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## **DEFINING THE PERFORMANCE GAP: CONDUCTING A SELF-ASSESSMENT**

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### **PREFACE**

This paper presents two different approaches to performing self-assessments of continuous improvement activities. Case Study 1 describes the activities performed by JSC to assess the implementation of continuous improvement efforts at the NASA Center. The JSC approach included surveys administered to randomly selected NASA personnel and personal interviews with NASA and contractor management personnel. Case Study 2 describes the continuous improvement survey performed by the JSC Safety, Reliability, and Quality Assurance (SR&QA organization). This survey consisted of a short questionnaire (50 questions) administered to all NASA and contractor SR&QA personnel. The questionnaire is based on the eight categories of the President's Award for Quality and Productivity Improvement. It is designed to objectively determine placement on the TQ benchmark and identify a roadmap for improvement.

### **INTRODUCTION**

We have been following Continuous Improvement (CI) principles at JSC for many years, although only in the last several years have we recognized our efforts as part of a CI program. Of course, the degree of implementation varied from organization to organization and we had never measured how well we were doing within individual organizations or, for that matter, Center-wide. After conducting management retreats and consulting with outside sources, we decided that an internal self-assessment of our progress would help us baseline our efforts to date. The self-assessment survey would provide a benchmark placement based on the President's Award criteria; point out the strengths and weaknesses in our CI implementation; allow development of action plans to focus on areas for improvement; and help identify communication problems.

JSC conducted a Center-wide survey in 1991 and established a benchmark based on the President's Award criteria. The same survey was conducted in May, 1992 and other measurement techniques were added to supplement this survey. The entire survey in 1992 consisted of several different data gathering tools including the Center-wide survey administered to 325 employees; personal interviews with 100% of our top executives; organizational questionnaires focusing on specific CI accomplishments; and surveys of managerial employees at four major contractors concerning the impact of JSC's CI efforts on the contractor community.

While these Center-wide activities were taking place, the JSC SR&QA organization initiated their own independent self-assessment activities. This consisted of a CI survey conducted in June 1992 that was administered to all SR&QA personnel (NASA and contractor). Actual

participation in the survey was about 90% (A total of 633 respondents out of about 700 personnel). As with the JSC Center-wide survey, this survey also provided a benchmark based on the President's Award criteria. Loral Space Information Systems, the main JSC SR&QA contractor, had previously developed a benchmark in 1991 using the same criteria. However, only high level contractor managers were used to establish that benchmark.

With these two independent and simultaneous CI survey activities, we learned a great deal about ourselves and how effective we have been in establishing, communicating, and implementing our CI goals and objectives.

## **CASE STUDY 1 - JSC SELF-ASSESSMENT**

### **BACKGROUND**

Historically, the JSC efforts had focused on R&D productivity initiatives and the Team Excellence program. In the Fall of 1989, we conducted the first self-assessment of our quality environment. We did this prior to applying for OMB's Quality Improvement Prototype Award; and indeed, we did receive this award in 1990. Shortly after this self-assessment was conducted, a number of our organizations (particularly Engineering and SR&QA) became extremely interested in quality improvement. Managers started reading publications and attending seminars on Total Quality (TQ), which we are now beginning to refer to as Continuous Improvement (CI). In July of 1990, 150 JSC managers attended a W. Edwards Deming seminar held in Houston and jointly sponsored by JSC and Loral, our SR&QA support contractor. This was the first exposure to CI for many of our managers and it helped us realize that we needed a formal CI program at JSC.

In the Summer of 1990, we formed an ad hoc committee composed of JSC managers to determine the strategy to set up and implement a CI program. The committee members decided that the program should start at the top level of management, so they initiated CI training for themselves as a first step. After evaluating several potential consultants and vendors, they selected The Cumberland Group to help us develop an implementation plan, establish a CI benchmark and structure, and provide the first phase of CI training. Cumberland conducted the first employee CI survey in February 1991 and also conducted executive interviews. A month later, we held a 2-day retreat for our senior executives and their deputies. At the retreat, the executives became aware of and committed to a CI philosophy and approach; updated the JSC vision, mission, goals, and objectives; chartered the Executive Council which includes all direct reports to the Center Director; and determined our benchmark placement based on the President's Award criteria.

In April 1991, the JSC TQ Steering Committee, which is composed of the Deputy Directors from all JSC organizations, was formed and became the 'shepherds' of our Center-wide CI implementation in developing our overall policy and strategy. We also established subcommittees to oversee the implementation of CI training and strategic planning, and the formation of process improvement teams. By June 1991, we had started the formal implementation of our CI initiative. This included two day training sessions, taught by The Cumberland group, for all managers and supervisors; training of future in-house facilitators; training in analyzing work processes and in the use of TQ tools; and training of Q+ Team personnel. Our Q+ Teams (we have one team per directorate or program office) are CI initiative partners with management. They are responsible for establishing systems to implement CI activities in their organizations and for helping our employees become more

knowledgeable about and involved in our improvement efforts. With our Q+ Teams trained and in place, our managers trained, and our facilitators identified, we were ready to move forward with our CI efforts.

## **DEVELOPMENT AND ADMINISTRATION OF DATA GATHERING TOOLS**

About one year into the JSC CI initiative (April-May 1992), we conducted a self-assessment of the state of the Center in preparation for a two day retreat for the Steering Committee and our Q+ Team Chairs. The goal was to assess the direction that JSC should take in CI activities for the next year. As mentioned in the Introduction, five data gathering tools were used to perform the self-assessment:

- 1) A 107 question quality survey keyed to the President's Award criteria was administered to 325 randomly selected Civil Service employees. This was basically the same survey administered to 125 employees in early 1991, although 15 new questions focusing on strategic planning, goal setting, and empowerment were added.
- 2) This same quality questionnaire was administered to our 15 Q+ Team Chairs. These employees were considered more knowledgeable than most employees about our CI activities because of their involvement in planning and implementing CI programs for their organizations.
- 3) The top 18 members of the JSC senior staff were interviewed to determine their involvement in and their plans for CI, and their view of the progress we have made to date in CI. The interviews consisted of 14 open ended questions specifically prepared by JSC for these executive interviews.
- 4) Each of the Q+ Teams completed a JSC-designed questionnaire on CI accomplishments in their organization. The questionnaire focused on education, improvement opportunity identification, continuous improvement implementation, and measurement.
- 5) We also surveyed managers at four major contractors to gain their input into JSC's CI objectives, barriers, actions, and plans as they relate to the contractor community.

The data gathered from these five tools were first analyzed on a Center-wide basis. Later, individual organization results were available to each Directorate/Program Office for their own analysis and action planning.

## **ANALYSIS OF FINDINGS**

To analyze the results of the self-assessment, we formed five JSC subcommittees with members from the JSC TQ Steering Committee and the Q+ Team Chairs. The subcommittees and their areas of concentration were 1) Strategic Planning; 2) Leadership, Empowerment, and Training; 3) Process Improvement; 4) Measurement and Benchmarking; and 5) Customer/Supplier Partnerships. Each subcommittee had access to all five data sources in analyzing JSC's performance in the eight categories of the President's Award. The analysis performed by each subcommittee included:

- 1) Correlation of survey questions with the executive interview data.
- 2) Analysis of Center-wide responses versus responses from Q+ Chairs.
- 3) Analysis of statistically significant differences between 1991 and 1992 data.
- 4) Analysis of implications of highest and lowest ranked questions.
- 5) Identification of strengths and weaknesses in each Award category.
- 6) In-depth review of elements at each level in the President's Award criteria against JSC's accomplishments to date.
- 7) Benchmark placements and rationale for the placement.
- 8) After-the-fact comparison with the 1991 benchmark placements which were established solely by JSC Senior Staff at their March 1991 retreat. Except for Training and Strategic Planning (which were the two major areas of Center-wide focus during our initial deployment of TQ in 1991-1992), all the 1992 benchmark placements were lower than those assigned in 1991.

## **RESULTS OF SURVEYS AND INTERVIEWS**

The Steering Committee and the Q+ Chairs held a retreat in June 1992 to discuss the results of their analysis of the survey data. Each subcommittee presented the strengths and weaknesses and the benchmark rating for their assigned areas of concentration. They also recommended three objectives for the next year based on the identified strengths and weaknesses. This retreat resulted in a common understanding of the future CI direction for JSC and identified specific objectives and action plans to focus our CI activities for the next year. Additionally, we formed a separate training advisory subcommittee to continue our emphasis in this critical area.

Following the June retreat, the Steering Committee met with the Executive Council in July 1992 to finalize the 1992-1993 objectives and actions and to establish priorities. This meeting was designed to get the 'buy-in' of the top tier of JSC executives and to ensure that the Executive Council was willing to commit the time and resources needed to achieve the objectives. We felt the meeting was very successful and provided the opportunity for the Executive Council (the 'Owners') and the Steering Committee (the 'Implementors') to discuss and then finalize our CI direction for the coming year.

## **NEXT STEPS**

We plan to conduct a comparable self-assessment annually. The quality questionnaire will be reviewed to determine if additions or modifications are required. We also plan to incorporate CI questions in the next NASA-wide Culture Survey. Using these survey techniques and any new methods that we develop, we will determine our benchmark placements annually and assess the effects of our improvement efforts. In the interim, the subcommittees that we established will work to accomplish the objectives and actions that were adopted. Individual organizations will also analyze their own survey data to assess their TQ implementation efforts and to establish their own objectives and action plans.

## **CASE STUDY 2 - SR&QA SELF-ASSESSMENT**

### **BACKGROUND**

In conjunction with the Center-wide CI activities, the JSC SR&QA organization initiated our own CI program. At first, many of these activities were focused on the Loral (contractor) side. We established a Loral TQ Steering Committee in 1990 to guide our efforts. Following this, we formed process improvement teams that were primarily composed of contractor personnel. Strategic goals were set and teams were established to define objectives for these goals. We conducted an internal culture survey and also identified teamwork inhibitors via a survey that did include NASA SR&QA personnel. All personnel were briefed on the results of the culture survey and the teamwork inhibitor survey.

In 1991, NASA and Loral joined together to form a joint SR&QA TQ Steering Committee. The Deming seminar was conducted in the spring of 1991. Through a series of retreats, we developed integrated NASA and Loral goals. In the summer of 1991, we established our first TQ benchmark placement, based on the President's Award criteria, using inputs from Loral management personnel only. Our process improvement team activities continued, but more NASA personnel were assigned to the teams. Our training department began training in the use of TQ tools, facilitator skills, and team building for all SR&QA personnel.

By late 1991 to early 1992, we had conducted strategic planning seminars where we defined our Mission, Goals, and Values; our improvement objectives were defined; and teamwork between NASA and Loral was really emphasized by management. Loral and NASA employees were beginning to work as teammates in their day-to-day activities as well as on the teams to which they were assigned. We thought the time had arrived to perform an internal self-assessment of the progress we had made in our CI activities

### **DEVELOPMENT AND ADMINISTRATION OF DATA GATHERING TOOLS**

We decided to continue to use the President's Award criteria for our self-assessment benchmark because we had a previous benchmark using this criteria and the JSC survey was also using this criteria. Thus, this would provide several benchmark comparisons. The American Productivity and Quality Center (APQC) prepared the initial questionnaire for the survey. We changed some of the wording of the questions and added/deleted some questions to tailor the questionnaire to our employees needs. The final questionnaire consisted of 50 questions, 10 of which were designed to obtain demographic data. In addition to the demographic questions and the specific questions, we developed codes for each organization to allow sorting by organization and to assure anonymity for the employees. The remaining 40 questions were keyed to the eight categories of the President's Award criteria with five questions per category. These categories are represented by the bars designated as A through H on the SR&QA benchmark Chart (See Figure 1, SR&QA Continuous Improvement Benchmark) and are defined as:

- A) Management Leadership & Support
- B) Strategic Planning
- C) Customer Satisfaction
- D) Employee Training & Recognition
- E) Employee Empowerment and Teamwork
- F) Continuous Improvement Measurement and Analysis
- G) Continuous Improvement Activities
- H) Quality Productivity Improvement Results

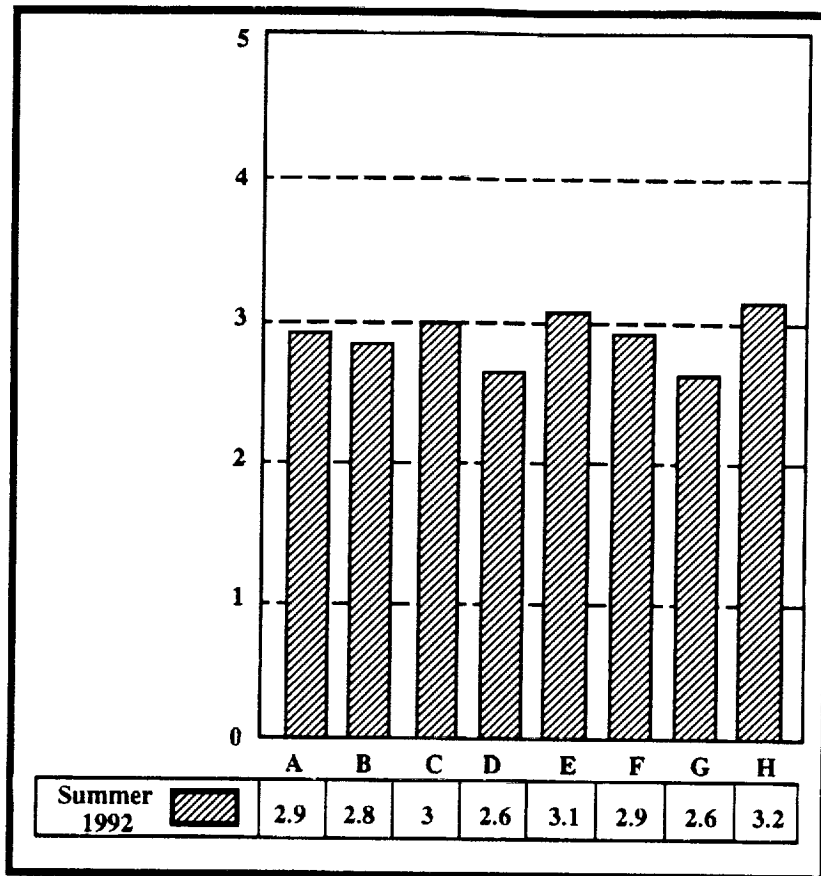


FIGURE 1 - SR&QA Continuous Improvement Benchmark

The self-assessment survey had three basic purposes: 1) Provide an objective means for determining our placement on the benchmark chart, 2) Provide a roadmap for identifying areas that need improvement at the working group level, and 3) Provide a baseline for measuring the effectiveness of our improvement efforts. Each group of five questions for the eight categories was designed to objectively determine our placement with respect to the five status levels of the President's Award criteria. In addition, each individual question was carefully designed to measure different aspects of each category. For example, the aspects of Category A (Management Leadership & Support) are goal-setting, top-down communication, bottom-up communication, evaluation, and recognition. Individual questions in Category A address each of the aspects. We had decided that the survey would be provided to all SR&QA employees rather than a randomly sampling of employees. This included NASA (at JSC, White Sands Test Facility, and Downey/Huntington Beach), and contractor employees from Loral (the main SR&QA contractor), SIMCO (who operates the SR&QA calibration laboratory), and Webb-Murray & Associates (who are responsible JSC industrial safety, test safety, and the Safety Learning Center). We realized that a special plan was required to assure that a large percentage of employees participated in the survey. So, on a published schedule basis, we provided NASA and contractor focal points in the building where the employees worked to solicit their responses. Electronic scan sheets and the survey questionnaire were available in these locations and the employees were encouraged to come into the room to complete the survey. We briefed them on the value of the survey to them and to the SR&QA organization

and assured their anonymity. No names were required on the response sheets, groups with less than five employees would not be provided separate reports, and management was not allowed to see individual responses. This approach resulted in an overwhelming response: with slightly over 700 employees, we received 633 responses to the survey.

While we were planning the collection of survey data, we contracted with the University of Houston Clear Lake (UHCL) to develop the database and reporting system for our survey data. The President's Award criteria is scored from 1 to 5 points. After discussion with APQC and UHCL, we decided to use a scoring scale of 1 to 10 (1 representing inadequate implementation; 10 representing excellent implementation). These scores were then converted to the 1 to 5 scale. This would allow a larger range of responses and provide more granularity in our survey results.

## **ANALYSIS OF FINDINGS**

We completed the survey and received our reports in July 1992 from the UHCL. Individual reports were prepared and distributed for about 55 organizations. Other reports were developed by 'rolling up' individual reports into the next higher level of management. Each report included a bar graph summarizing the average response for each survey category as well as detailed data on the responses to each of the five questions in each category. The responses to the 10 demographic questions were summarized only at the top management level for NASA and each of the individual contractors.

As mentioned previously, the objectives for this self-assessment survey were to determine our placement on the benchmark and, more importantly, to identify areas for improvement at the lowest possible working group level. The first objective was realized with the average benchmark scores from the survey (See Figure 1). The second objective was reached by carefully analyzing the survey data to identify areas for improvement, develop action plans, and implement actions. The joint SR&QA TQ Steering Committee was responsible for identifying the top level tasks that required improvement actions (such as benchmarking improvements) and for assuring integration of lower level activities. Each organization reviewed their own survey data, discussed the results with their employees, and developed action plans to initiate improvements in their work area. These improvement ideas were shared with their management and with other organizations.

## **RESULTS OF SURVEY**

For the overall SR&QA organization, the benchmark placements for each category ranged from 2.6 to 3.2 as can be seen in Figure 1. These scores were rather consistent from organization to organization. The lowest scores were in category D (Training and Recognition) and category G (Continuous Improvement Activities). Analysis of the responses to individual questions revealed that the deficiencies in category D were in measuring the effectiveness of our training program and in providing timely recognition of individuals and teams. Actions are being taken to develop training plans tailored for each employee. These individualized plans will address the needs of each employee in skills training, personal development training, and CI training. Currently, training effectiveness is determined through course evaluations that are completed immediately following the course. During the coming year, we will be implementing follow-up evaluations three to six months after each course. Through this method, we can determine the actual impact each course has had in improving performance. We have established a unified recognition program that includes NASA and contractor personnel. The timeliness of the presentation of recognition awards has been greatly increased.

The low score in category G was attributed to the lack of documentation and measurement of key work processes. A number of these processes have been documented, but they have not been made readily available to most employees. In many cases, process measurements have not been established. Our process improvement teams are making progress in documenting the processes and are beginning to establish meaningful measurements. Training courses on individual work processes are also being provided for employees. We have also identified a need for benchmarking studies in significant SR&QA processes. A pilot study has already been initiated; more studies will follow.

In addition to these actions, individual work groups are continuing to identify areas for improvement at the working level and are developing action plans to improve those areas. The SR&QA TQ Steering Committee is coordinating these efforts and provides a forum for sharing the 'lessons learned' by each work group. The Committee also is responsible for developing action plans for certain tasks that must be work at the top level of management.

### **NEXT STEPS**

The self-assessment survey will be administered to all SR&QA employees every six months for about two years. We will review the survey questionnaire and may modify individual questions based on this review. However, we will not make drastic changes in the questionnaire because we want to maintain a valid relationship to our established baseline. As new benchmark data is obtained, we will assess the effects of our CI improvement activities on the benchmark. Benchmark charts mounted on large boards have been placed in the primary buildings where NASA and contractor personnel are housed. The current benchmark placements are plotted on these charts and subsequent placements will also be plotted. This is a positive way of showing the employees that their participation in the self-assessment survey is important and to make them aware of the progress that has taken place in our CI efforts.

The value of this type of survey will probably decrease after about two years. So we will investigate new methods for assessing our CI performance. The first method that we are considering is the use of certified internal auditors to determine our benchmark placement.

### **CONCLUSIONS**

Although JSC and the JSC SR&QA organization are using slightly different methods for performing self-assessments, we are accomplishing a common goal: measuring our CI performance so that we can focus our resources on critical areas for improvement. Self-assessment using employee inputs is a quick, simple, and effective way of obtaining that measurement early in the CI initiative.