization? (Circle one)**

   A. Not Valuable
   B. Little Value
   C. No opinion
   D. Somewhat valuable
   E. Very valuable

4. **Do you think the proceedings are: (Circle one)**

   A. Too Short
   B. Just Right
   C. Too Long

5. **What would you add or exclude from the proceedings?**

   Add:

   Exclude:

6. **Rate the timeliness of the proceedings: (Cirlce one)**

   A. Takes so long it's not useful
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   C. Timely

7. **Any additional comments?**

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