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A SURVEY OF TOTAL QUALITY MANAGEMENT (TQM) RESOURCE CENTERS

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This document describes a study of various models of Total Quality Management Resource Centers that have been established, and is intended to assist in the development of a design for a Department of Defense (DoD) TQM Resource Center. The Institute for Defense (IDA) surveyed eight organizations with TQM Resource Centers for their designs and operations. While a precise set of organizational models did not emerge from the data collected, three critical design issues did---the level of activity, the degree of centralization, and the philosophy of operation. Moreover, the data from the study did not argue for or against the establishment of a DoD TQM Resource Center, nor was IDA asked to make this determination. Although the organizations surveyed have successfully used TQM Resource Centers to improve quality, at least two organizations who were winners of the prestigious Baldrige Award for Quality did not invest in TQM Resource Centers. Further study is required by the DoD to determine whether a DoD TQM Resource Center is needed and who its customers would be.

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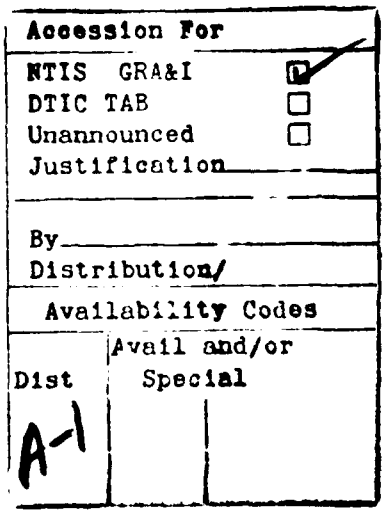
PREFACE

IDA Document D-745, *Survey of Total Quality Management (TQM) Resource Centers*, provides technical assistance in the development of a design for a Department of Defense (DoD) TQM (Total Quality Management) Resource Center. Specifically, we surveyed organizations in the industrial, government, and research communities to (a) assess whether they, and a future DoD TQM Resource Center, could establish a network to share information of mutual interest and (b) establish the different organizational models adopted, the subject matter of interest to different centers, and such other data as may be useful to DoD in considering what design it might adopt for a TQM Resource Center.

The importance of this document is predicated on its use to provide a basis for developing and evaluating plans for a DoD TQM resource center and is directed towards the Office of the Secretary of Defense (OSD) and the Navy Personnel Research and Development Center (NPRDC) who has been tasked by OSD to develop a design for a TQM resource center for DoD.

This document was reviewed on March 20, 1990 by the following members of the CSED Peer Review: Paul Richanbach (SF&RD), Robert Rolfe, Jesse Orlansky (STD), James Pennell, Robert Rolfe, William Akin, Robert Winner, and Terry Mayfield.



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EXECUTIVE SUMMARY

IDA Document D-745, *Survey of Total Quality Management (TQM) Resource Centers*, describes a study of various models of TQM Resource Centers that have been established. It is intended to assist in the development of a design for a Department of Defense (DoD) Total Quality Management (TQM) Resource Center. The Institute for Defense Analyses (IDA) surveyed eight organizations with TQM Resource Centers in the Federal, private, and academic sectors regarding their design, operation, and evaluation in order to identify different organizational models adopted, and make recommendations.

While a precise set of organizational models did not emerge from the data collected, three critical design issues - the level of activity of the center, the degree of centralization, and the philosophy of operation - did. Moreover, the data from our study did not argue for or against the establishment of a DoD TQM Resource Center, nor were we asked to make this determination. Although the organizations we surveyed have successfully used TQM Resource Centers to improve quality, at least two organizations which have won the prestigious Baldridge Award for Quality did not invest in TQM Resource Centers. Further study is required by the DoD to determine whether a DoD TQM Resource Center is needed and who its customers would be. However, if DoD decides to establish a TQM Resource Center, we recommend the following.

First, DoD should examine the strategic plan for implementing TQM within the DoD, with a view to identifying possible contributions a TQM Resource Center could make. Second, DoD should form a team comprising representatives of all groups whose work processes would be affected by the Center to analyze design alternatives and recommend a specific design.

This team should consider three critical design issues that emerged from our study. The first is that there seem to be two separable levels of activity among the Resource Centers studied. At the lower level, activity is restricted to library-like functions of collecting, storing, and retrieving information. Other Centers augmented these functions with services such as consulting and technical assistance, the development and demonstration of tools, techniques, and case studies, and the development and running of training courses, seminars,and workshops. The decision about activity level has implications for several design issues including size and qualifications of staff, services and

products offered, types of information collected, size of budget, and networking requirements.

The second critical design issue is the choice of whether to decentralize or centralize the Center within the parent organization. While several respondents argued for decentralization by pointing out that quality should not be a separate function but integrated into the business of the organization, centralization may be a practical necessity in a large organization. The largest Resource Center surveyed was centralized, even though it shared the philosophy that quality should not be delegated. Again, this issue has ramifications for the design and operation of the Resource Center.

The third issue is a philosophical one. Whatever model is selected, three conditions must be present. The first is *commitment and leadership* at the top of the unit desiring to implement an increase in quality. The second is *flexibility* in manner of proceeding (allowing and encouraging innovation,) and the third is *involvement* at all levels of the organization.

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1. INTRODUCTION

1.1 PURPOSE

The Office of the Secretary of Defense (OSD) and Navy Personnel Research and Development Center (NPRDC) asked the Institute for Defense Analyses (IDA) to study support centers in a sample of organizations with well-established quality improvement programs. The purpose of the study was to provide an empirical basis for presenting design alternatives to the OSD regarding any planned TQM support center and thereby to provide the OSD with a rationale for making design choices. It is this study that is described in the present report. The question of whether or not the DoD should have a resource center is beyond the scope of this study.

The following elements of Task Order (IDA Task Order T-B5-714) guided the study:

a. Identify organizations that might be interesting for further study.
b. Assess whether a network could be established to share information of mutual interest.
c. Analyze the information provided by these organizations to establish the different organizational models adopted, the subject matter of interest to different centers, and such other data as may be useful to DoD and Department of the Navy.
d. Evaluate how a DoD Resource Center might supplement existing educational, library, or research facilities, and address its design, operation, and evaluation.

Specifically, the study examined features of each organization's quality support center [1], through a standardized set of questions administered in the form of a questionnaire. The study was undertaken to provide a basis for recommendations concerning the design of a Department of Defense (DoD) Total Quality Management (TQM)

[1]The terms, "resource center" and "support center" are used synonymously in this report.

Support Center. The document discusses the background of events from which this study evolved, describes the approach used in planning the study (design of questionnaire, selection of sample), describes and analyzes the results obtained, and offers recommendations, based on the results, for the design of any future support center which might be mandated by the Office of the Secretary of Defense (OSD) as part of the implementation of TQM within the DoD.

1.2 BACKGROUND

Executive Orders EO 12552 (Feb. 25, 1986) and EO 12637 (Apr. 27, 1988) mandated that every federal agency design a plan for increasing its productivity. In August 1988, the Secretary of Defense formally announced adoption of Total Quality Management, DoD Total Quality Management Master Plan, August 1988, as the DoD's vehicle for responding to EO 12637.

The DoD Total Quality Management Master Plan was aimed at "establishing a consistent purpose and approach to TQM implementation" within the DoD. It did not specifically mention a resource or support center as an element in the plan. Many organizations we surveyed have achieved the goals of TQM by setting up an organizational unit identified as a resource or support center. However, these goals can also be met in the absence of such a center. In fact, two organizations[2] that have won the intensely competitive Baldridge Award for Quality had no unit designated as a resource center.

The OSD asked the Navy Personnel Research and Development Center (NPRDC) to draft a strategy for TQM education and training within the DoD. A draft report on this topic was produced in June 1989[3]. In that document, goals within three different time perspectives (sh .t-, mid-, and long-range) were identified. Among the long-range goals were the following: "DoD will have a support network of resources and communications internal and external to DoD" (p. viii), and as a supporting mid-range goal, "A DoD resource center will be in operation" (p. viii).

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[2]Westinghouse Commercial Nuclear Fuel Division, and Motorola Company.

[3]Greebler, C.S., & Suarez, J. G. (July 1989). *An Education and Training Strategy for Total Quality Management in the Department of Defense* (Tech. Note 89-28). San Diego, CA: Navy Personnel Research and Development Center.

Thus, at this early planning stage the idea of a resource center was linked specifically to education and training functions, e.g.: "A DoD resource center is also necessary for an effective education and training program. The resource center should serve as a support network for resource materials and be a communication link to organizations both internal and external to DoD" (p. ix). To our knowledge, the idea of a DoD TQM support center has not been mentioned in any context other than education and training. This, however, does not mean that such a center might not play other roles as well.

As part of their assistance to OSD, NPRDC researchers undertook the task of providing recommendations for the design and operation of a DoD TQM Resource Center. These were delivered to OSD in November 1989.[4]

1.3 ACRONYMS

APICS	American Production and Inventory Control Society
ASME	American Society of Mechanical Engineering
ASQC	American Society for Quality Control
DoD	Department of Defense
EO	Executive Order
FQI	Federal Quality Institute
GPC	Georgia Productivity Center
IDA	Institute for Defense Analyses
IEEE	Institute of Electrical and Electronics Engineers
NPRDC	Navy Personnel Research and Development Center
OASTP	Office of the Assistant Secretary for Technology Policy, U.S. Department of Commerce
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
QSC	Quality Support Center
SME	Society of Mechanical Engineering
TQM	Total Quality Management

[4] Suarez, J. G., (Nov. 1, 1989). Proposed Elements and Functions of a Total Quality Management Resource Center for the Department of Defense (Draft).

2. APPROACH

2.1 IDENTIFICATION OF SAMPLE

Two sources suggested candidates for the sample. During a previous study[5], IDA contacted many companies who are implementing TQM and have corporate or division quality centers. The second source was Dr. Robert Sniffen of NPRDC (Washington office), who also had made a number of potentially relevant contacts. Candidate companies from both sources were combined into a single list.

Individuals on the initial list were telephoned and given a brief outline of the purpose of the study. In some cases, the contact's situation was found irrelevant to our purposes, and the contact was dropped. In some cases, the contact referred us on to other people either within the organization or outside it, and an effort was made to contact all these referrals.

When a pool of some thirty-five organizations had been contacted (six academic centers; nine federal agencies; fourteen private sector companies; and six other organizations), the information provided by telephone was reviewed, and a smaller sample was selected for questionnaire survey. The selection was made with a view to maximizing three characteristics:

a. Relevance to the DoD.
b. Demonstrated excellence of quality improvement efforts.
c. Variety of center designs reflected in the sample. Obviously, the choice of sample required certain trade-offs.

No claim is made that this sample is either random or representative in any rigorously defined way. A rigorous selection of the sample of respondents was beyond the

[5] *The Role of Concurrent Engineering in Weapons System Acquisition*, by Robert I. Winner et al., Institute for Defense Analyses Report R-338, December 1988.

constraints of time and money under which the task was done. The telephone interviews provided considerable confidence, however, that our pool included considerable variety.

One global constraint governed the size of the sample: The Paperwork Reduction Act requires approval by the Office of Management and Budget (OMB) if a survey is to be administered to more than nine members of the general public. The estimated time to complete this process was considerably beyond the limits established in the Task Order for delivery of results. This meant that only nine respondents representing organizations outside the federal government could be solicited.

2.2 DEVELOPMENT OF QUESTIONNAIRE

The objective of the questionaire was to capture information decision-makers would need to set up a new resource center. A provisional structure for the pre-questionnaire phone interviews was designed around the following questions:

a. When was the center established?
b. What services are offered?
c. Who are the customers?
d. How large is the operation?
e. What lessons have been learned?

These were used only as guidelines; most of the interviews were more free-form in structure, as respondents talked enthusiastically about what they did and in what context. Appendix A contains an example of the form.

The questionnaire items eventually used evolved from an effort to replace each of the questions above with a set of more specific ones, and to add new ones, based on the content of the phone interviews and on discussions with sponsors of the research. Besides asking questions about the organization's overall quality improvement effort, the questionnaire explored such parameters as center age and size, types of services and products provided, types of information collected, costs and how they are paid for, and the general operation of the center. The final questions asked, in an open-ended way, for advice on designing and operating a DoD TQM Support Center. Appendix B provides a copy of the questionnaire.

2.3 PILOT TESTING

Once a questionnaire was devised, two respondents were asked to use it to describe their own support centers and also to comment on ambiguities and other difficulties encountered with the questionnaire, and to make suggestions for its improvement. A third party, knowledgeable about TQM and about surveys but not working in a center, also provided comments. The questionnaire was revised on the basis of this input.

2.4 ANALYSIS OF RESULTS

This study was done using survey methodology. The survey method was suited to the goals and limits of this study, which was to gain an idea of what form the quality support center has taken in various organizations. But it would be a mistake to assume that the way in which the sampled organizations operate is now completely understood, since a survey can only yield a superficial view of its subjects.

Statistical analyses were not carried out on the raw data obtained because of both the small sample size and the nature of the data. While many of the items generated quantitative results, others were essentially qualitative and could not be assigned numbers (e.g., Do you have a mission statement? Does this group provide guidelines or standards for quality improvement procedures?). Because of the small sample size, essential treatment of information from this questionnaire has been descriptive and discursive rather than statistical.

3. RESULTS

3.1 RESPONSES RECEIVED

Eight individuals responded to our questionnaire. Five of these work with private sector commercial organizations, two with federal government agencies, and one in an academic center.

- Westinghouse Productivity and Quality Center (private)—A large private corporation with multiple divisions, and a centralized support center activity staffed by well over 100 people.
- Boeing Aerospace and Electronics Quality Improvement Center (private)—One division of a large private corporation, with its own small support center.
- Hewlett Packard Company Direct Marketing Division Quality Department (private)—One division of a medium-sized private corporation, which has no centralized support center but disperses its Quality Managers among divisions.
- GenCorp Aerojet Total Quality Management (private)—A medium-size private producer of defense with a decentralized TQM support effort
- Hughes Aircraft Company Electro-Optical and Data Systems Group Quality Directorate (private)—A medium-size private defense-related industry with a small centralized support activity.
- U.S. Department of Commerce, Office of the Assistant Secretary for Technology Policy (OASTP) (government)—A Federal government department, with a small quality support office.
- Federal Quality Institute (FQI) (government)—A Federal government activity set up expressly to support quality improvement efforts anywhere in the government.
- Georgia Productivity Center (GPC) (academic)—A center at the Georgia Institute of Technology set up to support quality improvement efforts anywhere in Georgia.

3.2 DESCRIPTION OF RESPONSES

This section presents brief descriptions of aggregated responses to most of the questionnaire items. Comments and reflections will be reserved for Section 4.1 (Summary Comments).

3.2.1 Parent Organizational Activity

Four of the parent organizations are engaged in service activity, and one of these cited design, manufacturing, and distribution activities as well as depicted in Figure 1, two claimed research and development activity, two indicated a mixture of activities (unspecified), and two others referred to "other" activities (unspecified). The total here is larger than eight because several organizations cited more than one activity.

Organization	R&D	Service	Design	Manufacturing	Distribution	Mixture	Other
Westinghouse							X
Boeing						X	
Hewlett-Packard		X			X		
GenCorp	X	X	X	X			
Hughes						X	
Dept of Commerce							X
Federal Quality Institute		X					
Georgia Productivity Ctr.	X	X					
TOTAL	2	4	1	1	1	2	2

Figure 1. Matrix of Organizational Activities Represented in Sample

3.2.2 Age And Size Of Center

Support centers responding ranged in age from 2 to 10 years (median age was 7 years), and in size of staff from 3 to 130 (median, 4). Age was computed by subtracting the date the center started from 1990. One center, Commerce, did not give a starting date. Another index of size, annual operating budget, ranged from $50,000 to more than $16 million. The median operating budget was between $200,000 and $250,000. Two centers (Hewlett-Packard and FQI) did not supply this data. Figure 2 depicts center age, while Figure 3 shows the number of staff and budgets.

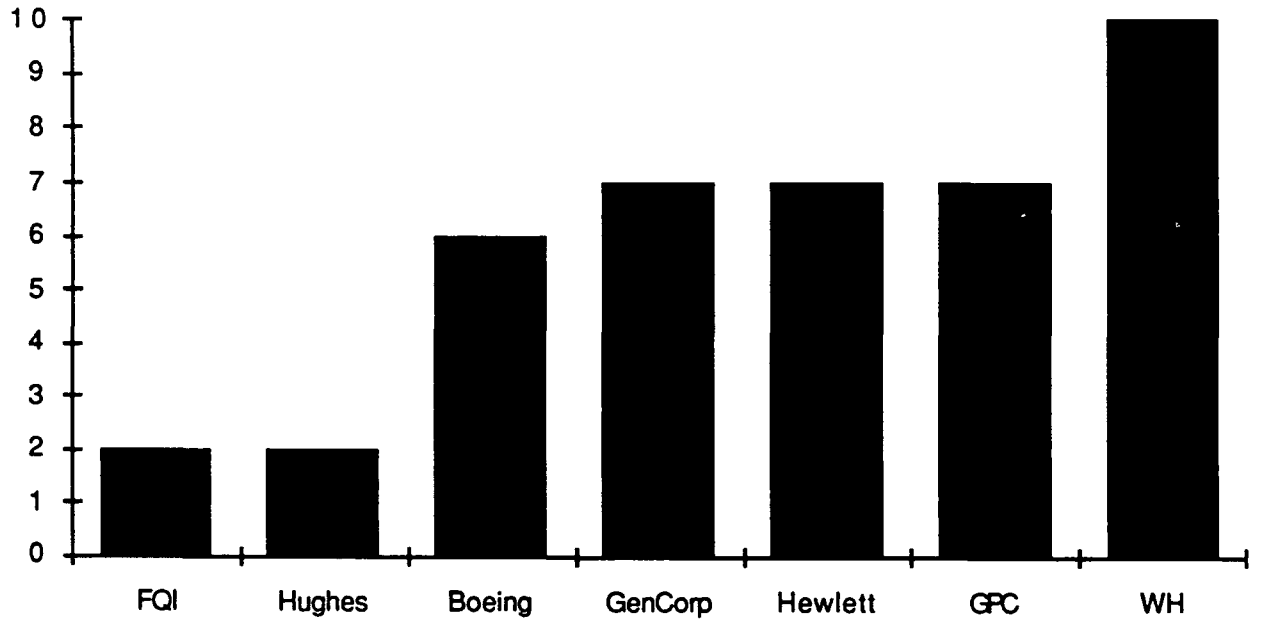

Figure 2. Age of Center

ORGANIZATION NAME	STAFF SIZE	BUDGET
Westinghouse	130	$16,000,000
GenCorp	3	$ 200,000
Hewlett-Packard	4	*
Dept. of Commerce	*	$ 50,000
FQI	7	$ *
Hughes	*	$ 60,000
Boeing	4	$ 350,000
Georgia Productivity Center	6	$ 250,000

* - not reported

Figure 3. Staff Size and Budget Size

3.2.3 Organizational Structure

People with specific responsibility for supporting quality-improvement efforts might be organized either as a centralized unit with its own identity (which is what "support center" suggests), or they might be decentralized among the operating units they serve. In this sample, we find both designs represented nearly equally among organizations which had the choice (see Section 4.2.2). However, three organizations did not respond to the question. Figure 4 illustrates the number of organization structures (centralized or decentralized) by type (Government or Private). The FQI is centralized as are Boeing and Westinghouse, whereas Hughes, Hewlett-Packard, and GenCorp are decentralized. The academic institution in the sample did not respond to this question and therefore is not included in the figure.

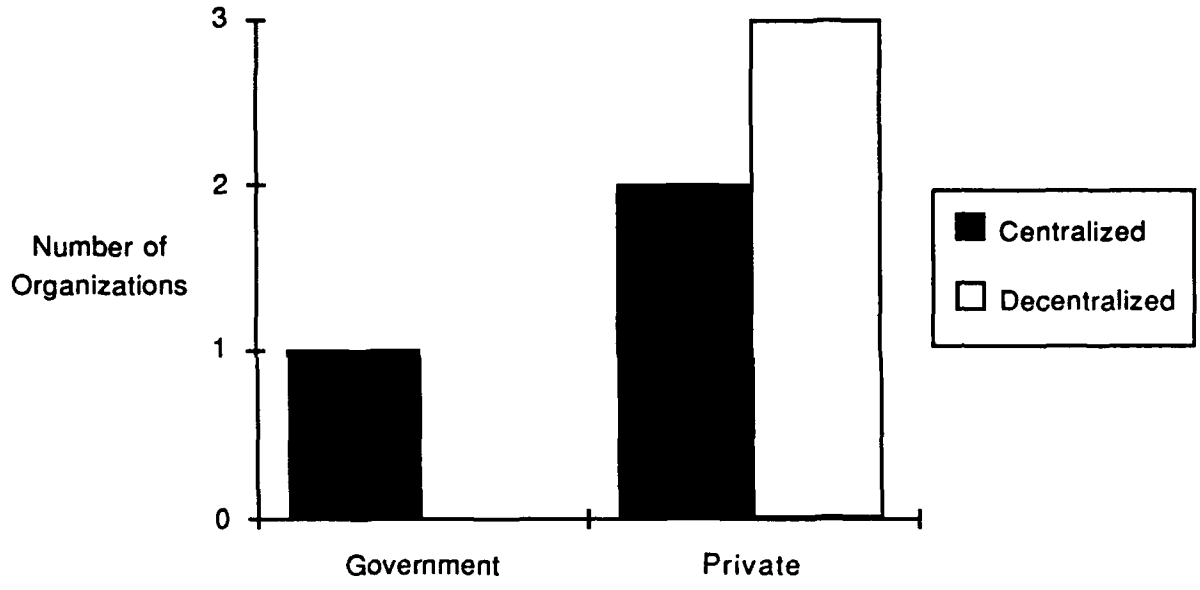

Figure 4. Organizational Type and Structure

3.2.4 Statement Of Mission

When asked to describe their mission, responses of the participants ranged from "catalyst" and "support" for quality improvement efforts to "change agent". Respondents operating in a decentralized mode were not required to have a mission statement separate from that of the unit in which they were located. Moreover, they did not want one. These people tended to argue that too visible identification of a person as a "quality expert" makes it easier for other employees to avoid taking responsibility for quality.

3.2.5 Key Concepts And Subject Matters

The key concepts they are trying to implement are of basic importance for understanding the centers described in these questionnaires. In view of the DoD's commitment to TQM, it is worth noting that six of the eight organizations in our sample labeled their quality improvement efforts as "total quality management" or "total quality control". All of these resposses are derived from or entirely consistent with statements of TQM philosophy.

Question D. Please describe briefly the key concepts and the guiding philosophy of your organization's particular quality improvement effort.

> (Hewlett Packard) continuously achieve customer satisfaction. It is done through continuous improvement: it applies to planning, customer focus, the improve-cycles manufacturing process management and total participation from employees.
>
> (Westinghouse) The key concepts are: focusing on process improvement, involving all employees, defining quality as "performance" rather than as a product attribute, emphasizing continuous improvement, focusing all efforts on satisfying the customer, specifying that customers may be internal as well as external, and setting goals to be the best. The importance of management leadership and commitment are heavily stressed.

FQI defined its key concepts as those of total quality management without giving any detail; the Commerce Department had no response because there is no ongoing quality effort within the parent organization.

Question 5. Does this group [the support center] provide guidelines or standards for quality improvement procedures? If so, how are the standards arrived at?

Of the five organizations who responded, one (Hughes) said: "No, the Quality Directorate presides over Quality practices and procedures as well as the Quality Improvement Plan." Four gave affirmative answers, and one of these (Boeing) provided "A Resource Guide to Management Involvement" to illustrate its guidelines. The affirmative answers, however, indicated a fairly low level of standardization with much choice left up to individual expertise and judgement. For example:

> (Hewlett Packard) Both the Quality Department [decentralized] and the Division managers do it. For overall guidelines our Corporate Quality Department put together some guidelines based on the Baldridge Award.
>
> (FQI) [Consultants] offer guidelines as to good procedures, but these are not highly standardized. Based on research, consultation, discussion.

Question 6. How much flexibility is allowed to individual managers (or units) in the parent organization, with regard to quality improvement processes?

Most indicated that managers and units have almost complete freedom to pursue quality as it seems best to them. Examples of the responses included the following:

> (Hughes) At present a lot of flexibility, they define their own processes and improvements.
>
> (GenCorp) Very much. Taking authority and risk-taking are encouraged.
>
> (Westinghouse) The process and its implementation are entirely the responsibility and the determination of local management in each operating unit.

3.2.6 Staffing

Question 8. What various disciplines and/or skills are represented?

Answers given demonstrate that existing support centers are staffed by people with a wide variety of expertise and backgrounds. The largest center (Westinghouse) includes professionals with backgrounds in industrial engineering, computer systems, organization design, quality assurance, and a variety of other disciplines, but the smaller centers are staffed by people with experience in management, sales and marketing, finance, and contracting.

Question 10. Selection criteria for staff?

> Replies emphasized line manager experience, interpersonal skills, and interest, as Hewlett-Packard expressed it, "in improving processes and working with others to do the same." Ability to communicate with and function as an integral part of, the line organization was implied by almost all responses, and this is often assured by selectiong people from within the line organization.

3.2.7 Definition Of Customers And Their Needs

Question 12. Who are the customers, or target population of customers, for the quality support center?

(Hewlett Packard) Supervisors and managers and whose who work for them.

(Hughes) All the divisions and directorates within the group.

(Westinghouse) Selected suppliers and customers of the parent company, as well as a small of number of other corporations who hire it as a consultant.

Customers for the government and academic centers are generally external to the parent organization and are harder to define with any precision. For example:

(FQI) Any Federal managers.

(GPC) [State] business.

Question 13. How are these customers' needs identified or defined?

Responses provided little detail. For the private sector, responses ran from the vaguely worded "it is determined in our planning process" (Hewlett Packard) and "by bringing in the customers and making them a part of the plan" (GenCorp) to the more explicit reply from the corporation with the most experience (Westinghouse): "We generally begin by helping the customer management to identify Key Issues - those improvement opportunities which will have a significant effect on the success of the enterprise, both short and long term." FQI uses "interviews in the unit as a basis for tailoring efforts." Presumably, these interviews are designed to elicite customer needs.

Customer requests for service play a large role in defining customer needs; e.g., one of the government centers (Commerce Department) said, "Customer needs determined by inquiry activity. Develop products based on inquiry trends." Inquiries and requests often undergo some processing beyond what the request itself contains, e.g., to separate "the symptoms from the disease" (Westinghouse) or to establish priorities among needs.

Assessment of an organizational unit (the customer) in terms of some abstract set of criteria represents the most ambitious approach to customer needs, and was not often mentioned. The academic center (GPC) puts its heaviest priority on "overall initial assessment of organization" as a way to establish client needs, and organizational

assessment is also strongly emphasized by the center with the longest history (Westinghouse). Only the latter in our sample has developed specific and systematic tools for analyzing customer needs.

Question 15. Is there any priority among identified needs? (Please describe.) Has this changed over the life of the Center?

Respondents indicated that priority among needs was generally tied to business priorities and/or to the views of senior executives, both of which do change over time. Another kind of change over time was illustrated by the Westinghouse response:

> In its early years, the Center was focused largely on [consulting about] ways of beginning the Total Quality Improvement process. As [corporate] operations mature, we are able to concentrate more on process improvement and customer focus.

3.2.8 Services Offered And Emphasized

Question 16. What services is the Center able to provide to your organization?

The question provided a checklist of fifteen possible services which separates naturally into two groups: library-like functions (information collection and retrieval) which might be considered minimal functions for a quality support center, and more active (and expensive) services such as consulting and technical assistance, tool or technique development, and training course development. All the responding organizations reported offering a basic set of library functions. Those which go beyond that into the more active services are also those centers with the larger budgets. Those which go beyond basic library functions also indicate that their most important services are in that more active group. However, there was not much consensus about which particular services were considered "most important." The assessment of what is "important" could reflect a number of circumstances that vary among organizations (such as top management preferences, or skills represented among center staff, or even simply the particular way the center grew). Figure 5 illustrates the number of companies offering different services.

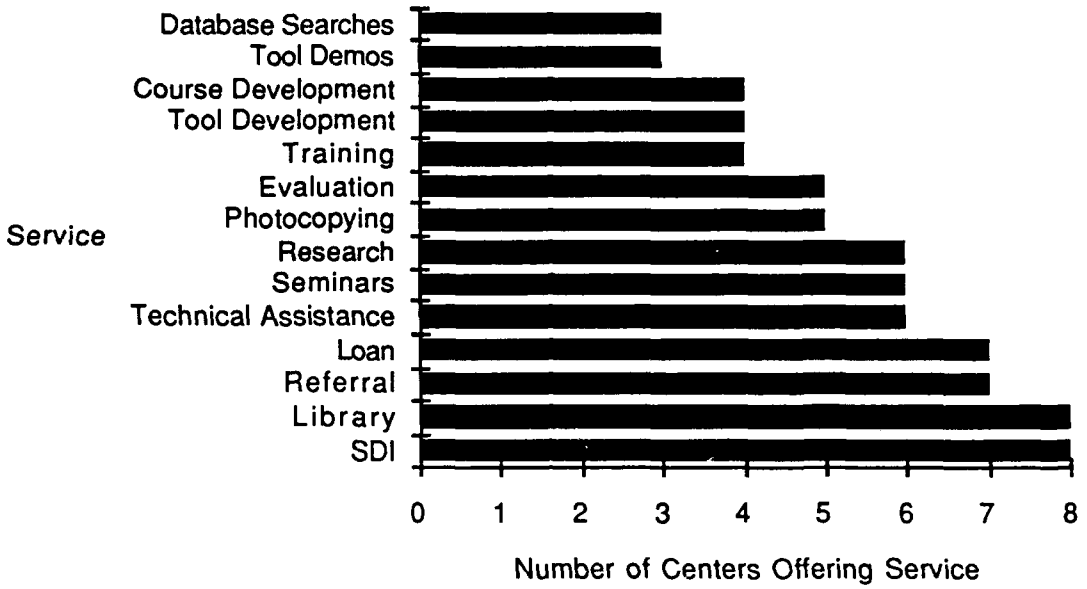

Figure 5. Frequency of Services

Within the sample as a whole, the most frequently offered services were as follows:

a. Selective dissemination of information (SDI)

b. Access to library of information on quality improvement

c. Loan of items from library

d. Referrals to other organizations, trainers, or consultants

e. Seminars, workshops, conferences

f. Consulting/technical assistance (note that half, a high ratio, of those offering these services considered them among their most important)

g. Conducting research/surveys, etc.

The services offered least often were the following:

a. Database searches

b. Technology/tool/technique demonstrations

c. Development of tools/techniques (but note that three out of the four offering this service marked it as very important)

d. Training courses

e. Course development as needed

Question 17. What materials are produced by the Center for customers?

It included a checklist of eleven items (see Figure 6). There is considerable variability among organizations, but the materials and products most often generated are brochures and directories (consistent with the nearly universal library function). The products generated least often are tools/techniques and self-assessment checklists. But note that both of those organizations reporting development of tools and techniques marked these products as among their most important. Case studies fall in the same category---rarely produced but considered very important by those who produce them. Generation of tools and techniques and case studies is labor-intensive and thus these are among the more expensive possible products. One respondent (Hewlett Packard), working in the decentralized mode, checked none of the items and noted, "We are consultants and teachers," and not (he implied) producers of documents.

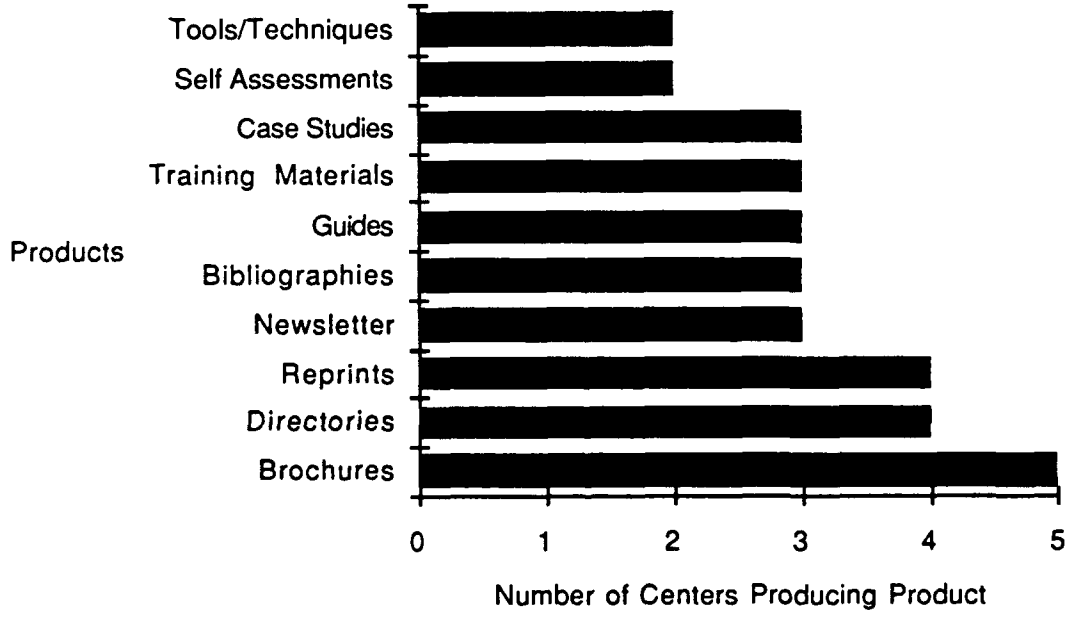

Figure 6. Number of Products Produced

Question 18. What types of information are collected and held?

Generic library functions were almost universal in this sample and nine possibilities were listed. Almost all the options were chosen by half or more of the respondents. The only options with a noteworthy low frequency of choice were audio cassettes (four) and project summaries (five).

Question 19. How is the center's information base created and updated?

None of the centers reported a formal, systematic procedure for finding materials and instead emphasized the individual judgement and activity of supported center staff. For example:

> (FQI) Subscribe to ten journals, several newsletters. Maintain topical file of selected articles. Staff attends workshops, conferences. Read research literature.
>
> (Boeing) Accretion by all members of center.

Question 20. How is information for collection evaluated and selected?

> (Boeing) Random process, no structured activity.
>
> (FQI) Not standardized. Based on staff experience.

Queston 21. Can you provide a copy of your information indexing or classification system? (If not, can you outline it briefly?)

We received no actual classification systems being used. Six centers either gave no answer or said they had no classification system, one said classification was done by way of key words, and one responded, "It is specific to our needs in our business. And it is highly competitive."

3.2.9 Operations

Time required to get the support center up and running had a median value of six months (three organizations did not respond). Figure 7 shows the responses. Problems encountered in getting started were described only in brief terms such as finding funding,

staff selection, decisions about organization and structure, defining scope, reporting level, and direction, and creating effective marketing techniques.

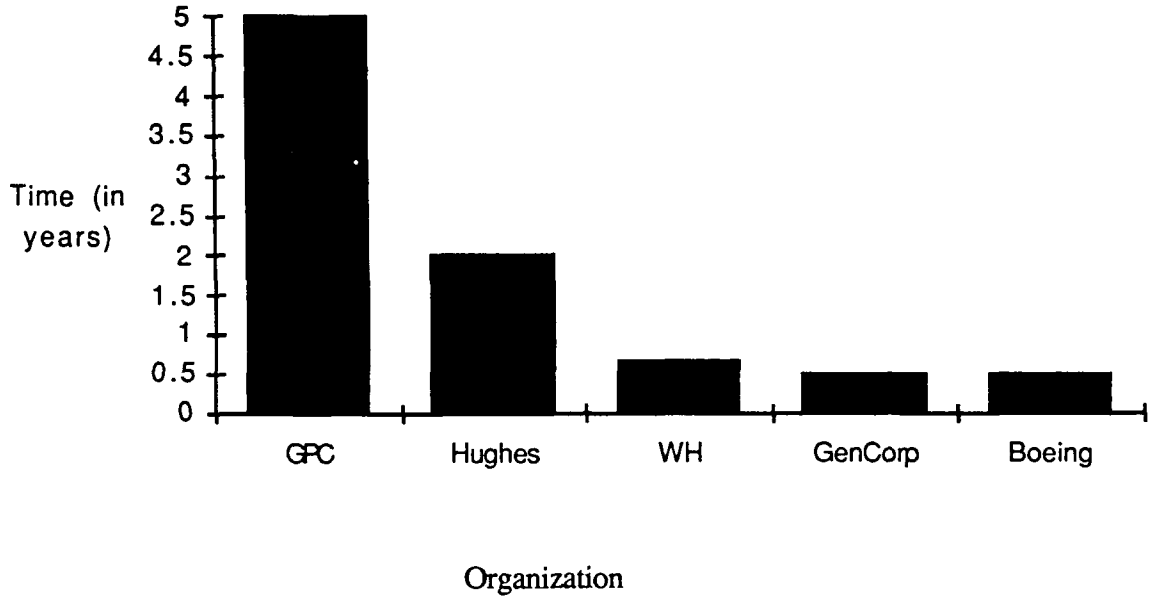

Figure 7. Time to Get Center Up and Running

Question 31. Who "owns" or is responsible for the center's overall process?

Replies generally pointed to the top executives of the operating unit within which the center resides, e.g., "Group executives" (Hughes), "Top staff person at Corporate and within each operating unit" (GenCorp), "Total Quality Council (Vice President and staff)" (Westinghouse).

Question 33. How has the process been improved over time?

TQM philosophy seeks continual improvement. Three organizations gave no reply, one candidly said, "Not much," and the rest said affirmed the beneficial effects of experience, for example:

(Boeing) Improved skills and knowledge.

(GenCorp) (1) Each major thrust is developed further. (2) Continuing reassessment of corporate/operating needs. (3) Continual updating by listening to the customer. (4) Assessment of what is going on in similar companies.

Not surprisingly, the most experienced center (Westinghouse) was the most explicit:

> Most recent improvement is the analysis and description of our key processes, along with teams assembled to work on improving them. Perhaps the most significant accomplishment of the past two to three years has been to integrate the various functions at the Center to address broad-based client problems as multi-functional teams.

Question 25. Who pays the costs?

Seven of the eight organizations reported that funding was out of overhead. Only Westinghouse, the largest and oldest of the centers, charges fees for services where fees cover 85% of costs at present, and the center aims to be entirely fee-based by 1991.

Question 38. Are there any plans for changing the way the Center operates? What are they, and why are the changes being made?

Most gave some form of positive answer but without much detail, for example:

(Boeing) Continuously, to improve service

(GenCorp) To use synergism, by bringing together all operating unit talents, and make available corporate wide.

(GPC) More research.

3.2.10 Networking

Question 37. Does the Center maintain communications with people or groups outside the parent organization? With whom?

In a field where new ideas appear frequently and few organizations have much experience, there is a great deal to be gained through participating in a network of people with similar interests. Replies covered a wide spectrum including customers, suppliers, professional organizations, professionals in productivity, quality, competitiveness, and

other centers. Westinghouse noted that communication with other corporations' quality organizations has probably been their most useful form of networking.

How are communications maintained outside the parent company?

Responses were heavily weighted toward face-to-face communication, as for example:

> (GenCorp) Attendance, membership, participation, public speaking, etc.
>
> (Westinghouse) Exchange of visits, society meetings, participation in societies, conferences, sponsored seminars, exchange of newsletters, serving on Boards of Directors.

Electronic networking was never mentioned.

3.2.11 Evaluation Of Centers

Question 32. By what measures is the Center's process monitored?

We got a variety of answers but almost none with the specificity we had hoped for. Only the oldest center was able to be explicit:

> (Westinghouse) Current key measures are Corporate Allocated Expense (corporate subsidy expressed as a percentage of total expense); number of employees serving on Total Quality Fitness Review Teams (best Quality training course we have found); number of employees rotating back into [company] line organizations...; percentage completion of the annual Total Quality Improvement Plan ...; cost of "unquality" (being developed); and customer satisfaction (an index under development).

Question 35. Do customers evaluate the center, provide feedback? In what ways?

Evaluation by management is not the only kind to consider. The TQM philosophy puts great emphasis on customer feedback. Most responses described some form of routine feedback collection, ranging from "30-day follow-up by phone" to "We conduct a biennial customer survey of every general manager ... Currently, each consultant and manager individually contacts customers to request feedback. Every meeting, seminar,

presentation, etc. is concluded with the attendees filling out an evaluation and rating form. These are assessed and used for improvement."

Question 36. How is customer feedback used to improve processes?

Four organizations responded, but only two provided any specificity in their answers:

> (Westinghouse) Extensive modifications are often caused by this feedback, ranging from changing personnel assignments to methodological shifts and revision of tools.
>
> (GPC) Focuses seminars and services.

3.2.12 Final Questions

The final four questions we asked were different from the others in that they required the respondent to step outside the context of his or her own setting. We hoped to draw out reflections, implications and advice from respondents which might not be obvious from reading their other responses. It seems worthwhile to quote all responses here, rather than to summarize or paraphrase.

Question 40. What Topics Has This Questionnaire Not Covered?

> (FQI) Operating hours? Appointments required? Marketing mechanisms?
>
> (GenCorp) The quality of management itself—the most important ingredient.
>
> (GPC) How do we work with other centers? There are a lot of people reinventing the wheel. What research is being done to demonstrate the effectiveness of "known" productivity and quality tools?
>
> (Westinghouse) We believe an important element is to practice improvement as well as to support it and "evangelize" for it. We do both.

Question 41. Do You Think An Organization Like The DoD Needs A Support Center? If So, Would You Recommend Your Model, And Why?

> (Boeing) Not sure is DoD too high a level.
>
> (Hughes) Yes, to identify a *standard* approach.

(GenCorp) Yes and no. It does *not* need more bureaucracy! It should **not** be a permanent fixture; better, it should be from the outside, by contract!

(GPC) Yes, DoD probably does need a center. The budget cutbacks will force departments to become more effective and efficient. Any large organization can become better.

(Commerce) Yes. [Our model] provides customized information services and some technical assistance.

(Westinghouse) The only possible answer is, "It depends." It depends on the needs, the processes, and the goals of the organizations served. Our model has been extremely successful for [us] ... others have found other paths for the Total Quality journey.

Question 42. Can you identify any issues to which DoD ought to give special attention as it plans for future quality support centers?

(Westinghouse) The critical element in any Quality improvement effort is top management commitment and consistent participation. If a support center is to succeed, it must establish and maintain extremely close working relationships with the top management of the organization supported.

(FQI) Make it easy to use—not just another bureaucracy. Assess own unique needs and unique culture—probably need emphasis on manufacturing, R&D, various technical areas.

(Boeing) Highly skilled staff [This same center indicated elsewhere that it has since 1987 been emphasizing professional skills in its own staff.]

(Hughes) A strong tie to the traditional Quality and Oversight functions.

(GPC) Consider a departmental loan program where DoD personnel are "loaned" to the center for 6 months to one year. This will not only increase center staff but also provide great training for key managers who can take their experience back to operating units.

(GenCorp) Clean house within! Simplify the acquisition process; reduce the number of levels of agencies! Talk with its *own field customers*.

Question 43. Can you give any advice, general or specific, to the DoD with regard to its design for future quality support centers?

(FQI) Can it be decentralized?

(GPC) I would suggest regional based centers who can respond quickly and develop ownership in the DoD facilities they support. The centers should be staffed with systems and human resource people to provide a balanced team approach to continuous improvement.

(GenCorp) Leadership is the most important aspect of it. It needs a true leader to own it—outspoken, fearless, one who *takes* authority. Then,

don't listen to *all* sources equally. Use common sense to *differentiate the wheat from the chaff.* E.g., some academic sources are bunk! Others are excellent ... Don't fill your "pot" with mediocrity. Prioritize! Speak out! Question: Can a bureaucracy ever do all of the above, successfully?

(Commerce) Look at broader issues. See what areas the "quality journey" leads to. It's not self-contained. It may drive change in a wide range of areas.

(Hughes) Provide for linkage to existing certification programs, service activities and industry representative organizations.

(Westinghouse) The definition of the organization's role is an important key. [Our center] was defined as a "change agent" virtually from the start. Other missions and visions—such as "information center" or "training center" or "support center"—will cause the organization to take other courses of action. In our case, the desired result ... was to change the culture of [the corporation] to one of Total Quality.

4. CONCLUSIONS REGARDING RESULTS

We now summarize the individual responses that have just been described.

Although we did not receive responses from all the individuals who expressed willingness to complete the questionnaire, our sample includes organizations with sufficient variety to provide useful information. We obtained a picture of important ways in which existing quality support centers differ. Furthermore, the respondent organizations hold orientations toward quality and its improvement which show considerable consensus and overlap with the official DoD orientation, making their responses relevant to OSD.

We did not find a common pattern in remarks about getting a center going from scratch. Times taken differed, as did problems encountered. It appears that getting a center up and running is very much a matter of dealing with issues specific to the particular center. Projections of future operations were also varied and for the most part simply reflected the TQM philosophy of continuous improvement.

The people who are staffing the centers we investigated reflect a wide variety of backgrounds, skills, and expertise. Clearly there is as yet no standardization here. The same holds true for criteria used to select staff: experience and competence in some functional area is important, but emphasis is also placed on personal interest in quality-related work (a self-selection factor), and on the interpersonal skills that enhance consulting work. Implementing these criteria has produced a wide variety of people active in facilitating quality improvements in organizations.

Our data imply that defining the needs of customers for staff services is not yet a science. Everyone pays attention to customer needs, but getting close enough to the customer to clearly identify needs may not be as easy as it sounds. In any case, we did not obtain much detail on this point.

Almost all organizations in our sample collect and hold different forms of information relating to quality improvement. It was something of a surprise to find no

consensus on how to collect information, other than treating it as everyone's responsibility. But the domain of quality improvement is still new and information and ideas come in from many quarters. We did not learn much about what criteria are in use to judge the quality of information. The field is too new or the sample too small to generate clear indicators of quality. We infer that reasonable people may well differ in judging what information in this domain has value today. Regarding the management (in particular the classification) of information being held, it appears that this is something in need of development. In information collection, evaluation, and management, the highly relevant skills of library and information science professionals are being under-utilized.

Finally, in spite of the obvious differences among our respondents, which support the conclusion that there is no "one best model" for the design of a quality support center, three fundamental points seem agreed upon. These points are commonly made in the literature of quality improvement, and they were all emphasized at various points in our telephone and questionnaire responses. One is the need for *commitment and leadership* at the top of the unit desiring to implement an increase in quality. The second is *flexibility* in manner of proceeding (allowing and encouraging innovation), and the third is *involvement* at all levels of the organization. Whatever a TQM support center does, it should contribute to, and not impede, the realization of these conditions. On this there was a consensus.

4.1 IDENTIFICATION OF ORGANIZATIONAL MODELS

Our data are too limited, both by sample size and by fullness of response to items, to permit the identification of organizational models for resource center design. Moreover, our description of the eight support activities sampled in this study demonstrates that there is considerable variety possible among viable and effective centers, all operating with a similar perspective on quality—variety in size, budget, skills represented, services and products offered, problems encountered in starting up, methods for obtaining customer feedback, etc.

We infer that the whole quality movement, of which TQM is one manifestation, is still too new for strong conclusions to be drawn about how a support center should be designed and operated. Ultimately, it may be possible to conclude that certain techniques or procedures operate at their best in certain situations, but at this early stage variety seems appropriate and understandable. Only experience with these various solutions will tell whether general conclusions can be drawn.

Although we have not found evidence for one best model center, we can discuss two of the ways in which our sample members differed which seem to present central issues for any proposed design of an OSD support center. One is the level of activity of the center, and the other is the way it is organized, viz., centralized vs. decentralized. Each of these will be discussed in the following sections.

4.1.1 Activity Level

There seem to be two separable levels of activity shown among our sample. At the lower level, activity is limited to library-like functions: gathering, storing, and retrieving information which can be provided to users. This is the simplest and least expensive thing to do, and all centers who responded do it, although frequently without the aid of an information professional. Standards governing what information is of acceptable quality are still somewhat vague in this new and fast-developing area, as are systems for classifying and indexing the information held. All respondents seems to agree that even at this simple level it is important to tailor information to the needs of particular users, but resources for doing this vary enormously (from simple interviews with service-requesters, to highly systematic organizational assessments). Maintaining channels of communication with outside sources of information, i.e., some form of networking, which is the other activity at the lower level, is essential because it is not effective to seek new information only from a few standard and routine sources.

The higher level of activity and initiative includes the development of tools and techniques (tailored to particular users), consulting and technical assistance, developing and providing training courses, seminars, workshops, preparing case studies and the like. All of these are likely to require a larger staff, and greater expertise among staff members, than do the simpler activities. We were unable to obtain data on the costs of services provided; however, those that can afford these labor-intensive services consider the payoff high. It appears that decisions about services to be offered have implications for a number of other features of a center, which gives these decisions a central position with regard to design of a center.

4.1.2. Centralization

The choice of whether to centralize or decentralize people with responsibility for supporting quality improvement efforts is the second critical decision. It is available only where the customer group is part of, or very closely related to, the parent organization. Only if the QSC and the customer groups are part of the same whole can management decide to assign its TQM experts to functional divisions. Where customer groups lie outside the boundary of the parent organization, as with our government and academic groups, the expertise has to be centralized. Therefore, only our five private-sector organizations could choose either option. Among them we found both centralized and decentralized units in about equal number (two and three respectively). Figure 4 in Section 3.2.3 illustrates the situation.

We asked for reasons behind the choice to either centralize or decentralize, but no one answered the question. We can speculate that such choices, made several years in the past and at other levels of the organization than where our respondents resided, were in fact shaped by historical facts which cannot be captured in a questionnaire.

However, in the pre-questionnaire telephone interviews those respondents working in a decentralized context were explicit about what they perceived to be the value of that design. They want to avoid having a Department or Division of "experts" to whom responsibility for quality can be delegated (or, better, "relegated"). They believe having the "experts" be part of operating units broadcasts the message that quality is everyone's responsibility. Some do not use the words TQM and prefer not to talk about a quality "philosophy" at all; they prefer to help people in their units solve problems, and to teach the quality philosophy by bringing to bear certain concepts and techniques on the problem-solving process. At its extreme, this approach is represented by an organization which has some 120 Quality Managers scattered among its various divisions, each devising strategies and developing materials as he or she sees fit, functioning without company-wide manuals and universal training modules and with no attempts at standardization. From this perspective (rightly or wrongly), centralization means bureaucratization, in a pejorative sense.

It may be, however, that there is some organizational size, or user-group size, beyond which centralization is simply a necessity; we cannot answer this question with our data. In other words, in a large organization a centralized support unit may not reflect

beliefs any different from those just outlined; it may reflect only a practical reality. Our sample did include one large and centralized support center (working very effectively within a very large organization) which in fact seems to share the belief that quality should not be delegated. In any case, the choice here involves another decision with implications for a number of the characteristics of a TQM support group.

5. RECOMMENDATIONS TO OSD

We were not asked to answer the question of whether or not OSD *should* establish a quality support center (QSC) and we did not collect data to answer it. We have already pointed out that at least two organizations which have won the prestigious Baldridge Award for Quality did not invest in a quality support center to support their efforts. What we do recommend here is a set of steps to follow in the event that the OSD decides to consider establishing such a center.

Recommendation 1: Examine the strategic plan for implementing TQM within the DoD, with a view to identifying possible contributions a QSC could make.

At the first stage the aim should be not to provide a detailed blueprint but rather to ensure that any support center designed will play a necessary role in, and will function effectively with, the other elements of the plan. As this study has shown, various options are possible, with the one constraint that a QSC should be an integral part of a strategic plan for implementing TQM. A central issue to be considered in the light of the strategic plan is that of defining who the intended customers for a DoD TQM QSC would be.

The Office of the Secretary of Defense (OSD) comprises several thousand managers and staff, working mainly in a common location, the Pentagon. These people constitute a primary potential group of customers for TQM support services of any or all kinds. Even if the separate Services establish their own QSCs, the OSD will not be directly served. It is particularly important to note that the OSD includes the DoD Executive Steering Group for TQM, which has responsibility for overseeing the implementation of DoD policy and procedures regarding TQM. An OSD QSC could conceivably play an important role by providing support services tailored specifically to this group.

The need for defining bounded customer groups becomes clearer outside the OSD. In practical terms, one QSC for all of the DoD is an impossibility, and it seems highly likely to us that the Services will establish their own QSCs. If that is part of the strategic

plan, then an OSD QSC could play the important roles of coordination and communication among the various Service QSCs.

DoD's implementation of TQM will have implications for its suppliers. The TQM approach to quality argues that improvements come by way of managing processes, beginning with control over the input to any given process. The work done within the DoD depends on inputs from outside DoD. There will have to be some implementation of quality control and improvement within those suppliers. This is a very large issue and it will require many mechanisms to deal with it. An OSD TQM QSC might have a role to play in this enterprise.

In considering how a QSC could contribute to the DoD's implementation of TQM, the following possible roles (all of which were exemplified among our study sample) would undoubtedly be discussed:

a. Clearinghouse or library
b. Networking (maintaining channels of communication)
c. Coordinating and communicating
d. Training resource
e. Consultation resource (tailoring services to particular units)
f. Research and development of tools and techniques
g. Agent for culture change

This list has been arranged roughly along an activity dimension, with those first in the list involving the least or the simplest activity and initiative, and those further down involving considerably more. This dimension has both cost and benefit implications. The more active roles put the center in a position to help solve more of the significant problems in the organization and to spread an understanding of tools and techniques for quality improvement further into the workplace. In doing those things, the center is also signifying and making widely visible top management's commitment to TQM. However, doing those things also costs more money.

The authors believe it is important that attention be paid to how an OSD QSC might draw upon and supplement, but not duplicate, existing educational, library, or research facilities within the DoD.

Recommendation 2: Form a team to analyze design alternatives and recommend a specific design.

Composition of the team to perform this analytic and advisory task should be consistent with the TQM approach. This requires that the team include representatives of all the groups whose work processes would be affected by the center, especially decision implementors in the decision making process. This includes customer groups whose needs are to be addressed. Identification of these groups should have been an output of accomplishing the first recommendation.

The team should include at least top management, line management, budget managers, TQM staff specialists, librarians, educators, and a variety of potential customer representatives.

The team's final output should be a set of recommendations for the design of a center, including a plan for implementation of the design (assuming that at this point a center is still considered desirable).

An important part of the recommendations should be an explicit plan for evaluation of the center's operation. This should include a statement of expected benefits from the center's operation and identification of reasonable criteria for use in evaluating it. Evaluation is a difficult and complex matter, the heart of which is finding measures which are truly appropriate to the process being evaluated. Methods and approaches to help with finding appropriate measures within the context of TQM are under development and in use in various places and should be considered.

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