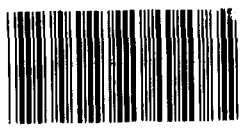
United States General Accounting Office

GAO

Report of the Comptroller General's Task Force on Interdisciplinary Management

April 1990

Diversifying and Expanding Technical Skills at GAO



GAO/PEMD-90-18

Volume 1

Executive Summary

Purpose

In September 1988, the Comptroller General established a Task Force on Interdisciplinary Management to review the utilization, training, and management of technical staff within the General Accounting Office (GAO), and to recommend any needed changes in the agency's management practices. The task force report is published in two volumes.

Background

Over several decades, GAO has hired staff with a wide range of technical skills to respond to the increasingly complex issues that the Congress has asked it to address. In this context, "technical staff" refers to employees with advanced training in disciplines that are outside GAO's mainstream professions—accounting and business or public administration. The term incorporates both staffmembers providing technical assistance in specific areas and those with technical training who function as evaluators producing reports.

To assess GAO's current management of this multidisciplinary staff and to identify potential alternative approaches, the task force carried out a series of related data collection activities. After formulating an operational definition for technical staff (p. 28), task force members conducted a census of those technical staff currently employed by the agency, and interviewed a sample of 43 former technical and nontechnical GAO staffmembers. All current technical staff (470 persons) and midlevel GAO managers (375 persons) were then queried via two mail surveys, which obtained response rates of 92 percent and 89 percent respectively. In addition, the views of 38 of GAO's senior managers were elicited through six focus groups. The range of available alternatives was explored through a systematic review of relevant literature, as well as interviews with outside experts and nontechnical managers of technical staff in both public and private organizations.

Results in Brief

GAO has had notable success in building a workforce with strong technical skills and is making great headway in its efforts to manage that workforce in an interdisciplinary manner—that is, producing reports that closely integrate contributions of staff from a wide variety of technical and nontechnical backgrounds. However, the agency will have a continuing need to enlarge the technical capabilities of all its professional staff through a combination of recruitment and internal as well as external training. GAO's personnel information systems currently do not contain sufficient up-to-date data on staff education and training to enable the agency to routinely monitor its progress along these lines.

Most of GAO's technical staffmembers find their work challenging and interesting, and 57 percent of them reported that they are moderately to very satisfied at GAO. Yet fewer than half (43 percent) would recommend GAO as a place to work for those with training similar to their own, and attrition rates for technical staff are much higher than those for nontechnical staff. Areas where technical staff believe that improvements would most enhance GAO's attractiveness to them include increased access to personal computers, higher salaries, and more input into decisions on the way their work is planned and carried out.

Principal Findings

Many organizations, in both the private and public sectors, have not succeeded in their efforts to integrate staff trained in technical disciplines that are outside the mainstream of their professional workforce. GAO has addressed this issue by creating three different roles for technical staff: providing technical assistance, carrying out assignments in technical divisions where most colleagues have advanced degrees, and working side-by-side on projects with auditors. This range of opportunities has enabled GAO both to attract top-flight staff with a wide spectrum of technical skills, and also to facilitate the spread of technical capabilities and awareness among its nontechnical staff.

Although most technical staff are generally satisfied with the use of their work in GAO reports, some find that it is not always accurately portrayed, or that issues are not always decided in a technically adequate way. GAO currently makes little use of outside technical experts to inform the resolution of technical disputes or to provide other forms of assistance in the development of GAO products.

Most GAO managers believe that the technical staff make a great contribution to the agency's work. However, many managers have concerns about the interpersonal and written communication skills of technical staff, and they also find them less knowledgeable about agency procedures than their nontechnical colleagues. This seems to be due more to gaps in the training that technical staff have received at GAO than to disinterest on their part. Indeed, 56 percent of technical staff report that they find GAO's basic working procedures to be reasonable, but only 43 percent of them had received training in those procedures during their first 6 months on the job.

GAO is currently revamping its curriculum of internal training courses. The experience of other organizations suggests that the integration of technical staff into the organization can be facilitated by tailoring at

least parts of this training specifically for them. In particular, differences across disciplines in the meaning and use of certain words or concepts can be clarified, and the rationale for GAO's operating procedures can be explained in terms of the professional norms that technical staff bring with them. GAO managers and technical staff agree that the latter also need expanded opportunities for external training in technical subjects.

Many technical staff find that the work they actually do at GAO differs markedly from what they expected when they joined the agency. Although most managers recognize the importance of conveying to potential recruits an accurate sense of the nature of the work they are likely to do at GAO, as well as a clear picture of the way GAO functions as an organization, it appears that these intentions may not be fully realized in practice.

Many technical staff prefer not to shift into managerial roles, but 70 percent of them would welcome opportunities to manage, especially if a promotion were involved. Historically, technical staff at GAO have felt at a disadvantage in competing for promotions. Indeed, a large proportion of GAO managers reported their view that technical staff (line as well as technical assistance staff) are not as well suited for management as their nontechnical colleagues. The task force, however, found that more than a quarter of the senior officials currently holding line management positions at GAO qualify as technical under its definition. At the same time, the agency has not yet taken advantage of the existing potential under GAO's new broad-banding structure to create nonmanagerial Band III positions that senior technical staff could compete for.

Recommendations

Based on these findings, the task force recommends to GAO's managers that they

- enhance their use of recruitment interviews to validate the interpersonal and communication skills of technically-trained candidates and also to convey to them accurate impressions about GAO, the work they would be likely to do, and their opportunities for promotion;
- foster the job satisfaction of technical staff by involving them where possible in project decisions and providing them feedback and public recognition for their contributions;
- expand the informal use of outside technical experts; and
- ensure that channels exist in their unit through which unresolved technical issues can be raised to the appropriate level.

The task force recommends to GAO's technical staffmembers that they

- learn GAO's organizational procedures and professional norms as soon as possible after joining GAO and also try to establish contact with seasoned GAO employees, both within and outside their technical discipline; and
- improve their ability to communicate well to lay audiences via available GAO courses.

The task force recommends that the Comptroller General

- increase the number of nonmanagerial Band III positions that senior technical staff can compete for, while preserving the essentially managerial focus of the Senior Executive Service;
- expand training in technical subjects for all GAO staff;
- obtain an adequate supply of personal computers as soon as possible;
- ensure that all technical staff receive training in GAO's organizational procedures immediately after their arrival at the agency, training that explains those procedures in terms of the professional norms of the major technical disciplines;
- publish a glossary of terms that have different meanings and connotations across diverse disciplines; and
- continue the development of a common, GAO-wide, personnel information system to maintain complete, accurate, and up-to-date information on the educational attainments and training of all GAO staff.

The task force also asks the Comptroller General to consider making courses in auditing and accounting available to technical staff on a voluntary basis and to provide training in supervision skills specifically related to the management of technical staff.

In conclusion, the members of the task force express their conviction that GAO is making excellent progress toward the goal of interdisciplinary management and that the above recommendations—all of which have been approved by the Comptroller General—are both necessary and achievable. Indeed, it should be borne in mind that the concerns uncovered by the task force are largely the products of GAO's success in diversifying, expanding, and managing its staff resources to meet congressional demands for ever more complex evaluations. By recommending that GAO move forward in optimizing the use of its staff's technical skills, the task force thus recognizes both the advantages of GAO's current situation and also the areas where improvements are needed.

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Abbreviations

ACG	Assistant Comptroller General
ADP	Automated Data Processing
AFMD	Accounting and Financial Management Division
ARCO	Atlantic Richfield Company
ARM	Assistant Regional Manager
BARS	Behaviorally Anchored Rating Scales
BOB	Bureau of the Budget
CAPS	Central Assignment and Payables System
CEO	Chief Executive Officer
CPA	Certified Public Accountant
CTC	Corporate Technical Committee
DELTA	Database for Entry-level Tracking
DMTAG	Design and Methodology Technical Assistance Group
EAG	Economic Analysis Group
EEO	Equal Employment Opportunity
GAO	General Accounting Office
GGD	General Government Division
GPA	Grade Point Average
GS	General Schedule
GWU	George Washington University
HHS/IG	Department of Health and Human Services Inspector General
HIS	House Information System
HRD	Human Resources Division
IBM	International Business Machines
ICI	Imperial Chemical Industries
IMTEC	Information Management and Technology Division
MIS	Management Information System
MIT	Massachusetts Institute of Technology
NFC	National Finance Center
NIH	National Institutes of Health
NIST	National Institute for Standards and Technology
NSIAD	National Security and International Affairs Division
OCE	Office of the Chief Economist
OIRM	Office of Information Resources Management
OJT	On-The-Job Training
OPM	Office of Personnel Management
OR	Office of Recruitment
PAES	Personnel Awards/Education System
PC	Personal Computer
PEMD	Program Evaluation and Methodology Division
PFP	Pay for Performance

RCED	Resources, Community, and Economic Development Division
RFF	Resources for the Future
SES	Senior Executive Service
SMIS	Staff Management Information System
TAG	Technical Assistance Group
TI	Training Institute
TRS	Training Registration System

A Task Force on Interdisciplinary Management

In September 1988, the Comptroller General established an internal task force on interdisciplinary management in the General Accounting Office (GAO). The task force mandate was to review the management, training, and utilization of technical staff from many different disciplines in the GAO workplace; determine whether a changing workforce required any concomitant changes in GAO's management practices; and make recommendations as needed in all or any of these areas.

The report is published in two volumes. Volume 1 contains the analyses and recommendations of the task force. Volume 2 provides more detailed descriptions of the various data collection efforts conducted by the task force.

It is probably fair to say that the task force came into being because of a generalized realization that changes in recruiting objectives had shifted GAO's staff composition away from what had been a remarkably homogeneous population of auditors in the nineteen fifties and sixties toward a multidisciplinary workforce with many different kinds of skills, training and backgrounds, in the seventies and eighties. This shift was not accidental. On the contrary, GAO made deliberate efforts between 1970 and today to widen and deepen its expertise in a variety of technical areas. This happened in part because of GAO's own recognition of a need to diversify its skill base, in part as a response to congressional requests involving issues of continually increasing technical complexity, and in part as a result of developments taking place in the analytical and evaluative fields.

These efforts have been notably successful. In his memorandum setting up the task force, the Comptroller General commented on the important contributions staffmembers with advanced technical skills had made to the quality and credibility of GAO's work.[1] Many members of the Congress and of the academic community have also expressed this view. However, having established this initial success, it seemed equally important now to build upon and develop it by examining, in the Comptroller General's words, "where we need to reinforce or disseminate good practice, and where we need to find new solutions to managerial or technical problems."

In this report, the task force responds to this charge, documenting what has been learned about the current status of technical staff at GAO and

[1]Charles A. Bowsher, "A Task Force on Interdisciplinary Management at GAO" (memorandum to the heads of divisions and offices, September 23, 1988).

recommending ways by which that status might be improved through actions taken by GAO as a whole, by individual managers at GAO, and by technical staffmembers themselves. In particular, the task force focus has been on the procedures followed in recruiting technical staff, the training they receive once hired, and the different approaches to their management at GAO. An additional emphasis has been on determining the degree to which technical staff have found GAO to be a supportive environment—conducive to producing high-quality work as well as providing desirable career options. Throughout, the task force has looked for ways to maximize not only the personal satisfaction that technical staff derive from their work and the ease of their adaptation to GAO, but also the optimal application of their technical skills to the purposes of the agency as a whole.

Before proceeding further, it will be useful to define the term "interdisciplinary management"; to review briefly some of GAO's recent history; and to explain what is intended by the task force's use of the term "technical staff." This background should allow the reader some understanding both of GAO's past evolution and of its current workplace configuration. These two, taken together, supply the dynamic context into which the task force's efforts must fit.

What Is Interdisciplinary Management and Why Is It of Interest to GAO?

Bringing people from multiple disciplines into the GAO workplace has confronted GAO's managers with a difficult task: to run audit and evaluation teams that produce strong reports under compressed timelines, while employing staff with varied types and levels of skills and training. It is true, of course, that good management is never easy; still, many burdens are lightened when staff "speak the same language" because they have come from the same field, or the same university, or have experienced the same level of education. But when groups working on a project are truly heterogeneous, and the end report must be an integrated one, then the manager needs to create an environment in which effective communication and collaboration can take place despite the barriers of different training, different approaches or methods, and different modes of expression. This is the classic situation for interdisciplinary management, which is the art of bringing together a number of

individuals representing dissimilar areas of expertise to work on a common problem in such a way as to permit the integration of their individual contributions into a cohesive whole.[2]

The concept of integration is the key difference between interdisciplinary and multidisciplinary management. In the latter, staff work separately, and their individual products are also separate. Although work contributions are made by staff of different disciplinary backgrounds, they are juxtaposed rather than meshed together.

There are several reasons why interdisciplinary management is likely to be important at GAO. First, given the advent of technical staff along with the close collaboration and product integration that are normal on GAO projects, such management is already a fact of life for some managers, and seems destined to spread as GAO continues to diversify its staff. Second, interdisciplinary management has had some spectacular successes in the past, especially in defense-related areas like the Manhattan Project during World War II, and many more recent ones in which contributions from different scientific disciplines, human factors research, engineering studies, and politico-strategic analyses have been tightly integrated. The RAND Corporation, especially, has seen the potential of this kind of management, setting up its matrix organization with the specific aim of facilitating interdisciplinary research (see appendix II in volume 2 of this report). Third, the kinds of substantive issues likely to confront GAO, the Congress, and the nation over the next 20 years clearly indicate the need for this kind of management: problems as diverse as global warming, the decline of industrial competitiveness, or inadequate service delivery in urban and rural areas, all call for efforts involving integrated contributions from many different fields.[3] Indeed, most reports of progress presented today in the scientific and technical literature include information that is useful to a number of different disciplines. Fourth, interdisciplinary management presents a target of

[2]Library of Congress, "Interdisciplinary Research: An Exploration of Public Policy Issues," prepared for the Subcommittee on Science, Research and Development, House Committee on Science and Astronautics (October 1970), p. 9; see also Lowell H. Hattery, "Interdisciplinary Management: Research Needs and Opportunities," prepared for the International Conference on Interdisciplinary Research Management (Ulm, West Germany: April 1979), p. 2.

[3]Directly to the point, a recent study of the American ability to compete internationally found that a major problem was a kind of "caste system" in U.S. companies which separates "design people" from "manufacturing people," so that an engineer working on a product may know little about the results of consumer research, or the profit margins of the product being developed, or even the costs of the engineering changes he or she has proposed. This contrasts with Japan where everyone involved in a project is an integral part of the team dedicated to developing the product. (The Economist, February 18, 1989, pp. 68-69.)

opportunity for GAO in that the rigidly disciplinary structures of many other organizations do not permit them to pursue excellence in this area. Finally, the idea itself is merely a logical extension of GAO's long-term evolutionary development: the agency has been moving in this direction for many years.

Some Institutional Background

GAO was established 68 years ago as the nation's independent audit agency. That role has deeply affected both GAO's internal culture and the way it has been perceived by the rest of the federal government and by the public at large. Indeed, the agency's reputation for objectivity and probity derives in large part from its history, mission, and procedures as an independent auditing institution.

Across the years, the scope of GAO's work has expanded well beyond its original domain of financial audits and "economy and efficiency" reviews. Since 1967, the Congress has asked GAO with increasing frequency to assess the effectiveness of federal programs. These requests placed major demands on the organization to produce sophisticated analyses of complex programs within relatively tight timeframes.

GAO responded to this change in the nature of its work by bringing in new staffmembers with increasingly diverse training and experience. The nearly exclusive recruitment of accounting majors in the nineteen fifties and early sixties slowly gave way to a more mixed group of staff with degrees in business and public administration as well as accounting.[4]

At the same time, a number of people with more specialized technical skills were also hired, beginning with a small staff of systems analysts in 1967. Over time, staff with quite different training (e.g., computer scientists, statisticians, operations research analysts, economists, and others) were recruited to provide expert knowledge in a range of areas. Most of these people functioned as "specialists," either in headquarters or in the regions. This means that they advised auditors—who in GAO are called "generalists"—on segments of projects (rather than working on projects from beginning to end), or that they assisted auditors (rather than assuming responsibility for leading projects themselves). Other technically trained staff, however, did carry out complete projects and managed them. But they were still called "specialists," and tended to be

[4]See, for example, U.S. GAO History Program, Leo Herbert: GAO, 1956-1974 (GAO/OP-7-OH, December 1988), pp. 53-54.

concentrated in a few units that undertook more technically oriented studies, such as the Energy and Minerals or Program Analysis Divisions.[5]

In this way, GAO attempted to acquire the technical expertise needed without disrupting the basic structure that had developed over the agency's first half century of existence: a "generalist" auditor mainstream culture supported by subcultures of technical "specialists." This also meant, however, that since technical staff were concentrated in assistance roles, or in a few technical units, work and work procedures in the mainline units remained relatively unchanged. That is, the new skills (in automated data processing, for example, or in survey research, or data analysis) were too unevenly spread across GAO's divisions and regions to make a major impact on the day-to-day work of the organization. And the spread of these skills was further impeded by a growing perception on the part of technical staff that their own interests were not well served by this mainstream/non-mainstream dichotomy.

These staff felt that they were performing valuable services for GAO but that being part of a subculture was hurting their career advancement, as evidenced by the greater success of generalist auditors in acceding to upper level positions.[6] In GAO's regional offices, for example, all vacancies at the GS-13 and -14 levels had been designated generalist auditor positions. This created two problems for technical staff in the regions, as they saw it. First, there were no positions for them to be promoted to on the basis of their special skills and experience. Second, their skills and experience were discounted when compared to the skills and experience of generalist auditors.[7]

This situation seemed to leave technical staff at GAO with three fairly problematical alternatives: try to join the ranks of the generalists and manage projects from beginning to end (which might eventually weaken technical skills through disuse but improve career paths); remain in the technical role for which their training had prepared them and accept a de facto ceiling on career advancement (which meant sure and certain frustration for technical staff); or leave GAO for greener pastures (which signified the loss of GAO's investment in these staff). These alternatives

[5]Roger L. Sperry, et al., GAO 1966-1981: An Administrative History (U.S. GAO, 1981), p. 178.

[6]Ibid., pp. 177-78.

[7]Walter C. Herrmann, Jr., and Fred D. Layton, "Internal Task Force Report on Managing Specialists in the Regions," July 1980, p. 5.

were thus either at cross-purposes with the intended goal of generalizing technical expertise at GAO, or they came at heavy cost both to technical staff and to GAO.

Concerns related to these two issues—the spread of technical skills and the fairness of existing career practices—were documented in two internal reports. The first of these was a 1979 paper outlining the negative impacts on technical staff morale and retention that stemmed from the dominance of generalists at GAO.[8] The report pointed out that a kind of caste system of generalists and specialists existed at GAO;[9] that the overwhelming majority of GAO staff considered the term "specialist" to be derogatory; that organizational traditions and rewards appeared to discourage specialization[10] ; and that, in sum, this situation was obstructing GAO's efforts to broaden its talent base and develop increasingly higher levels of technical expertise.

The second report was that of a task force charged with examining specialist problems in the regional offices.[11] It noted the staff perception that technical work was "a career liability," and cited survey results showing that 85 percent of regional technical staff saw their promotion potential as having been hurt by their technical work.

The two reports came to the same conclusion, essentially that equal opportunity was needed for non-mainstream groups. Both recommended that separate promotion criteria be established for technical staff.

[8]Harry S. Havens, "Some Thoughts on the Concept of Specialists and Generalists in GAO," February 1979, pp. 4, 8, 13, 14.

[9]The report noted, "One of the oddest things about the caste system is that the lower caste consists of people whom GAO decided, as a matter of policy, it wanted to attract. The economists, operations research analysts and others . . . didn't arrive by accident, nor did those people originally seek out GAO. They were actively recruited because GAO decided to broaden the base of talent available to it. Yet the caste system works to minimize the usefulness of that group and to maximize their desire to leave GAO."

[10]The report said that "the most important training this group [generalist auditors] receives is that gained after arrival in GAO. The early years of an auditor's career in GAO are spent acquiring, through formal training and OJT, a whole new set of skills and, in the process, forgetting (because of disuse) whatever skills were acquired prior to arrival in GAO [emphasis supplied]. The result is that, after a few years in GAO, an auditor who arrived with a degree in economics behaves and thinks just like an auditor who arrived with a degree in accounting, or business, or political science, or English. Any benefit which might have been gained through recruiting a broader range of disciplines is lost because those skills are never used or further developed. It doesn't matter what disciplines we recruit if they all come out looking alike as a result of the socialization process."

[11]Herrmann and Layton, op. cit.

A new impetus toward broadening the base of GAO's technical expertise occurred in 1980 with the establishment of the Institute for Program Evaluation (now the Program Evaluation and Methodology Division). In the course of its development, the new division brought into GAO, over time, a sizable group of technical staff from a wide variety of disciplines (including all of the social sciences, but also physics, mathematics, statistics, operations research, chemistry, engineering, and others) with experience in an equally wide variety of program areas. These staff, however, were not intended to perform "specialist" functions. They would be working on projects and supporting requests from the Congress: that is, performing the same function as generalist auditors.

In the same way, the Information Management and Technology Division was established at GAO in 1983, and brought in computer scientists to conduct reviews of all types. Both of these new divisions thus further reinforced the effort, begun in the late sixties, to broaden the base of GAO's talent pool.

An additional move, implemented between 1984 and 1986, consecrated the continuing importance of technical assistance at GAO: Design, Methodology, and Technical Assistance Groups (known as DMTAGS) were established in each of the four program divisions.[12] Given that technical assistance groups were already established in the regions, this meant that every unit in GAO would now have a cadre of technical staff able to assist in the conduct of its projects. In addition, division and regional managers were encouraged to help technical staff move out from the DMTAGS and work directly on projects with auditors in the field.

Thus, technical staff at GAO today have three different options: to work with auditors on segments of jobs where special skills can be used to best effect; to work in a technical division where most people have advanced degrees; or to work side-by-side with generalists in the field, becoming generalists themselves and eventually managing projects with important potential for career advancement. In the last two of these three cases, technical staff are not specialists, but instead perform the same job functions as generalist auditors.

[12]This followed a recommendation of the Task Force on GAO Reports, "Excellence Through the 80's" (November 1982), p. 13.

The evolution in work and in staff composition and functions has thus been considerable at GAO since the nineteen fifties. Moving beyond financial audits and economy and efficiency reviews (both of which GAO continues to do in sizable quantity), the institution now routinely handles requests from the Congress for program effectiveness evaluations, for audits of complex computer system procurement and performance, for forecasting and related prospective research, and for methodological critiques of others' studies. Simultaneously with this expansion of its work menu, GAO has moved from a homogeneous generalist auditor workforce to one in which the majority is still made up of individuals with bachelors degrees in accounting, business, or public administration, but where an increasing fraction includes quantitatively trained people with advanced degrees in a variety of disciplines. Finally, concomitant with changes in the work and the workforce, the organization of the work itself has changed, offering new opportunities of various kinds for technically skilled staff.

What Is Meant by the Term "Technical Staff" and How Is It Different From the Term "Specialist"?

As the above discussion has shown, the word "specialist" has long been a part of GAO's vocabulary. The Task Force on Managing Specialists defined them as possessing: "technical expertise, such as designing a sampling plan, evaluating a mathematical model, or assessing the reliability of computerized data," and noted that specialists "have acquired skills beyond those usually expected of the general audit staff."[13]

Thus, in 1980, it was understood that a specialist at GAO possessed technical expertise of a particular kind, and assisted auditors in the technical aspects of their jobs. This is not very different from what technical staff working in the assistance role at headquarters or in the regions do today. But it is also the case that since 1973 persons with strong technical capabilities have been staffing and managing entire projects at GAO, that they have also been working directly with auditors as full-time project staff, and that it is in these two areas that the greatest growth in technical staff recruitment has occurred. Although these people have continued to be called "specialists" at GAO, it is evident that this term is too narrow to define all three technical roles. Therefore, the task force decided to use the broader term "technical staff" to cover people with skills that are — in the words of the Task Force on Managing Specialists—"beyond those usually expected of the general audit staff," whether their role is that of the "specialist" or not. The term is also a

[13]Herrmann and Layton, op. cit., p. 7.

shorthand way of pinpointing that the discussion here refers to particular technical skills, not to organizational placement.

But what then does "technical" signify? Clearly, the task force could not use the broadest dictionary definition here, which might apply to almost anyone at GAO. Nor does it use the earlier GAO definition of a "technical specialist" as "one who devotes or limits his interest to a single set of technical skills and is unusually proficient in the application of those skills."[14] Rather, the term is used here relative to the task force's mandate: to look at what promotes and what impedes interdisciplinary management.

Therefore, the technical population whose condition the task force seeks to examine is made up of those staff with disciplinary backgrounds and training markedly different from those of the generalist auditor staff, whatever their organizational placement. And it is especially important to include technically trained staff who are assigned to the ordinary work of the office (whether audits or evaluations) because it is they who are most likely to have difficulty—from an interdisciplinary perspective—in becoming integrated into GAO's mainstream. The question here is less whether the powerful GAO socializing principle discussed earlier still works, but rather whether such socialization is the best way to broaden GAO's disciplinary base. That is, interdisciplinary management seeks to preserve, hone, and expand the different skills of people in the workplace, not to let them become dulled, dated, or diminished through disuse.

This means that the term "technical staff," as used in this report, should be seen as inclusive. It speaks to background and training, but also to the type and level of education, and to the content of the work performed. But the term (again as used here), is also exclusive: people trained as auditors may well have acquired technical skills equivalent to those of "technical staff" but are not likely to have difficulty in integrating GAO's mainstream. Finally, the term is iterative, in harmony not only with GAO's past, but also with its likely future evolution. The technical/nontechnical dichotomy is no more survivable in an interdisciplinary context than was the generalist/specialist one. Indeed, the task force believes that those technical skills celebrated today as exceptional will be the norm at GAO within 10 years. Thus, interdisciplinary management must conceptualize all skills in the workplace as dynamically evolving.

[14]Havens, op. cit., p. 5.

The GAO Workplace Today: Some Preliminary Observations

As an initial effort to determine the current status of GAO's "technical investment,"[15] a few exploratory interviews were conducted with technical staff functioning in all three roles (staffing or managing projects in a technical division, performing technical assistance, and working with auditors at field sites) and with nontechnical managers at different supervisory levels.[16] These interviews surfaced some continuing concerns on both sides.

Technical Staff Views

Technical staff raised three main issues having to do with promotion opportunity, recognition, and job satisfaction.

With regard to promotion opportunity, the chief problem mentioned by technical assistance people was that they feel they have too few opportunities to progress beyond the GS-14 level. People in the technical divisions shared this view, except that for them, the threshold was at the Senior Executive Service (SES) level. All contended that these "ceilings" on promotions reflected a continuing disadvantage of technical staff compared to auditor generalists. However, promotion opportunities below the GS-15 or SES levels no longer seemed to be viewed as a problem, at least for headquarters staff.

Recognition problems mentioned were, in the regions, the paucity of awards to technical staff and, in the divisions, lack of positive verbal feedback from managers. While the number of awards was not raised as an issue by DMTAG staff, some said they felt their efforts often went unrecognized. They believed the chief reason for this was that supervisors often failed to ask the questions that could determine who in fact had made the major contributions to a project. No technical staffmember or manager queried in the technical divisions raised any issues with respect to awards.

All technical staff interviewed, whatever their role or function, had comments to make on job satisfaction issues. Many said that needed work tools are often hard to get. A number of staff (especially computer scientists) mentioned misunderstandings that had occurred during recruitment interviews about the nature of GAO work: some came to GAO

[15]Bowsher, op. cit., p. 1.

[16]Eleanor Chelimsky, "Managing Technical People at GAO: How Do We Retain and Integrate Them?" (Memorandum to the Director, IMTEC, and the Regional Managers of the New York and Boston offices, February 2, 1988); and "Transforming GAO's Multidisciplinary Workforce into an Interdisciplinary Workforce for the Nineties" (Memorandum to the Comptroller General).

believing that they would be designing systems, and found instead that they would only be reviewing them. Technical assistance and technical division staff mentioned work areas that are too small for their needs. All felt that technical training for people with advanced skills has been inadequate (lack of travel money was blamed in some regional cases, but the more generalized view was that "technical training has been swept up into generalist training"). Some technical people working directly with auditors at field sites complained of isolation, pointing out that good matches are not always achieved among technical staff, assistant directors, and a particular audit site population. These same staff said that generalist managers sometimes feared using methods new to them and thereby weakened or inhibited technical staff efforts to develop sound and innovative methodology.

Staff in the technical divisions surfaced some special job satisfaction problems that seemed to reflect organizational relationships between the technical and the generalist programming divisions. These staff were concerned about institutionally prescribed "one-way procedures" (for example, technical divisions having to coordinate their work with programming divisions, but not vice versa), and also talked about "both misunderstandings and fundamental differences" with respect to what was viewed as an appropriate methodological approach across divisions.

Thus, the issues that surfaced from these exploratory interviews with technical staff suggested the possibility that a certain evolution in their situation had taken place over the past few years. The promotion limitations now discussed chiefly concerned exclusion from the very highest grades; and a shortage of awards seemed to be a problem mainly in the regional offices. Instead, job satisfaction issues appeared to be taking on more importance relative to the other issues of promotion and recognition, and the former seemed quite closely tied to the particular technical role or function of the staffmember.

Two questions, then, immediately come to mind. (1) Perceptions aside, are technical staff disadvantaged vis-a-vis generalists with regard to promotions and awards? And (2), how important are the issues they raise to technical staff? Important enough to cause them to "vote with their feet"? The task force looked at some existing data to see what, if

any, discrepancies might emerge between generalists and technical staff with regard to awards, promotions, and separations.[17]

Based on data for one technical staff series and for one generalist series, technical staff do not seem to be disadvantaged, overall, either with regard to promotions or awards. However, these data cannot supply a definitive evaluation of this issue, since they do not inform on entry into the SES and since access to the GS-15 level may be masked by the average data.

On the other hand, the data do suggest that technical staff may be leaving GAO at a relatively high rate. While some of this attrition could be favorable (e.g., technical staff who are happy at GAO may be leaving for career advancement elsewhere), it does seem important that retention of technical staff should last at least long enough for GAO to be able to recover the costs of recruitment, orientation, mentoring, training, and all the other costs attendant upon bringing someone up to speed at GAO.

Managers' Views

In general, managers included in the exploratory interviews were laudatory of the contributions being made by technical staff; all however, mentioned ongoing problems in their assimilation into GAO work groups. Most of the managers' experience related to DMTAGs, but two did address issues that arose when technical staff worked under generalist auditor supervisors.

All managers discussed the importance of making sure that the technical staff recruited are the kinds of people who can fit in at GAO. They pointed out that some technical experts who come to GAO from universities may chafe painfully at agency rules and regulations, and may not see the need to acquire GAO skills, to understand GAO values, or to fulfill GAO job requirements. Specific problems they said they had found in managing technical staff were: a certain insensitivity to deadlines; an unwillingness to consider factors other than technical ones; overuse of technical terms in their writing; little experience in being managed or in reporting to supervisors, or in having their work reviewed in great detail; and reluctance to learn GAO's careful methods of report preparation and quality control (especially workpaper development, indexing, and referencing). Managers reported conflicts, based on these and other

[17]Howard Rhile, "Analysis of Promotions and Awards Data for Specialists and Generalists" (Memorandum to the Directors of IMTEC and PEMD, and to the Regional Manager of the New York Office, July 5, 1988).

work problems, which appeared to reflect both different ways of looking at methodological issues and difficulties in communicating across different backgrounds and training, different ways of expressing things, and perhaps also, differential willingness to listen.

Promising Practice

The exploratory interviews surfaced a few managerial responses currently being put in place that are intended to address some of these problems. For example,

- In all of the programming divisions, DMTAG staff have now become active in interviewing new technical candidates. This not only facilitates selecting those technically qualified staff who are most likely to adapt well to GAO, but should also diminish misunderstandings about what GAO work is all about.
- DMTAG staff in two programming divisions now help in placing technical staff moving out from the DMTAG to an audit site. (That is, their help is sought in deciding on the most propitious match of people and locale with the technical staffmember.)
- In one technical division, all staff now receive training, upon entering GAO, in workpaper preparation, indexing, and referencing.
- Most divisions now formally recognize technical contributions to their projects in their reports.

These exploratory interviews do not, of course, suffice as measures of current technical and managerial views or status, and the task force immediately identified the need for a much more careful and comprehensive data collection effort (see chapter 2). However, the information gleaned does suggest that changes, moving in the direction of alleviating at least some technical staff problems, have been taking place at GAO. Those concerns that continue to be raised, however, once again emphasize the difficulties involved in integrating the kinds of elements—both technical and nontechnical—that need to be brought together in developing and executing GAO's work.

Looking Forward

In sum, over the last two decades, GAO has responded to a growing demand for more technically sophisticated studies by substantially increasing the number of technically trained people it has hired, both at entry level and above. However, the process of integrating these technical staff into the mainstream GAO body of generalist auditors is only now beginning to develop momentum. As GAO moves toward an interdisciplinary workplace, and as training continues for all staff, technical and

nontechnical staff will be brought into ever closer cooperation, both groups will evolve, and the distinction between them should start to blur.

There is little doubt that interdisciplinary management has a particular resonance for GAO's mission and basic purpose as an institution. The different types of questions that are addressed by GAO, the data that are collected and analyzed, the products that are generated, the reporting style that must meet the needs of different customers, and the independence, objectivity and probity that must inform GAO's work do not derive from, or fit into, any single disciplinary mold, or any technical versus nontechnical orientation. The need the task force sees is to sustain and reinforce the strengths of GAO's generalist auditor—independence, traditions, values, and work quality—while drawing, in a coherent and appropriate fashion, on the relevant contributions of a range of technical disciplines.

Almost any GAO assignment can illustrate the point. Take, for example, an evaluation of a military training program. Various academic disciplines and subfields will provide insights and methodologies that are relevant to different aspects of the overall problem: educational measurement, human factors analysis, technology diffusion, and organization theory. In addition, concrete details about the structure of the armed forces, the organization of particular programs, and the characteristics of selected weapon systems can all have a major impact on the analysis, quite apart from the concepts or methods that emerge from the perspectives of academic disciplines. These programmatic realities will often drive both the questions that need to be considered and the data available for answering them. Finally, GAO reports are intended to be read by a range of technical and nontechnical audiences. They need to be technically accurate, understandable, and inherently credible to all readers. But establishing and maintaining an effective balance among all these competing objectives and perspectives is no simple matter.

For the past 20 years, GAO has been responding to its changing congressional mandates by moving incrementally toward an interdisciplinary workforce. That trend will necessarily continue as the demand for GAO to perform and defend technically complex studies increases. The task force charge was to look systematically at what that will require of both the organization's managers and the technical and nontechnical staff working within it. In so doing, the purpose is to help the agency make its necessary adaptations more rapidly—and at lower human and financial costs—than would otherwise be the case.

The Task Force Approach

The task force's mandate was, in essence, to assess how GAO is doing in integrating its growing technical staff, and to determine whether the agency's current ways of doing things—especially in managing, training, and utilizing technical people--are moving it closer to the broad institutional goals it has implicitly espoused for about two decades.

In deciding how best to fulfill its mandate, the task force attempted to define those goals (based in part on the GAO source documents discussed in chapter 1) as follows:

- to widen, deepen, and continually modernize GAO's technical expertise;
- to preserve GAO's institutional values of independence, objectivity, and accuracy;
- to optimize the application of technical staff skills in GAO projects; and
- to manage technical staff in such a way as to maintain and expand their skills, ease their adaptation into the GAO workplace, and maximize the satisfaction they derive from their work.

Given the increasing complexity of GAO's work, and given also the increasing heterogeneity of GAO's workforce, interdisciplinary management seemed to the task force a useful framework within which to try to reach these four goals, consecrating as it does the move away from a mainstream/non-mainstream organization to a pluralistic one that deliberately sets out to be hospitable to new disciplines and new ideas.

The discussion of the goals and framework led the task force to identify a set of evaluation questions whose answers would allow the formulation of guidelines and recommendations that could help attain those goals. These questions were the following:

1. What is known about interdisciplinary management and how it can be achieved? For example, what does the literature say, what do experts suggest, and what relevant experience has there been in other organizations? How similar is the experience of different federal agencies to that of the GAO, and what useful lessons can be learned?

2. What is the present status of interdisciplinary management at GAO? Is preliminary information derived from a few technical staff, managers, and early GAO documents—suggesting specific difficulties of technical staff integration into GAO's mainstream—borne out by more generalized data and more current perceptions in the GAO workplace? What precisely are the problems, if any, that need to be addressed?

3. How can GAO best monitor its "technical investment"? What kinds of indicators are needed to know how well GAO is doing in training and retaining technical staff?

To answer these questions, the task force undertook a series of 10 studies, using different methodologies. These are summarized in table 2.1.

Table 2.1: Methods Used by the Task Force to Answer the Three Evaluation Questions and Where in the Report the Results Are Presented

Evaluation question	Method	Where detailed
1. What is known about interdisciplinary management and how it can be achieved? (chapter 3)	Literature review	Appendix I
	Interviews with experts in interdisciplinary management	Appendix II
	Interviews with managers of technical staff outside GAO	Appendix III
2. What is the present status of interdisciplinary managment at GAO? (chapter 4)	Census of GAO technical staff	Appendix IV
	Interviews with technical and nontechnical staff from divisions and regions who have left GAO	Appendix V
	Survey of technical staff	Appendix VI
	Survey of GAO mid-level managers and users of technical staff; focus groups of senior managers	Appendix VII
	Analysis of relationships between the technical and mid-level manager survey findings	Appendix VIII
3. How can GAO best monitor its progress in training and retaining technical staff? (chapter 5)	Review of available orientation and training programs	Appendix IX
	Review of systems for identifying and tracking recruitment, training, retention, and rewarding of technical staff	Appendixes X and XI

With regard to the initial evaluation question (i.e., what is known about interdisciplinary management and how it can be achieved), the task force conducted three studies. First came an extensive review of prior assessments and analyses in the theoretical and research literature. Second, interviews were performed with eight experts in interdisciplinary management. These people were senior executives with experience both in public sector agencies and private sector organizations offering areas of comparability with GAO in terms of product (audits and evaluations), personnel constraints (government agencies), or discipline (accounting firms and social science research organizations). Third, the task force interviewed nontechnical managers of technical staff outside GAO. In all of these efforts, the task force sought to learn whether other organizations have dealt with workforce changes similar to those at GAO, how

successfully those changes were handled, and what useful lessons could be learned from their experience.

The task force devoted five studies to the second question (i.e., what the status of interdisciplinary management currently is at GAO). Here, the effort was to establish what the situation is like now for technical staff and their managers at GAO with regard to a variety of issues (for example, what general problems technical staff have encountered at GAO; why skilled technical people have left the agency; what the first year at GAO has been like from the perspectives of both technical employees and their managers; how technical work has been integrated into a GAO product; what communication problems have occurred; what general problems nontechnical managers have experienced in managing technical people; how the career path has worked at GAO for technical personnel—whether in the DMTAGS or regional TAGS, in technical divisions, or working at program division audit sites; and the kinds of training technical personnel have received).

It was immediately clear that two surveys would be required to get at these and other issues: one for technical staff and one for their managers. However, it also became clear that there was a problem in deciding who should be included in the technical staff survey. This was due to a gap in GAO's information about its technical people: currently, there is no ability to count them accurately or to track their progress because of the various options afforded by GAO's classification system. Technical people can choose to belong to the "evaluator 347" series (which includes large numbers of nontechnical people), or to the "evaluator-related" series. The problem for counting them, then, is that if the 347 series is used, a majority of nontechnical staff are included. But if the 347 series is left out of consideration, it should not be assumed that only a tiny number of technical people would be missed. On the contrary, in the technical divisions and elsewhere, many social scientists have chosen this classification. Further, even in the "evaluator-related" series, which ought to be less ambiguous, there are still a number of categories that include both technical and nontechnical people (the "management analyst 343" and "program analyst 345" are examples).

Thus, the task force had to undertake a considerable effort merely to determine which staff at GAO should be considered technical and receive a questionnaire in consequence. The first step in this effort was to arrive at an operational definition of "technical staff"; the second was to conduct the first systematic census ever done of GAO's technically trained staff.

The task force's definition of technical staff is given in figure 2.1. It responded to several imperatives:

- it would capture everyone with doctoral training, even those whose disciplines made it easy for them to be integrated into the GAO workplace;
- it avoided assuming that only people with the Ph.D. have technical skills (staff with or without the B.A. could qualify under 3.e.);
- it put some emphasis on the relation between technical training and work content at GAO;
- it seemed unlikely to include too many nontechnical people;
- it allowed unit heads the discretion to include technical staff who were excluded via the other categories; and
- most importantly, it distinguished between mainstream disciplines (i.e., those which did not appear to pose a socialization or integration problem at GAO) and non-mainstream disciplines (see 3.d.).

Figure 2.1: Definition of Technical Staff for Purposes of Inclusion in the Task Force Census

For inclusion in the census, the staff member should meet the following three criteria:

(1) The individual has a current GS level between 9 and 15 if still at GAO (last GS level at GAO if the person has left the organization).

(2) The individual is either a current GAO employee (regardless of when hired), or if no longer with GAO, hired by GAO within the period of January 1984 and December 1988.

(3) The individual belongs to at least one of the following categories:

(a) Any current staff member in a divisional DMTAG, economic assistance/analysis group, or regional office TAG, plus all non-administrative staff in PEMD and OCE. (Staff on a short-term—less than one year—rotational assignment are excluded.)

(b) Anyone who once worked in one of the DMTAGs, EAGs, regional TAGs, PEMD, or OCE and then transferred somewhere else within GAO (again excluding those on short-term rotational assignments).

(c) Anyone who has completed a Ph.D. in any discipline.

(d) Anyone who was hired by GAO specifically to work within his or her field of training, represented by a masters degree in any of the following disciplines: economics (but not business), sociology, anthropology, psychology, political science (but not public administration or public policy), all physical and natural sciences, computer science, mathematics and statistics, engineering, and operations research.

(e) Any other staff member considered by the division head or regional manager to perform specific technical functions. (For each such case a description of those particular functions is needed.)

Once the definition was established, its validity as a way of identifying technical staff for the census was pre-tested by applying it in one division. (That is, the census was performed in that division, using the definition, and the results were reviewed by people in the division who knew all the staff with technical training and could assess the appropriateness of inclusions and exclusions based on the definition. It was determined that no one was excluded who should have been included, and that no one who was included really did not belong in the group.) Finally, the census itself took place in all of GAO's divisions and regional offices, as well as in some staff offices, which allowed the identification of the universe of technical staff at GAO, according to the task force definition.

The next step was to attempt to illuminate the issue of technical staff attrition, as discussed in chapter 1. To determine the reasons why technical staff had decided not to stay at GAO, the task force conducted interviews with 18 technical and 21 nontechnical staff who had left GAO between 1986 and 1988. These interviews had a first purpose of helping to explain departures: the task force believed that people who had left GAO might well be more candid about their experiences some time after their departure than they had felt was possible at their exit interview. In addition, the interviews had two other purposes: to distinguish experiences common to GAO staff from those unique to technically trained personnel; and to refine the focus of the two large technical staff and managers' surveys.

The task force then moved to develop and administer these two surveys. The first was addressed to the adjusted universe of technical staff located through the census (470 persons); the second survey went to GAO supervisors who manage or consult with technical staff (375 persons). In both the interviews and surveys, information was obtained on all the issues mentioned earlier (e.g., first-year experiences at GAO, training received, and so forth).

In preparing the survey of current technical staff, a three-step procedure was used. First, the numerous task force questions were translated into survey items. Second, the draft survey was reviewed by all the task force members for technical and substantive input. Third, the draft survey was pre-tested with samples of technical staff representing the ranges of disciplines and experiences in the universe; revisions were made and re-testing was completed before the survey was mailed out. These precautions helped to generate a 92 percent response rate. Finally, the usual GAO procedures were followed in clearing and coding the data, and ensuring accuracy in preparation of the large resulting data files. These data were then combined with selected information drawn from GAO's personnel files, such as dates of entry, promotions, and transfers within GAO.

The survey of mid-level managers (i.e., those supervising and consulting with technical staff) was augmented by a set of focus groups in order to reach senior managers, include their perspectives in the task force thinking, and assure the completeness and institutional sensitivity of the eventual recommendations. At the same time, the management survey was developed for the much larger group of issue area directors, assistant directors, assistant regional managers, and others. This survey was reviewed by all members of the task force, and was pretested with

appropriate samples of managerial personnel before it was finalized. Using regular GAO procedures, follow-ups were conducted to assure high response rates, the resulting information was coded and checked, and data tapes were prepared. These efforts culminated in a response rate of 89 percent.

Finally, in a fifth study, the task force performed an analysis of the relationships between the findings of the two surveys.

With regard to the third question (i.e., how GAO can best monitor its progress in training and retaining technical staff), the task force reviewed current and planned approaches to the orientation and training of technical staff. In addition, the task force identified major ongoing and planned administrative data systems that could provide relevant information on the progress of all GAO staff in acquiring technical skills and examined their strengths and limitations for this purpose.

Because the findings and recommendations of this report have the potential to affect different segments of the GAO population, the task force met with many groups and disseminated information to explain the purpose of its work and solicit input. The study was highlighted, for example, in the October 3-7, 1988, Management News; presented at the Spring 1989 Technical Conference; and discussed at meetings of Directors for Planning and Reporting, Directors for Operations, and other key groups. In addition, the two surveys and the focus groups (involving a total of about 900 GAO staff) created a very special opportunity to obtain the opinions and perceptions of GAO managers and staff in all of these areas. The findings and further details of the methodology of each individual study are presented in the appendixes. The next chapters integrate the results across the relevant task force studies to answer the three evaluation questions.

What Is Known About Interdisciplinary Management?

As noted in chapter 2, the task force turned to three sources of information on the experience of other organizations with interdisciplinary management: published literature, interviews with individual experts in the field, and interviews with nontechnical managers currently directing technical staff. The effort here was to learn as much as possible about what other organizations have done and to report on promising practice in integrating technical and nontechnical staff. The information obtained from each of the three studies the task force performed is reported in appendixes I, II, and III. This chapter presents a summary drawn from all three sources.

Looking across the results of these studies, then, two points stand out immediately. First, both the effort to achieve an interdisciplinary workforce and the problems encountered in doing so are old, widespread, and well recognized. Many different organizations over the past 30-40 years have diversified their staffs, and much has been written about how to manage such diversity effectively. Thus, GAO's own evolution is part of a more general pattern.

The second point is that none of the three studies revealed issues that were appreciably different from those already laid out by GAO's task force (see chapter 1). This similarity (or lack of dissimilarity) increases the relevance of outside experience for GAO.

What then are the issues? Synthesizing those discussed in all three studies, there appear to be three general themes that have emerged in organizations trying to integrate a number of disciplines under a single roof. These are:

- "fitting-in": tensions among different value systems and their impacts on work quality;
- job satisfaction among technical staff; and
- communications within the organization.

These are discussed below, along with a number of strategies for dealing with them that were identified and developed by the various organizations and respondents queried by the task force.

Fitting-In: Minimizing Tensions and Maximizing Work Quality

The literature abounds with discussions of the problems faced by technical staff in fitting into any large organization (see appendix I). Perhaps the most common difficulties—and those most relevant to GAO—deal with: positioning technical staff so that they can favorably influence work quality without causing great institutional turmoil; reconciling research autonomy and peer review methods of quality assurance with the hierarchical control and authority typical in organizations; and meshing one set of professional standards with other sets and with organizational policies and practices generally.

Overall, the organizations examined by the task force made use of a number of different structural arrangements to incorporate technical staff into their workforces. Some concentrated technical staff in separate units. Some instead dispersed technical staff throughout the organization. While each of these approaches revealed characteristic strengths and weaknesses, neither appeared to have succeeded in taking maximum advantage of technical staff expertise while minimizing the problems raised by their assimilation into the organizational culture.

Assigning technical staff to separate work units, as was done in the Inspector General's office at the Department of Health and Human Services (HHS), the Bureau of the Budget, and Coopers and Lybrand (see appendix II), tended both to accentuate the differences between technical and nontechnical staff and to reduce the conflict those differences generate by restricting the contact between technical and nontechnical colleagues. Separation seems to have made it easier for technical staff to maintain their distinctive disciplinary culture and thereby helped their organizations to recruit and retain analysts with a higher caliber of technical expertise. However, this autonomy came at the price of some organizational irrelevance: technical work tended to be viewed as peripheral to the core concerns of the organization, its influence on the organization's general work quality was limited, and the technical staff claim on centrally distributed resources was correspondingly weak.

Organizations that pushed for a thoroughgoing integration of technical and nontechnical staff faced the reverse situation. That is, the technically trained staff who remained in the organization did work closely with their nontechnical colleagues, but because that work involved many nontechnical elements, and because keeping technical capability in a "cutting-edge" state requires constant honing, their organizational immersion meant the stagnation or decline of their technical expertise over time. Meanwhile, those staff most concerned with building and sustaining their technical knowledge tended to leave for more technically

stimulating work environments, and it became more and more difficult for the organizations to recruit top-flight analysts.

The lesson here seems to be that, if the purpose of bringing technical staff into an organization is to allow that organization to maintain and improve its technical capabilities in a changing market, then too much separation is a self-defeating strategy (little organizational stress, perhaps, but little organizational influence, either) as is too much assimilation (again little stress, but a gradual loss of the desired expertise). The problem is that, to the extent technical staff disengage from their disciplinary communities outside the organization, they are less likely to keep up with new developments in their field. Moreover, they will be less aware of the higher-level standards of technical quality that peers within their discipline are familiar with and take seriously. Thus, organizations may benefit if their technical staffmembers are not too completely assimilated into the prevailing organizational culture. What is needed is a strategy that accepts some institutional turmoil but maximizes both the quality of technical skills and their dissemination, where needed and appropriate, across the organization. IBM and RAND have understood this; and GAO, with its three options for technical staff (see chapter 1), appears to be dealing well with this problem.

The difficulty of reconciling peer review with hierarchical quality control, mentioned earlier, has to do with the belief among technical staff that organizational norms and objectives are automatically satisfied if professional colleagues have approved the technical quality of the work produced. The literature presents this problem as one of organizational values that technical staff have tended to downplay: e.g., the need for clarity of communication to groups outside their own disciplinary community, the need for careful documentation of evidence to support conclusions, and the need to comply with organizationally developed work procedures as opposed to reliance on individuals exercising their professional judgment. RAND and Resources for the Future (RFF), for example, have had problems in these areas, as has GAO, and it is certainly the case that the conflicts or divergent views between technical and nontechnical staff, or among staff representing various disciplines, must be resolved in some fashion. Both the substantive content of those decisions and the manner in which they are made will affect the ability of an organization to use its technical staff effectively. Organizations vary in their openness to relevant information from technical as well as nontechnical staff, in their capacity to consciously weigh tradeoffs between technical standards and established organizational priorities, and in their ability to arrive at clearly defined resolutions that all interested parties within

the organization can accept without an inordinate expenditure of time and effort. RAND's and RFF's multiple peer reviews, and Arthur Andersen's "practice director" (see appendix II) are two cost/effective mechanisms for dealing with this problem.

With regard to communicating clearly to general audiences, the potential for conflict between technical and organizational norms is nowhere more acute than in the area of writing. Technically trained staff writing on technical subjects usually view their disciplinary colleagues as their main audience, and this engenders the use of specialized technical vocabulary (i.e., jargon) and detailed explanations of any caveats or limitations that apply to the data or analytical techniques employed. But the organizations for whom technical staff work typically focus on very different audiences, such as corporate managers, policymakers, journalists, the general public, or all of the above. As a result, these organizations often have quite different priorities for their written products. Their audiences are less likely to find fault with particular points; rather, the concern is that they will simply ignore written products that are not clear, concise, and fairly emphatic in the message they convey. So there often arises a fundamental conflict between the technical staff's standard for a complete and accurate description of the work that was done, and the organization's need to produce reports that will be read and understood by diverse audiences.

In the same way, professional standards may not suffice in the organizational environment. Technical staff bring with them to the workplace a set of professionally-defined standards of quality, and the expectation that analysts should be willing and able to assume personal responsibility for maintaining these standards through their individual exercise of professional judgment. Not only do organizations want to assert hierarchical authority, however, most have discovered the practical necessity of developing their own work procedures and standards for assuring the quality of their work, and these reflect their history, their objectives, and their understanding of their clients' requirements. These standards and procedures are often very different, however, from those defined by academic disciplines. Thus, technical staff are much more likely than nontechnical staff to find themselves torn between the value system of the discipline whose technical expertise they have acquired and the organization's own norms and expectations.

The issues of peer review versus hierarchical control and of professional versus organizational standards and procedures may not be as dichotomous as they appear, however. Regular reviews of internal technical

work by outside experts have not interfered with responsible management control at RAND and RFF, for example. Instead, they help management by providing an assurance of the technical quality of staff work at the same time that they satisfy the preference of technical staff to have their work judged by technical peers. Among the organizations examined by the task force, the two that relied most heavily on reviews by external experts—RAND and RFF—also put the strongest emphasis on maintaining a high level of technical expertise in their permanent staff. Further, organizational standards and procedures act more as an add-on to professional norms than anything else. What is needed here is to ensure that new technical staff are given the opportunity to be trained early on in such standards and procedures, rather than assume, a priori, that they are in conflict with disciplinary values. Arthur Andersen, for example, has developed an extensive training program to convey to its technical staff the organization's highly detailed specifications of approved practices and procedures. At GAO, this translates into a parallel need to train new technical staff in "workpaper" preparation, indexing, and referencing.

Improving Job Satisfaction for Technical Staff

At the same time that management and nontechnical staff may worry about the commitment of technical staffmembers to organizational goals and expectations, technical staff may complain of being "second-class citizens." Particularly in organizations that are not dominated by technically trained people, some technical staff may feel misunderstood, underappreciated, and alienated from the organizational "mainstream." Management may accord their work less priority or solicit and act upon their views less frequently.

The discussion in appendix II of problems in the Bureau of the Budget (now OMB) is especially relevant in this regard. Nontechnical colleagues tended to ignore technical staff or treat them as a threat to their own status within the organization. Even when the specific expertise of technical staff was valued, their attention to detail and "perfectionism" (see appendix III), for example, was not appreciated. One federal agency has tried to compensate for this by formally drawing the attention of the organization to the contributions of its technical staff.

A particularly sensitive topic among technical staff in some organizations is salary. Many federal agency managers believed (see appendix III) that a good deal of their high turnover among technical staff stemmed from their inability to pay competitive salaries. Private sector organizations, on the other hand, generally took considerable care to see

that their salaries kept up with those offered by potential alternative employers of technical staff, such as major universities.

Several strategies have been adopted in various organizations to improve job satisfaction among technical staff. When salary could not be increased, these organizations often resorted to nonfinancial recognition. Perhaps because of tension between professional and organizational value structures and their uncertain acceptance by nontechnical colleagues, technical staff appear to have been particularly pleased with indications that their contributions to the organization were noted and appreciated. Also, because of their ties to their disciplinary communities, technical staff seem to value recognition from peers outside the organization. Organizations varied in the extent to which they promoted opportunities to garner such recognition.

For example, the HHS IG's office recognizes outside publications of agency staff by listing them in its annual report; this seems to be unique among the organizations queried by the task force. IBM provides wide recognition to its best technical people—those who have made exceptional intellectual contributions to the corporation—through different initiatives (e.g., a corporate technical committee, a fellows program, and a sabbatical program; see appendix II). Other organizations, especially federal agencies, have attempted to compensate for uncompetitive salaries by emphasizing certain types of resources, including up-to-date equipment, a suitable work environment, and the ability to obtain relevant training (appendix III).

Still other organizations have opted to institute a "dual career ladder" to conciliate the organizational need to attract and retain technical staff, and the technical staff's desire to receive higher salaries without assuming management responsibilities. The task force looked at some applications of this concept in a number of organizations and examined the experience as discussed in the literature. Reviews appear to be mixed. While technical staff in some of these organizations are pleased with the dual ladder, it is also seen as divisive by some organizations, and appears much more effective at its bottom rungs than at the top.

Overall, organizations tended to enhance job satisfaction for technical staff through the proxy of their managers. "Verbal feedback" was important; so was "promoting" the skills and accomplishments of technical staff to the rest of the organization (see appendix III). The key lesson here is the importance of the manager/technical staff relationship in helping technical staff become integrated into an organization. At

GAO, this is especially relevant to the situation where technical staff work closely with nontechnical staff in the field.

Assuring Good Communications in the Workplace

As already noted, the intellectual frame of reference acquired through graduate education in a technical field frequently subsumes a specialized vocabulary. Words and concepts are used in particular ways as a matter of course within the discipline. Other disciplines may use the same words or concepts quite differently, and this has led to communication problems both across disciplines and between technical and nontechnical staff within organizations (see appendix II). One of the experts interviewed recommended that organizations integrating new disciplines prepare a glossary for the use of all their employees describing variations in meaning for terms relevant to their work.

Two kinds of general strategies have been used to reduce communication problems, the first being training for both managers and technical staff, and the second a kind of deliberate integration of technical staff into the nontechnical workplace. Some audit organizations provide audit and accounting training for technical staff as well as technical training for nontechnical staff and managers. Other federal organizations require nontechnical managers to maintain a good understanding of technical issues in their areas, and emphasize the importance of training in their agencies to everyone they recruit (appendix II). RAND, IBM, and other organizations believe in the importance of managerial training for technical staff. Training, in sum, is a way of exposing both mainstream and nonmainstream groups in an integrating organization to the language, procedures, thinking, goals, and values of the other.

Deliberate integration also takes place in some organizations which team new technical recruits with seasoned, successful technical staff, or use rotational appointments that technical staff can request. To improve technical staff understanding of management perspectives, IBM, along with several other organizations, offers technical staff temporary assignments in management positions outside their regular work units. This enables technical staff to see how well they will perform in a management role, and how much they like it, without putting their current technical position at risk. IBM has also created ad hoc laboratories that combine research and product division staff on a temporary basis. In this way, IBM brings the resources of its "leading-edge" technical staff to bear on critical development problems without severing their association with the more advanced technical culture of the research division.

Finally, organizations have focused heavily on the recruitment interview to select technical staff who can function as part of a team and who can communicate well—both verbally and in writing. Technical staff retention and job satisfaction also seem to be increased by fully and precisely describing to potential recruits what they can expect their job to be like if they choose to join the organization (see appendix III). For example, some federal agencies make a point of explaining to new technical staff that their promotional opportunities will be limited if they do not wish to become managers. While this may narrow the pool of potential recruits, it is also likely that most of those whose application or acceptance of a job offer might be discouraged by this information would not do well were they to come. In addition, the adaptation of those who do join the organization is not encumbered by false expectations.

Implications for GAO

Two general conclusions emerge from this review of the experience of other organizations in dealing with issues of interdisciplinary management. First, many of the concerns about the integration of technical staff at GAO that prompted the establishment of this task force are replicated in a number of other organizations. This implies that the issues arise, in large part, not from particular characteristics of GAO, but rather from a more generic set of factors most probably linked to the divergent value systems of technical disciplines and large organizations, and to the push-and-pull of forces in an evolving, dynamic context.

The second general conclusion is that problems related to interdisciplinary management can be ameliorated, if not fully resolved, by a wide variety of measures. Many involve tradeoffs, primarily between levels of technical competence and adherence to organizational norms and expectations. But these tradeoffs are not immutable. Highly targeted strategies have been developed for a range of situations that creatively and flexibly maximize incentives for constructive interaction among technical and nontechnical staff.

Three smaller points also seem noteworthy. First, in thinking about today's GAO, the distinction between mainstream and non-mainstream is as important to keep in mind as that between technical and nontechnical. (However, as the agency moves toward greater pluralism, it is likely that both distinctions will become decreasingly relevant.) Second, all four of the task force goals noted in chapter 2 (i.e., to widen, deepen, and modernize GAO's technical expertise; to preserve GAO's institutional

values of independence, objectivity, and accuracy; to optimize the application of technical skills in GAO projects; and to help technical staff expand their skills, adapt to the GAO working environment, and maximize the satisfaction they derive from their work) need to be considered in applying strategies to GAO. Finally, individual improvements should not come at the price of organizational divisiveness.

In any case, the first step in applying what has been learned from the literature and the task force interviews is to understand more precisely what the current situation is at GAO, with regard to interdisciplinary management. What are the perceptions of both technical staff and managers with regard to its status, patterns, and development? The next chapter provides the results of the task force's efforts to garner that information.

The Current Practice of Interdisciplinary Management at GAO

The task force carried out five major activities to assess the current practice of interdisciplinary management at GAO. First, a census was undertaken to try to determine the number and organizational placement of technical staff at GAO using a standard definition across the entire agency (see chapter 2). Second, the task force carried out detailed interviews with a sample of 43 individuals (both generalist evaluators and persons identified as technical staff) who had left GAO in the previous 3 years, and some who had returned after spending time in other organizations. Third, it surveyed all current technical staff members (as identified by the census) with regard to their experiences at GAO and attitudes about the organization. Fourth, a similar survey asked GAO mid-level managers about their experiences with and attitudes toward technical staff; this survey was supplemented by a number of focus groups involving 38 senior managers. Finally, the task force compared the responses from the technical staff and mid-level manager surveys to determine patterns of agreement and divergence between them. The detailed findings of each of these activities are presented in appendixes IV, V, VI, VII, and VIII.

Because all of the data collection efforts were coordinated with each other, they have the advantage of using a consistent definition of technical staff. Thus, the staff identified through the census were the ones who received the technical staff survey, and technical staff who had left GAO were selected for interview based on the same definition. This greatly enhances the validity of synthesizing results obtained from the different sources. Also, the similar construction of the two survey instruments (which reached, in all, 375 mid-level managers and 470 technical staff) allows proper comparison across the two perspectives (see appendix VIII). In addition, the response rates achieved by these surveys—89 and 92 percent respectively—mean that a great deal of confidence can be placed in the representativeness of their findings. The task force has, however, been appropriately cautious in combining findings from the surveys with those of the focus groups and interviews because of their basic methodological differences. Focus group and interview findings, therefore, have been used only illustratively, as reinforcements or counterpoints to the survey findings.

This chapter pulls together the information gathered from all five sources, beginning with a description of how technical staff are distributed across the divisions and regions of GAO.

Distribution of Technical Staff Within GAO

As noted in chapter 3, the experience of other organizations suggests that the role and status of technical staff depend a great deal on their relative prevalence in the organization and the diversity or homogeneity among them. It is clear from the evolution of technical staff recruitment at GAO (see chapter 1) that these staff have always made up a fairly small minority of GAO's professional staff. Nonetheless, the census conducted by the task force, together with the responses to the technical staff survey, provide the first systematic assessment of just how large that minority is, how it is distributed throughout the organization, and how technical staff differ among themselves in background and function.

All told, the task force enumerated 481 technical staff at GAO as of December 31, 1988. This represents approximately 11 percent of GAO's professional staff.[1] Nineteen percent of these technical staff are in the regions, with the rest concentrated in the headquarters divisions. Among those, two of the three technical divisions—IMTEC and PEMD—account for 35 percent of the total technical work force, with almost all the rest distributed fairly evenly across HRD, GGD, NSIAD, and RCED.

Less than half (45 percent) of the technical staff have as their primary function to provide technical assistance; those who do are usually members of DMTAGS, EAGs, or regional TAG groups. The rest work in groups directly responsible for producing GAO reports of various kinds. Those providing technical assistance are relatively more likely to work in the regions than in headquarters, and to have been hired prior to 1981.

The diversity of the GAO technical work force is evident from the range of job series represented among the 481 persons identified as technical staff, as well as the spectrum of disciplines in which they hold advanced degrees. In addition to several broad job classifications (for example, the 46 percent of technical staff who are GAO evaluators of one kind or another and the 12 percent who are social science analysts), GAO's technical staff may be classified as economists, statisticians, operations research analysts, computer specialists, psychologists, engineers, or physical scientists.

About 25 percent of the technical staff have the bachelors as their highest degree; almost 30 percent have done masters level work; and just over 40 percent have received graduate training at the doctoral level.

[1]On March 31, 1989, GAO had a total of 4,315 employees in its professional workforce. See U.S. General Accounting Office, 1989 Midyear Report of Key Performance Indicators, p. 39.

Technical staff hired in the last 8 years are much more likely to hold a doctorate than those recruited prior to that time (43 percent versus 15 percent). The disciplines represented among GAO's technical staff with advanced degrees include psychology, sociology, economics, political science, international relations, education, public health, geography, computer science, mathematics, research methods, statistics, engineering, geology, physics, and biochemistry, among others. While the computer-related and social science disciplines tend to be relatively more prevalent, no single discipline comes close to characterizing the technical staff of GAO as a whole. However, certain units are dominated by individual disciplines, particularly computer science in IMTEC as well as in the regional TAG groups, and economics in the EAG's.

In short, most GAO technical staff are widely distributed across organizational units and often work with colleagues who either are not technical in their backgrounds, were trained at differing levels, or belong to other disciplines entirely. In practice, GAO has largely avoided the "separatist" approach (described in chapter 3 and appendix II) of some organizations, whose technical staffmembers have been concentrated in distinct subunits in order to minimize friction and ensure the maintenance of high-quality technical skills. GAO has chosen instead to directly involve its technical staff in GAO's central activity—producing reports—whether as line evaluators in technical and program divisions, or as technical assistance staff. However, as noted in chapter 3, the heightened interaction of technical and nontechnical staff (or technical staff from different disciplines) increases the need for interdisciplinary strategies to facilitate cooperation and avoid misunderstandings among staff with differing backgrounds, as well as between managers and technical staff, and to maintain the "leading-edge" expertise possessed by the technical staff recruited and retained by GAO.

How well, then, is GAO doing in integrating its technical staff? Chapter 3 developed an analytical framework to characterize the problems experienced by other organizations that have attempted interdisciplinary management. In this chapter, the task force looks instead at GAO and synthesizes what the five studies have found with regard to the three general themes identified in chapter 3: the ability of technical staff to fit into the organization, the level of job satisfaction they experience, and communications within the organization.

"Fitting-In": Minimizing Tensions and Maximizing Work Quality

There are two primary questions of interest relating to this general theme: (1) to what extent do GAO's technical staff members actually approach their work in ways that diverge notably from those of nontechnical staff?, and (2) if they do, to what extent do the nature and magnitude of such differences in workstyle and values affect the quality of the work produced, with respect to both technical quality and adherence to GAO's established practices and procedures? In other words, how is GAO faring in striking a balance between the integration of its technical staff with the rest of the agency, and its reinforcement of technical staff capabilities to help sustain a high level of technical quality in GAO reports?

The evidence on both these broad questions is mixed. Some in the organization see no meaningful differences between nontechnical and technical staff, other than those serving in a technical assistance role. This view was expressed quite strongly in the focus groups conducted with GAO's upper management (see appendix VII, section II). Many of these managers believe that all of GAO's evaluators constitute a pool of individuals with widely divergent talents and backgrounds, and in their view, technical training even at the doctoral level in no way distinguishes or sets one group of line staff apart from the others in terms of skills, basic orientation, or approach to GAO's work. They did, however, distinguish between technical assistance staff and evaluators, not in terms of skills or values or workstyles, but in terms of differences in the work they do. (The task force had discussed using a definition of technical staff based on work or function alone, but decided against it because such a definition would have masked the issue being investigated. That is, if it is assumed that everyone who does the same work is the same, then the question of how well technical staff are being integrated into the organizational mainstream cannot be investigated.)

This view that no distinction can or should be made between technical and nontechnical line staff because they perform the same work was, however, limited to senior management. Mid-level GAO managers (primarily directors for issue areas, associate directors, assistant directors, assistant regional managers, and directors of regional TAG groups) instead indicated consensus that there are substantial differences between nontechnical and technical staff, both in assistance and line positions, in specific domains. For example, by an overwhelming margin, managers find that technical staff have greater difficulty than nontechnical staff in adapting to GAO procedures (71 percent), in adjusting to the degree that work is reviewed at GAO (69 percent), and in accepting the limited recognition accorded to their work products (64 percent). (Senior

managers in the focus groups agree with this characterization only for technical assistance staff.)

In addition, almost half (44 percent) of the mid-level managers who supervise both technical and nontechnical staff recognize great or very great differences between them in terms of how they assign them to tasks. Another 35 percent reported a "moderate" difference and only 21 percent found some or no difference between their technical and nontechnical staffmembers on this dimension.

A similarly mixed message emerges from the results of the technical staff survey and interviews with former GAO employees, both technical and nontechnical. In some ways, technical staff responses in both surveys and interviews reveal them to be less different from nontechnical staff than the literature and other organizations' experience would lead one to expect, or than most mid-level GAO managers perceive them to be. For example, only 17 percent of technical staff feel that GAO's documentation requirements, such as indexing and referencing, are unreasonable, while 56 percent say they are reasonable.

Yet despite these points of similarity, GAO's technical staff are conscious of differences in their backgrounds compared to those of the rest of the agency's staff. About one-third (34 percent) of line technical staff indicate that their current supervisor has a background similar to their own, compared to 43 percent reporting that it is dissimilar. And among the minority of technical line staff (13 percent) who characterize their experience with their current supervisor as "more bad than good," 90 percent attribute this to differences in work philosophies, and 43 percent to differences in professional training.

The key question, as already noted, is whether and how these perceived similarities and differences between technical and nontechnical staff affect the production of good quality work. Overall, technical staff and managers both hold a positive view. Of the surveyed managers, 57 percent believe that technical assistance and line staff make a great or very great contribution to GAO. (However, those managers who supervise technical staff have a much more favorable view than those who do not.) Similarly, 46 percent of technical assistance staff believe that their advice is "always or almost always" given serious consideration, with 37 percent more saying that this "usually" occurs. Former technical staffmembers had also found GAO management receptive to their technical input.

At the same time, managers surveyed by the task force clearly have some qualms about the technical staff's capability with respect to organizational norms. For example, 79 percent of mid-level managers perceive technical staff as less knowledgeable of GAO policies and practices than nontechnical staff. Similarly, 59 percent of the managers rate technical staff as less proficient in written communications skills than their nontechnical colleagues.

Technical staff also expressed some reservations about the extent to which GAO faithfully portrays technical work. Only 30 percent of technical assistance staff report that their work is accurately reflected in GAO reports "all or almost all" of the time; however, over half (54 percent) say that "most" reports present their work accurately. On the other hand, 16 percent state that their work is accurately portrayed in reports no more than half the time. Moreover, only 23 percent of technical staff indicate that technical disputes are "always or almost always" settled in a technically adequate way, while 37 percent report this happens "usually." Thus, in the view of its technical staff, GAO currently achieves the technically appropriate result more often than not; on the other hand, these responses suggest there may be some room for improvement.

As noted in chapter 3, improved adherence to organizational norms and enhanced technical quality need not be mutually exclusive. For example, an important finding from both the technical staff survey and interviews with former GAO employees is that deficiencies among technical staff concerning knowledge of GAO procedures are more likely to reflect inadequate training than any unwillingness to comply with established GAO procedures. This is in direct contrast to the literature (see appendix I) in which active opposition by technical staff to organizational norms and procedures is assumed. Indeed, the technical staff survey suggests that most (though not all) of the technical staff who stay at GAO do accept quality control requirements like indexing and referencing. Moreover, mid-level managers suggest that more and earlier training in this area would be particularly desirable for technical staff.

With regard to technical staff reservations about the adequacy of the presentation of their work in GAO reports, this problem can be expected to diminish with the passage of time. That is, the planned increase in the proportion of GAO managers with technical training should lead to stronger presentations of technical issues, without losing sight of other organizational objectives such as clarity to lay audiences. It might also

be helpful to expand the use of outside technical consultants. The literature on the subject reveals that using external experts informally to augment traditional hierarchical reviews can help resolve technical disagreements among multidisciplinary staff (see appendix I). This device is used routinely in one technical GAO division, and some former GAO employees urge the agency to take greater advantage of outside consultants. However, the mid-level manager survey indicates that only 32 percent of managers GAO-wide have employed this technique in recent years to help settle technical disputes, and it does not appear from other sources that outside consultants are used much across GAO in any other context either.

Technical quality also depends on maintaining and expanding the expertise of the technical staff itself. Both mid-level managers and technical staffmembers endorsed an expansion of technical training for technical staff. Senior managers also advocate such training for these staff. Technical staff would prefer to rely largely on external training mechanisms, such as seminars and conferences. Although mid-level managers recognized that technical staff have a greater need for such training than nontechnical staff, many expressed reluctance to expand training opportunities for technical line staff much beyond that available to nontechnical staff. Indeed, the mid-level managers strongly endorsed technical training for nontechnical staff.

Improving Job Satisfaction

A plurality of technical staff (42 percent) is moderately satisfied with working at GAO. A minority is dissatisfied (9 percent are "very dissatisfied" and 17 percent are "moderately" so), compared to 15 percent reporting they are "very satisfied" and 17 percent neutral ("as satisfied as dissatisfied"). If the "very satisfied" and "moderately satisfied" totals are combined, it is clear that a majority (57 percent) of technical staff have a positive view of their work and are reasonably to extremely happy at GAO.

On the other hand, these responses also show that 43 percent of technical staff have a somewhat limited personal investment in their work, and this has implications not only for the retention of existing staff but also for the recruitment of new staff. While 43 percent would recommend GAO as a place to work for those with similar skills and backgrounds, 35 percent would not recommend it. Further, 39 percent of technical staff reported they were likely to look seriously for employment outside of GAO in the next two years, with another 26 percent indicating a 50 percent chance they would do so. This suggests that

although GAO is integrating a majority of its technical staff very well, there may be a need for improvement vis-a-vis the 43 percent who are neutral to dissatisfied, and the 35 percent who would not recommend GAO to new staff with similar skills and background to their own.

Despite the size of these proportions, it is difficult to be any more prescriptive in this area. It is always possible that the group of neutral or dissatisfied staff may include individuals whom GAO managers do not want to retain for various reasons. It is also not clear how much turnover is actually desirable. However, it is important for managers to determine whether the turnover they are experiencing is in fact acceptable to them. Responses from the mid-level managers' survey would tend to show that it is not. Indeed, fully 73 percent of the mid-level managers surveyed believe it would be difficult to replace their technical staffmembers. Moreover, 61 percent of those managers think that technical staff are more likely to leave GAO for other employment than nontechnical staff, compared to only 5 percent who think nontechnical staff are more likely to leave.[2] In addition, mid-level managers reported that they would have liked to retain about 70 percent of the technical staff whom they lost (the comparable figure for nontechnical staff was 50 percent).

Many senior managers in the focus groups, on the other hand, had a different view of technical staff recruitment and retention than did the mid-level managers (see appendix VII, section II). They believed GAO had little or no problem with recruitment, making exceptions only for particular regions that have high costs of living, or particular staff with highly demanded skills (such as computer specialists), and they perceived no difficulty at all with retention.

The technical staff and mid-level managers' surveys explored in some detail the factors that influence technical staff morale in GAO. (See appendixes VI and VII for the detailed analysis of these responses, and appendix VIII for a comparative analysis of the two sets.) Among the factors that the technical staff rated most important—the 16 out of 28 that more than half the technical staff thought were of great or very great importance—half or more of the staff rated GAO as "good" or "very good" on seven. These were, in order of importance to technical staff: the degree the work is professionally challenging, the ability for

[2]These views are borne out by actual attrition rates which now run at about 15 percent annually for technical assistance staff and about 6 percent for nontechnical staff.

staff to match assignments with their own areas of interest, the professional reputation of the agency, stability of employment, work in a variety of subject areas, importance of work outside the organization, and retirement benefits (see appendix VIII, table 1). The staff rated GAO most highly on stability of employment and work in a variety of subject areas, where 95 and 88 percent assessed the agency as good or very good. Notably, the technical staff also had a positive assessment of GAO regarding the factor they viewed as the most important of all among the 28—the degree of professional challenge in the work; here 58 percent considered GAO to be good or very good. Moreover, 69 percent of the technical staff rated GAO as good or very good in matching assignments with staff interests, their second most important employment factor. GAO did still better on the factor ranked fourth in importance, the professional reputation of the organization, rated good or very good by 71 percent of technical staff.

Technical staff rated another nine factors as important, but here fewer than half of them judged GAO's performance as good or very good. Three of these—access to personal computers, salary, and autonomy in carrying out the work—stand out as areas where improvements may be needed. All three combined relatively high levels of importance to technical staff (between 72 and 79 percent rating them of great or very great importance) with relatively low levels of perceived performance by GAO—only 31 to 39 percent of staff assessed GAO as good or very good in these areas.

With respect to the remaining 6 factors, those that came closest in importance to computer access, salary and autonomy were two areas where almost half the technical staff respondents rated GAO as good or very good: interaction with peers within GAO (49 percent) and opportunities to influence public policy (46 percent). However, GAO's assessed performance declined sharply for the remaining four factors—financial support for outside training (only 16 percent rating GAO as good or very good), career advancement without managing (9 percent), adequacy of work accommodations (21 percent), and interaction with peers outside GAO (24 percent). The low level of approval on these factors, along with the fact that each was still considered of great or very great importance by more than half the technical staff, means that attention to these issues could also pay substantial dividends in improved technical staff morale.

The surveyed mid-level managers agreed with and reinforced the judgments of technical staff that salary and access to computers were two

critical factors affecting technical staff retention. In weighing alternative measures to enhance the attractiveness of GAO, they gave high priorities to both, with a higher priority going to computers than to salary. However, few managers (18 percent) suggested giving high or very high priority to granting staff more influence over their assignments, the third factor highlighted by technical staff respondents.

One other area of high priority to mid-level managers was that of providing career rewards for technical as opposed to managerial tasks. Over half of these managers would support increasing the noncompetitive working grade for technical staff above GS-12 (or its equivalent), and two thirds would support nonmanagerial GS-15s for senior technical staff. However, many of GAO's senior managers again disagreed: they would support nonmanagerial positions at the GS-15 level only on an exceptional basis.

The technical staff rated GAO worse on the dimension of nonmanagerial promotion opportunities than on any other factor, with 91 percent rating GAO no better than fair. While this factor was not considered by technical staff to be as important as the other factors cited above, 55 percent of technical staff nonetheless considered it of great or very great importance (it was 13th out of 28). Moreover, salary—the fifth most important factor to technical staff—overlaps with nonmanagerial promotion to a considerable extent, since the main advantage to technical staff of career advancement in nonmanagerial positions is the possibility of increasing their income without changing the type of work that they do.

One reason why technical staff may place less importance on nonmanagerial advancement is that, contrary to the conventional wisdom about how technical staff view their paths of career development, and despite the dual career ladder literature (see appendixes I and III), many at GAO do aspire to managerial roles. Even among technical assistance staff, who typically have less involvement in the type of project management tasks that lead to larger managerial responsibilities, 33 percent would prefer to manage research or technical work rather than do it themselves, with no change in salary. To advance to a GS-15 position (and gain higher pay), 70 percent would willingly assume managerial responsibilities.

However, the mid-level managers surveyed by the task force, while supportive of nonmanagerial advancement for technical staff, were notably skeptical about their suitability for management responsibilities. They assessed technical assistance staff as less suitable than nontechnical

staff for assistant director, director, and regional manager positions by a margin of 73 percent to 8. Technical line staff—whose experience in managing jobs (19 percent are currently assistant directors and 50 percent assignment managers or project managers) more closely parallels that of the nontechnical staff vying for those positions—were perceived more favorably. Still, only 14 percent of managers saw an advantage in having a technical background at managerial levels, while 44 percent considered nontechnical staff more suitable for management (41 percent said they were equally suitable). This gives credence to the view held by many technical staff that their technical backgrounds are not helpful in terms of promotion, especially at higher levels (see chapter 1).

The focus groups involving GAO's senior managers, on the other hand, turned up a widespread perception among them that technical assistance staff receive "plenty of promotions," so many, indeed, as to risk creating resentment among generalist evaluators (see appendix VII, section II). Their view was that technical assistance staff need management experience and should "move into evaluator ranks" (i.e., become technical line staff and then managers), if they want to compete for GS-15 and SES promotions.

This mosaic of perceptions, preferences, and differential experience with technical staff at various levels of GAO management makes it difficult to determine whether the belief among technical staff that there are not enough promotion opportunities open to them (at least at the GS-15 level and above) is, on the whole, accurate or not. It may often depend on who is involved in individual promotion decisions. This uncertainty makes it harder for technical staff to accurately assess their long-term career prospects at GAO, and to make informed choices between career paths focusing on technical assistance or line positions. It also seems possible that such uncertainty could be having negative effects on retention.

Nevertheless, the survey of technical staff shows that, by and large, they are willing to assume managerial responsibilities as they advance to the level of assistant director and beyond. And at least some senior managers have appeared to welcome technically trained candidates into management ranks, since they see the GAO work force as a whole growing more technical. Indeed, promotions to upper management in GAO in recent years suggest more openness to qualified candidates with technical backgrounds than the focus group discussions might suggest. Currently, about 27 percent of SES line positions are held by individuals

with strong technical qualifications.[3] Given these developments, it seems reasonable to expect that both supervisors and senior managers will increasingly recognize the capabilities of technically trained staff as a group, and will see to it that individual technical staff members are not inhibited from obtaining the necessary qualifying experience and then applying for managerial positions, if they should want them.

Another important strategy for reinforcing technical staff morale and job satisfaction is providing public recognition for a job well done. Awards, for example, appear to be particularly important to technical assistance staff, nearly half of whom (49 percent) believe that their work has received less visibility than it deserved; similarly, 31 percent of technical line staff believe they have gained less recognition for their work than is appropriate. In this area, then, GAO's situation parallels that experienced by other organizations and discussed in the literature. A conscious effort to identify and reward exceptional technical work, as IBM does, for example (see appendix II), could help to overcome the historic (see chapter 1) and still pervasive sense among technical staff at GAO that their work is systematically undervalued compared to that performed by generalist evaluators. Indeed, 62 percent of mid-level managers assigned high or very high priority to providing more recognition for a job well done to help GAO retain its technical staff. And among those managers who supervise only technical staff, the comparable figure was 78 percent, with 46 percent assigning it very high priority.

Assuring Good Communication

As already noted, effective communication means different things to GAO's technical staff and to its mid-level managers. These managers (59 percent) are not only critical of technical staff concerning written communication, but a third (32 percent) also believe nontechnical staff communicate better orally than technical staff (64 percent judge them equal). The same proportion (31 percent) finds that nontechnical staff are better able to work well with other people (again with virtually all the rest, 67 percent, finding no difference).

Technical staff, on the other hand, see effective communication of technical results differently. To them, the paramount issue is the accuracy with which their work is presented in GAO reports (see appendix II), and they believe that some work must be described in technical language if it

[3]Memorandum to the Assistant Comptroller General for Program Evaluation and Methodology from the Regional Manager of Kansas City (October 16, 1989). The task force definition of technical staff was again used for this analysis.

is to be accurate. Yet such language is usually seen as jargon by writers of good English prose, and by the lay or nontechnical readers who constitute the primary audience for GAO reports. Thus, the ability to communicate transparently in clear language is required if those reports are to be read and used. As a result, technical staff in GAO have the difficult task of learning to present their arguments understandably while at the same time ensuring that the precision and accuracy of what is described have not been jeopardized through oversimplification.

Mid-level managers believe that one way to deal with these communication problems is to base hiring decisions for technical staff, at least in part, on their oral and written communication skills, as well as on their aptitude for team-oriented work. By the same token, they emphasize the importance of the recruitment interview. If candidates are asked to bring samples of their work with them to the interview, written communication skills can be assessed, oral communication can be observed at the interview, and candidates' ability to work well with people can be queried through reference checks.

It is also important at the recruitment interview to provide potential new hires with a clear understanding of what they should expect at GAO. Current and former technical staff (as well as former nontechnical staff) report that this has not always occurred in the past. For example, only 23 percent of technical staff hired since 1980 indicated in their survey responses that their first-year experience at GAO greatly or very greatly matched their expectations, though 48 percent did report a "moderate" match. The technical staff whose first-year experience did not closely match their expectations said they found the work less technical, more thoroughly reviewed, less challenging, and less visible than they had anticipated, and they also noted that they had less control over their work, faced more documentation requirements, and used their specialized skills less often than they had thought they would. This problem of disappointed expectations was apparently not widely observed by mid-level managers, three quarters of whom (76 percent) reported that their technical staffmembers were very or generally satisfied with the correspondence of their work assignments to the expectations they had had when hired.

More extensive training is another needed strategy for improving written communication. Only 27 percent of technical staff reported that they had received adequate training in GAO's reporting style in their first 6 months of work. Among former GAO employees, many technical staff felt

they would have benefited from courses in basic auditing techniques as well as in GAO procedures.

Another possible approach for enhancing both understanding and effective communication is to rotate technical assistance staff into line positions and vice versa. Senior and mid-level managers favor short-term assignments of technical staff into nontechnical positions, but are not favorable to rotations of nontechnical staff into DMTAGs or TAG groups. If the rotations were short-term, however, perhaps they could provide a way to interest more technical assistance staff in moving into a temporary position from which they could determine whether or not they were interested in management. (At present, few—8 percent—would want to be transferred laterally to an evaluator position.) And nontechnical staff could make good use of a short-term rotation into, say, a DMTAG to apply technical skills, newly acquired through GAO training, under expert direction.

Summary and Conclusions

In sum, the five task force studies make several points clear. First, a majority of technical staff are "moderately" to "very" satisfied with their work at GAO. Second, GAO is doing better in giving these staff professionally challenging work than in giving them the equipment (especially computers) that they need to do it with. Third, a majority of mid-level managers believe that technical staff are making a major contribution to GAO. Fourth, most managers do not think a technical background is helpful in management or that technical staff have much aptitude for it, and there is a corresponding view among technical staff that promotion possibilities at upper levels are rare for staff with technical backgrounds. Fifth, there is general consensus among managers surveyed about the need for more recognition of technical staff contributions.

There were at least three surprises: (1) it turned out that technical staff were not opposed to GAO procedures, as had been thought, but rather had not always received training in them; (2) senior managers and mid-level managers were in substantial disagreement on many points;[4] and (3) at GAO, most technical staff are not opposed to taking on management responsibilities.

[4]Among other things, this could be an artifact of method (e.g., the focus group versus the survey); or it could reflect the larger distance that exists between technical staff and senior managers than between technical staff and mid-level managers.

Compared to some other agencies and private-sector firms that have attempted to integrate technical staff into a mainstream organization, GAO appears to be doing very well. Particular points of tension have arisen, such as what really constitutes an adequate and effective description of a study's analytical approach, but the discussion in chapter 3 suggests that these tensions may be to some degree desirable, as well as inevitable. In order to consciously weigh any tradeoffs between aspects of technical quality and other organizational norms, the organization needs to have within it individuals who are not so perfectly assimilated into the prevailing culture that they are unable and unwilling to make the case for technically preferred alternatives. The generally positive but not uncritical attitudes toward GAO reported by the current technical staff (and mid-level GAO managers about the technical staff) is broadly consistent with this overall objective.

Nevertheless, in a number of different areas, improvements could be made that would reinforce the role and strengthen the contribution of technical staff at GAO. The recruitment interview could be used better to (1) determine a candidate's written and oral communication skills; (2) examine his or her aptitude for working in teams; and (3) convey a clearer comprehension both of the kind of work he or she would be doing at GAO, and of opportunities for promotion. Training in GAO practices and procedures could be expanded and improved, especially since it appears that, at GAO, noncompliance reflects not opposition but ignorance. Resources could be targeted to specific areas that would have the greatest impact on technical staff morale, while promoting organizational productivity overall—for example:

- increased opportunities for external technical training;
- improved access to personal computers;
- improved "verbal feedback" and awareness from managers, including a serious search for technical staff input, to the degree possible, into decisions on the work they will do and how they will do it; and
- increased recognition and rewards.

Also, it seems important to ensure that technical staff understand clearly what their career possibilities are at GAO. Either they need to be told that they cannot advance beyond a certain level, as the IG's office in HHS does (see appendix II) and outside managers have advised (see appendix III); or else they need to know that they can, and under what circumstances (e.g., the acquisition of management experience). The perception that a technical background is not useful for promotion potential is not a helpful one to maintain at GAO either for retaining successful

technical staff, for keeping their skills honed, or for transferring those skills to the rest of GAO.

It seems reasonable to expect—given the remarkable agreement in these areas between the technical staff and mid-level manager surveys—that changes such as these could benefit not only technical staff but also non-technical staff, managers, and GAO as a whole. This would come about as a function of increased understanding, clearer communication, improved morale, and the better working environment for all GAO-ers that these changes could be expected to create.

Capitalizing on What Has Been Achieved: Effecting and Monitoring Improvements in GAO's Technical Capabilities

GAO has come a long way in simultaneously expanding the technical capabilities of its staff and integrating those skills throughout its professional work force. Although that process has involved some degree of tension and conflict, it is greatly to GAO's credit that it has openly confronted these issues on a continuing basis—most recently with the establishment of this task force—and consciously sought adjustments in personnel practices and other areas that would help its increasingly diverse and technically-trained staff to function effectively as a whole.

The most important question, however, is not where the agency is today, but where it is heading. How can GAO organize itself to foster both more sophisticated and more widely dispersed technical skills among its staff? How can it correct existing difficulties and better foresee potential new ones?

Some part of the answers to these questions focuses on two major activities: training and monitoring. As numerous references in the previous chapters have made clear, training is the key to broadening and deepening the pool of technical talent in the agency. GAO has done well in giving increased attention to technical training for its mainstream professional staff and is now beginning to refine its plans to continue and broaden such training. But it has given somewhat less emphasis to training staff who have already achieved a certain level of technical skill, either to expand their technical expertise or to insure that they are well oriented to GAO procedures and the logic of audit approaches. The first of these is needed to ensure that technical expertise is not blunted over time; the second is a requisite for interdisciplinary understanding.

In a different but related area, GAO has similarly begun to put into place personnel information systems that will allow the agency to monitor its progress in expanding and strengthening its technical capabilities across its entire professional staff. There are, however, important limitations in the existing data systems that impede their use for this purpose with desirable flexibility, efficiency, and accuracy. These limitations affect GAO's ability to adequately track increases in the technical skills acquired by current staff, as distinct from the educational credentials they obtained prior to coming to GAO.

This chapter summarizes information from appendixes IX, X, and XI on GAO's training program and personnel information systems, with a focus on areas where incremental improvements could have particularly large potential benefits. The task force has attempted to identify, based on the information developed for this report, any critical gaps in the mix of

internal and external technical training provided to GAO staff and in the organization of existing data systems for purposes of monitoring staff development. Given the already great emphasis that has been put on technical training for nontechnical managers and staff, this will not be a focus of the present discussion. It is, nonetheless, a critically important part of GAO's ability to deal with the challenges of interdisciplinary management.

Training for Technical Staff in Organizational Procedures and Technical Skills

The subject of training for technical staff has come up several times in previous chapters, with respect to approaches taken by other organizations and the needs perceived by GAO managers and technical staff. This section relates those observations on alternative training objectives and methods to the training program that GAO offers its professional staff. The analysis is somewhat complicated by the fact that GAO's evaluator curriculum is currently undergoing major revisions. Past experience with GAO training may therefore have little relevance for what to expect in the future; at the same time, current plans may or may not be implemented as envisioned. Nevertheless, past experience and current plans together provide the best available evidence as to the direction in which GAO's training program is moving at this time.

In the preceding chapters, the discussion of training for technical staff has primarily focused on two types: (1) orientation to the organization and its cultural norms, and (2) technical training to expand existing technical expertise. Since orientation and technical training generally encounter different types of problems, each is examined separately here.

Orientation for staff hired with advanced technical training differs from that given to most entry-level evaluators less in its content than its context. Everyone in the organization needs to learn the same practices and procedures—workpaper preparation, indexing and referencing, etc. However, more than most entry-level hires, technical staff come to GAO with a pre-existing set of norms defining good quality work grounded in their professional training.

Every technical staff person at GAO has to integrate these professional norms with GAO's own standard operating procedures in order to function effectively in the organization. The responses to the technical staff survey indicate that most of GAO's technical staff have done so, over time. However, it seems clear, given the majority of technical staff who

find GAO's documentation requirements reasonable, that effective orientation training given as soon as possible after hiring, could facilitate and accelerate the process of accommodating the professional norms of technical staff to those of GAO.

There are two elements to this. The first is to ensure that all staff—including staff hired with advanced technical skills—receive relevant training in GAO's organizational procedures immediately after their arrival at the agency. This would represent a major change from the last 10 years, when fewer than half of technical staff hired by GAO could recall receiving training of this sort within 6 months of their arrival. Second, decisions need to be made about the extent to which technical staff would benefit from a specialized orientation program targeted to their particular need to integrate pre-existing professional norms.

In the past, GAO has provided minimal formal orientation to the technical staff it has recruited. In addition, there is a continuing lack of orientation training for mid- and upper-level hires. The training program has historically assumed that people came to GAO at the entry level and worked their way up in the organization. Over time that recruitment pattern has become less and less dominant, especially for those with advanced technical training.

The technical staff who in previous years took GAO's regular entry-level orientation, either in whole or in part, gave it mixed reviews. The course has recently been revamped to reflect the increasingly technical nature of GAO's work. It remains to be seen if these changes were sufficient to meet the needs of staff with relatively greater prior training in technical disciplines. GAO's Training Institute plans to examine this issue in the near future.

Several initiatives are now under way that may help to rectify past neglect of formal orientation training for technical staff at GAO. However, as the various components are designed and put into place, specific consideration should be given to how well they address the particular needs of recruits with substantial technical training. For some segments, additional or revised material specifically designed for technical staff might help them make a smoother and speedier transition into the GAO working environment.

In part, that transition can be eased by a better understanding of the similarities that exist between GAO's established working procedures and the professional norms technical staff bring with them. There are, of

course, important differences that should not be glossed over, such as the institutional authorship of products and the focus on writing for lay rather than technically sophisticated audiences. Moreover, GAO's current procedures should not be considered immutable; some may need to be revised or dropped as the range of work conducted by GAO changes. Questions raised by technical staff should help this reexamination process to occur.

On the other hand, some initial difficulties of newly hired technical staff may derive as much from the language or vocabulary used to describe GAO practices and policies as from their actual content. Most of GAO's working procedures have developed from accounting practices and are labeled accordingly. They need to be explained in ways that make sense to technical staff trained in a variety of disciplines. The key is to show how their purposes, such as establishing the empirical support for conclusions, relate to the concepts and values underlying technical professional norms. The match will not be perfect, but to the extent they do correspond, technical staff can come to understand that most GAO and professional norms are complementary rather than at odds with each other.

Formal orientation would also provide a suitable opportunity to introduce new technical—as well as nontechnical—staff to a glossary of technical terms and concepts whose usage varies across disciplines. As mentioned in chapter 3, this quite simple device can forestall a good deal of confusion and miscommunication in daily interactions among staff with different professional backgrounds. That alone could greatly facilitate the assimilation of technical staff at GAO.

The acculturation of technical staff can be launched by a well-developed orientation course, but it will take time to progress fully. Some will occur naturally through on-the-job experiences and interaction with other GAO staff. However, additional course work may also facilitate the process. In particular, numerous former GAO technical staff noted the value to people like themselves of courses in auditing and accounting. Similar comments were received from managers in other federal agencies. The point here is not to teach technical staff to do accounting, but to provide them a better understanding of the intellectual perspective of their auditor colleagues, which is also the basis for GAO's working procedures. For the same reason, technical assistance staff could benefit from some of the core courses required of line evaluators. (See appendix IX for a list of possible courses.) This should help the assistance staff to

more fully appreciate the situation and point of view of the evaluators they are advising.

The second major need for training by technical staff is for courses, conferences, and related activities to reinforce and expand their technical capabilities. This takes on added importance as a means for GAO to counteract the tendency, noted in chapter 3, of organizations which stressed the integration of technical and nontechnical staff to have greater difficulty maintaining a "leading edge" technical capability. The task force found a solid consensus among technical staff and both mid-level and senior managers regarding the importance of providing a substantial amount of technical training to the technical staff.

GAO's capacity to meet these needs through internal training may grow in future years, but currently it is quite limited and any expansion will probably occur slowly. Still, the demand for advanced training in quantitative techniques is likely to increase substantially as GAO implements a proposal to train all generalist evaluators in applied statistics to a level equivalent to one year of graduate work. Currently, there are plans to contract for courses in multivariate analysis, categorical data analysis, time series analysis, and causal modeling.

Nonetheless, technical staff and both mid-level and senior managers all agree that most of the advanced technical training needed by technical staff will have to be obtained through external sources. The needs of different staffmembers are so diverse that it is scarcely practical for GAO to attempt to provide this training in-house.

However, strong support in the abstract for external training of technical staff tends to diminish in the face of financial constraints and concerns over the equity of providing more resources to technical than nontechnical staff. On one hand, managers see the current level of support to technical staff as extremely expensive. On the other, only 16 percent of technical staff rate the availability of financial support for external training as good or very good at GAO. This is even lower than the proportion of technical staff (19 percent) who rate GAO's in-house technical training as good or very good. The situation may be worst for the TAG groups in the regions, where limited travel budgets impede access to internal as well as external training. Many, but not all, senior managers agree that GAO probably does not provide as much technical training for its technical staff as it should.

Perhaps the greatest difficulty in meeting this large unmet demand for technical training is the perceived inequity of spending a disproportionate share of training funds for line staff who already have relatively advanced technical skills compared to most mainstream evaluators. Almost half the mid-level managers surveyed (46 percent) indicated that technical line staff should not receive any greater training resources than nontechnical line staff. However, only 36 percent felt the same about greater training resources for technical assistance staff. In the same vein, the instructions for external budget justifications were revised this year to explicitly recognize the potentially greater needs of technical assistance staff for such training. Thus, some differential in training allocations may be acceptable at least for some technical staff.

Ultimately, scarce training funds should be distributed on the basis of organizational needs for specific skills. Unit heads are responsible for identifying these needs and for allocating training resources accordingly. Once the skills are identified, all those qualified to obtain such training should be able to compete for funding on an equitable basis. This is already occurring in the certificate program in information management science developed jointly by IMTEC, the Training Institute, and George Washington University.

Training in the Management of Technical Staff

One last area where specialized training might be appropriate is in the management of technical staff, for both managers with technical training and those without. Just as technical staff should benefit from training that relates GAO organizational procedures to their professional norms, nontechnical managers can probably function more effectively to the extent that they understand the perspectives and concerns of their technical staff. Technically trained managers may have different needs. They should already share, at least in broad terms, the professional orientation of their staff. However, many may find themselves assuming managerial responsibilities with less experience to draw on in working within the GAO environment than nontechnical managers, most of whom typically have worked longer at GAO because they came to the agency earlier in their careers.

The Training Institute is currently revising GAO's traditional sequence of courses on supervision, taking into account the increasingly technical nature of GAO's work. It is possible that these adjustments will take care of the particular needs of managers of technical staff. If not, additional material targeted to this group of managers could be presented through supplementary courses, either in-house or through external training.

Monitoring the Technical Capability of GAO Staff

Before the task force undertook its census of technical staff, there had been no systematic effort to identify staff with technical skills across GAO as a whole, using a consistent definition. However, that census by itself only provides data on the number and distribution of technical staff at one point in time. The task force believes that effective monitoring of the technical capabilities of GAO staffmembers requires systematic longitudinal data on changes in the technical skills of all professional staff over time, as well as on the number, distribution, and career paths of staff with various types and levels of technical training. This implies the existence of an ongoing data collection effort that is tied in some fashion to routine personnel procedures and management information systems.

Information of this sort could guide a range of personnel policy decisions at GAO. Where within the organization are the numbers of staff with specified levels of technical training growing? Where are they shrinking? How much do these changes reflect hiring new employees, attrition, or transfers from one unit to another? To what extent are non-technical staff developing into technical staff through internal and external training? To what degree are managers acquiring technical skills, particularly those supervising technical staff? How are the qualifications of technical staff at hire changing? To what extent are technical staff enhancing their technical qualifications once hired? How do the staff that leave GAO within a certain number of years compare to those who stay in terms of technical training? What types tend to be promoted faster and gain larger bonuses than others? What patterns seem to emerge among such factors as initial qualifications, location in GAO, line versus assistance roles, internal and external training, technical background of supervisors, promotions, bonuses, transfers, and attrition from GAO?

The kinds of data that would be needed to address questions of this sort include: name (or other personal identifier), demographics (age, race, sex, etc.), position series, date of hire by GAO and departure (if any), dates and organizational location of any internal transfers, educational attainments before and after hiring (including degree, date obtained, discipline, and institution), other internal and external training (by subject matter or skill and extent), and bonuses and salary increases received. As long as these data are collected and stored at the level of individuals, they can be aggregated in any way desired for a given analysis. It is also important to have some assurance that the data are relatively accurate, complete, and up-to-date. Any systematic differences among subgroups

of staff in the quality of these data could lead to biased or misleading conclusions involving comparisons across these groups.

The task force examined in some detail GAO's existing personnel-related management information systems in order to assess possible changes to enhance management's ability to monitor trends in GAO's technical capabilities. This review covered seven separate systems maintained by Personnel, the Office of Information Resource Management, the Training Institute, and the Office of Recruitment (identified and described in appendixes X and XI), with the single most important source being the Personnel/Payroll System operated by the National Finance Center. The task force found that most of the relevant data are currently collected in some form for some technical staff in at least one of these systems.

However, analyses of these data are seriously hampered by three factors. First, different data elements are dispersed among different management information systems, sometimes requiring cumbersome mechanisms to transfer data matched to specific individuals from one to the next. Second, many of these systems are designed to encompass only a subset of GAO employees. For example, the Applicant Tracking System of the Office of Recruitment includes only individuals recruited to GAO through the National Recruitment Program. It therefore excludes upper-level hires, a group that is likely to include a substantial proportion of technically-trained recruits.

Third, some data elements in these systems are not systematically updated. Thus, information on academic degrees and professional certification frequently reflects an employee's status when hired, unless the employee has taken the initiative to inform the personnel office of subsequent educational attainments. This means that analyses relying on these data are likely to underestimate the technical skills currently available in the GAO work force, especially those skills acquired after coming to the agency and not obtained through training provided by GAO.

The redundancies and gaps inherent in this decentralized approach to collecting and storing personnel data necessarily constrain the analyses that can be done. In addition, there are certain types of information where incremental improvements in the scope and quality of available data would be especially useful from the perspective of tracking technical capabilities at GAO. In particular, it would seem that capturing accurate, complete, and up-to-date data for all GAO employees concerning training and skills should be of high priority. Such information on a

wide array of educational activities and attainments is critical to monitoring changes over time in the composition and quality of GAO's technical staff. It is especially important for monitoring the status of staff who did not arrive at GAO with a graduate degree in a technical discipline, but who incrementally develop technical competencies through some combination of internal and external training.

Already, good quality data are being collected on current internal training as well as external training paid for by GAO. However, the existing system depends on staff initiative to report other external training, especially when a staffmember does not need the course work to satisfy GAO's 80-hour training requirement. The agency may therefore need to develop procedures to identify and correct on an ongoing basis inaccurate or incomplete data on education and skills acquisition by GAO staff.

Summary

In order to further the broadening and deepening of technical skills throughout GAO, the agency will need to rely on a combination of internal and external technical training directed at all its professional staff. Besides continuing its expansion of technical training to nontechnical staff, increased attention to orientation courses for technical staff could facilitate their assimilation within GAO's organizational procedures and culture. Moreover, in implementing any of the initiatives proposed by the task force (or others) to improve interdisciplinary management at GAO, and to evaluate their effectiveness, GAO needs the means to monitor changes in the status of staff with varying levels of technical skills on an ongoing basis.

Task Force Conclusions and Recommendations

Over the past 20 years, GAO has evolved into an increasingly multidisciplinary and technical organization. Its recruiting emphasis has changed from one that drew almost entirely on staff with accounting and business backgrounds to one that now includes staff with backgrounds in economics, sociology, operations research, computer science, engineering, psychology, and many others. That trend will almost certainly continue and accelerate as GAO adapts to the needs of the Congress and the Congress confronts ever more complicated issues and decisions. At the same time, the technical skills represented in the GAO workforce will grow increasingly sophisticated and diverse. Thus, GAO must position itself to manage and integrate a workforce with the kinds of varied skills that can respond adequately to the increasingly complex analyses the Congress needs in dealing with the nation's problems.

But managing and integrating such a diverse workforce so that it becomes a truly interdisciplinary one—people working together in close harmony to produce GAO's work—is a task that will challenge the skills of all GAO's managers. Ultimately, the charge of the Task Force on Interdisciplinary Management was to consider ways of managing this transition that would enable the growing proportion of GAO staff with advanced technical skills to make the greatest possible contribution to fulfilling the agency's mission. In so doing, the purpose was to help GAO make its necessary adaptations more rapidly—and at lower human and financial cost—than would otherwise be the case.

Based on a wide range of information and insights drawn from many different viewpoints, from outside as well as within GAO, the task force has arrived at several observations that help to clarify the spectrum of choices open to the agency and the likely consequences of those decisions. First, the tensions that GAO has experienced in attempting to integrate technical and nontechnical staff are not peculiar to this agency. Rather, the effort at integration is an old problem, shared by many other organizations that have tried to diversify their workforces. Most likely it derives from the differing value systems of technical disciplines and any large organization. The experience of other organizations also shows that these tensions can be managed successfully by carefully devising strategies that bridge barriers in communication and create incentives for constructive interactions among technical and nontechnical staff.

From the surveys of technical staff and mid-level managers conducted by the task force, it appears that GAO has largely succeeded in establishing this balance. Technical staff are generally satisfied with their work at GAO, but still see room for improvement in a number of areas related

to technical quality (e.g., the extent to which disagreements among staff are resolved in a technically adequate way). At the same time, most technical staff members accept the legitimacy of organizationally-defined aspects of quality, such as GAO's documentation requirements. Mid-level managers, on the other hand, credit technical staff with making major contributions to the agency, yet find that they have certain distinct limitations relative to nontechnical staff, primarily in their ability to communicate complex issues in layman's terms and their knowledge of GAO procedures.

One reason that technical staff function as well as they do at GAO is that the agency offers them a variety of roles and situations to choose among—providing technical assistance, carrying out assignments in technical divisions where most colleagues have advanced degrees, and working side-by-side with auditors. This allows individual technical staff to find an organizational niche that suits their interests and personal characteristics. In effect, they can—within limits—establish their own balance between integration with GAO's professional mainstream and maintenance of a separate technical identity.

This pluralistic approach has the added advantage of facilitating an expansion of the agency's technical capabilities through training of GAO's existing professional staff, as well as hiring of new staff with educational credentials in technical disciplines. The day-to-day interaction between technically trained staff and mainstream auditors in a variety of contexts should help the latter identify specific areas where additional technical training would be helpful to them. At the same time, the existence of groups with a preponderance of technically-trained staff should assist in recruiting and retaining technical staff members for whom contact with peers in their discipline is an important consideration.

While the basic approach that GAO has adopted to incorporate technically trained staff into its workforce is fundamentally sound, the task force has identified a number of areas where incremental improvements are possible and desirable. The recommendations that follow were all assessed in terms of four overall goals: to widen, deepen, and modernize GAO's technical expertise; to preserve GAO's institutional values of independence, objectivity, and accuracy; to optimize the application of technical skills in GAO projects; and to help technical staff expand their skills, adapt to the GAO working environment, and maximize the satisfaction they derive from their work. More generally, all recommendations seek to enhance morale and promote organizational productivity. Some

address the behavior of individual managers at GAO, some concern technical staff, and some relate to GAO as a whole. In recognition of the critical role played by managers in guiding the integration of technical staff into the organization, the recommendations addressed to them are presented first.

Task Force Recommendations to GAO Managers

1. Managers should try to enhance their use of recruitment interviews to (a) identify technically-trained candidates who can communicate effectively both orally and in writing, work well in teams, and possess good interpersonal skills; and (b) convey an accurate impression to potential hires both of the kind of work they can expect to do at GAO and their opportunities for promotion in staff and managerial positions.

Although in their survey responses, mid-level managers largely subscribed to these goals, their assessment of technical staff characteristics, as well as the technical staff's description of how their actual experience at GAO differed from what they had been led to expect, both suggest that in the past these goals may not have been fully realized. Renewed emphasis on both extracting and conveying information at the recruitment interview could help GAO to select those most likely to adapt successfully to GAO's working environment. Moreover, those that are hired will adapt more quickly and easily to the agency to the extent that their experience matches what they were led to expect.

2. Managers should consider carefully their interactions with technical staff and foster, wherever possible, their job satisfaction by consulting with them on the work they will do and how they will do it. Equally important is providing extensive "verbal feedback" and public recognition (such as awards) to explicitly acknowledge their contributions, both internal and external, to the organization.

Due perhaps to their sense of not being a part of GAO's professional mainstream, or for whatever reason, technical staff often feel their skills are undervalued and their contributions underappreciated. Moreover, the constraints imposed by a large, hierarchical organization represent one of the more difficult aspects of the GAO working environment for them. Individual managers have perhaps the greatest opportunity to ameliorate these conditions by making special efforts to be responsive, where possible, to technical staff preferences in the way they approach their work, and by recognizing their contributions both publicly as well as informally. Technical staff should be encouraged, where possible, in their pursuit of outside professional achievements. These are not only

important to technical staff, they confer a reputation for expertise both on the individual and on his or her institution. Unit heads and senior managers generally can also help by making clear that they value technical work at GAO and support technical staff efforts. (This is not to suggest that technical staff deserve greater consideration than nontechnical staff, but rather that they do not deserve any less.)

3. Where appropriate, managers should expand their informal use of outside technical experts as a way to ensure that all the relevant technical issues are raised and considered when they make key substantive decisions about jobs and review draft products.

Technical experts can be very helpful in raising questions about job designs and reviewing draft products. When and how to draw on such resources are matters of judgment by GAO's managers. But when provided on an advisory basis and used with discretion, outside technical advice can help to protect GAO from technical error or from ignoring important methodological issues. In addition, the credibility and legitimacy of many decisions will be enhanced by such consultation, which is a standard quality assurance procedure in most technical disciplines. This also has the integrational advantage of combining a tool familiar to technical staff with the organizational tools already in place at GAO.

4. Unit heads should ensure that channels exist for technical issues to be raised at the appropriate level.

Most technical staff are generally satisfied with the way their work is used by GAO. However, some indicate they have problems in getting their work reported accurately in GAO products and in achieving technically adequate resolutions to disagreements over jobs with other GAO staff. While the decisions that these staff object to may in fact have been justified—technical issues are not the only issues in reporting—it is important to assure that staff have a real opportunity to appeal decisions at a high enough level within the unit if they believe that a choice has been made that could have serious consequences for the quality of a GAO product. This serves two functions: reducing the probability of making the wrong decision on a technical issue, and reinforcing the morale of technical staff—even if they lose the argument, staff will have had the opportunity to make their case. While these channels already exist in some units, they may not be sufficiently well known to technical staff, or their use may be implicitly discouraged.

Task Force Recommendations to Technical Staff

1. Technical staff should make a concerted effort to learn the organizational practices of GAO, as well as the norms of the agency's mainstream professional culture, and to make contact with seasoned GAO staff both within and outside their technical discipline.

Some individuals with extensive technical skills thrive at GAO; others languish. One factor that seems to distinguish the first group from the second is a conscious decision on the part of the individual to understand how GAO works as an organization on its own terms. This involves not only a knowledge of the formal procedures described in official manuals, but also an understanding of the conceptual basis for those procedures, a sense of how work gets done in practice, and a feel for the language and style of interaction employed by GAO's mainstream auditors. These technical staff recognize the value of establishing a broad range of relationships with colleagues of different types across the agency, not least as a critical source of information about how the organization operates. They also grasp that technical staff, in some ways, are still pioneers: hence the importance of continuing to demonstrate, rather than simply asserting or assuming, the contribution that technical skills make to GAO's work.

Together, these actions and attitudes allow technical staff to accomplish more of what they want to do by working—or networking—"within the system." They also enable staffmembers to appreciate how what may seem to them the more frustrating aspects of the organization—hierarchical controls, multiple layers of review, etc.—serve to reinforce the organization's strengths: its commitment to independent and thorough analysis whose conclusions are based on empirical findings rather than predetermined policy positions; its willingness to stand behind those conclusions once its evidentiary standards have been met; and the resulting impact of GAO reports on policy decisions.

2. Technical staff should take advantage of available GAO courses to improve their written and oral communication skills.

Several areas where managers perceive that technical staff perform less well than nontechnical staff, most notably written and—to a lesser extent—oral communication skills, have great relevance for the ability of technical staff to contribute to GAO's work. The Training Institute has developed a series of courses on writing, plus another on oral communication that makes effective use of exercises employing video recording of presentations. Technical staff with limitations in these areas will

serve their own personal interests, as well as GAO's, if they take advantage of these currently available courses.

Task Force Recommendations to the Comptroller General

1. The task force proposes that a larger number of nonmanagerial Band III positions be created that senior technical staff could compete for, while preserving the managerial focus of the Senior Executive Service.

Technical staff and mid-level managers agree that many technical staff leave GAO in order to earn a higher salary. They find the work professionally challenging and rewarding, but their compensation fails to keep pace with available alternatives. One way to address this problem without revamping GAO's salary structure is to recognize an increased role for senior technical staff that does not involve a shift into management. The vast majority of Band III positions are currently reserved for managers, and only a handful of those involve supervision of primarily technical groups. While the recently instituted broad-banding structure permits nonmanagerial Band III's, this potential has yet to be realized to any substantial extent. For example, there were only three nonsupervisory Band III openings listed for the 1989 promotion cycle. All were in staff offices, and all were for generalist evaluators without quality ranking factors. Thus, for many technical staff, an aspiration to more than a Band II position requires them to reorient their career goals substantially. While the task force supports the existing trend of promoting staff with technical training to management roles, it is not in the agency's interest to have this be the sole route for advancement open to highly qualified technical staff.

The Senior Executive Service, on the other hand, is fundamentally organized to serve a management function. Its centralized selection procedures and provisions for assigning SES members with great flexibility across GAO are designed to create a cohesive leadership corps for the agency. While it turns out that a substantial proportion of SES line managers—27 percent—do have technical training, that training has been combined with managerial experience. The task force does not want to foreclose promoting a highly skilled technical staffmember to an SES-level position as the occasion warrants or requires, but does believe the SES should remain essentially a managerial corps.

The task force considered but rejected a recommendation that GAO create a dual career ladder in GAO, one that would provide technical staff with a completely different, but parallel, career path based on technical merit rather than managerial expertise. After assessing the operation of

dual career ladders in five private corporations and one federal agency and examining the literature, the task force concluded that these programs generally failed to provide equivalent promotion opportunities to those selecting the technical career path. At the same time, they tended to accentuate divisions between technical and nontechnical staff, between technical staff and managers, and between mainstream and non-mainstream professions. The task force views this as a hindrance rather than a help in establishing an integrated, interdisciplinary workplace. Nonmanagerial Band III positions should provide much of the benefit desired of a dual career track without the divisiveness of a separate system.

2. The task force supports expansion of training in technical subjects for all professional staff in GAO.

GAO needs to increase both the number of staff with technical skills and the depth of knowledge possessed by its most technically sophisticated staff. Thus, all professional staff should receive some technical training at whatever level is appropriate given their existing knowledge base and the requirements of the assignments they are working on. Travel as well as training funds should be provided, so that no staff—including those assigned to regional TAG groups—are hindered from obtaining an equitable share of this training. Unit heads should make the determination of how to apportion this instruction between internal and external training, in coordination with the Training Institute.

3. The task force urges the agency to obtain an adequate supply of personal computers as quickly as possible.

Managers and technical staff agree that limited access to personal computers seriously detracts from the working environment of technical staff (and, no doubt, nontechnical staff as well). High priority should be placed on seeking to eliminate this major constraint on agency productivity in the very near future.

4. The task force proposes that steps be taken to ensure that all technical staff receive training in GAO's organizational procedures immediately after their arrival at the agency. The instruction should include, where appropriate, materials designed to explain GAO practices and procedures in terms of the professional norms of major technical disciplines.

GAO should quickly take action to make sure that technical staff no longer attempt to adapt to the GAO working environment without the

benefit of formal orientation training. Given that most technical staff do not in fact—as was generally believed—reject such organizational norms as GAO's documentation requirements, much of the perceived gap in their knowledge of GAO procedures should be readily remediable through appropriately structured coursework. However, it is important to make the effort not only to state what those procedures are, but also to explain them in terms that make sense from the perspective of the technical disciplines involved.

5. The task force recommends that a glossary be published which identifies commonly used terms that differ in meaning or connotation across several disciplines and describes the nature of those differences.

Various disciplines and professions employ the same or similar terms in dissimilar ways. For example, accountants and economists define "costs" quite differently; similarly, "significance," "validity," "reliability," and "materiality" are not understood by everyone to mean the same thing. However, many people are unaware that the definitions of these terms vary as they do, since most professionals are trained within a particular discipline. This can cause substantial confusion or disagreement and lead to continuing misunderstanding. Two divisions have already begun to collaborate on a draft for such a glossary as part of the Operations Improvement Program, with the Training Institute as an end-user. The task force recommends that this work go forward and the glossary, once finished, receive appropriate distribution within GAO.

6. The task force supports the recommendation of GAO's Human Resource Management Information Working Group that a common GAO-wide personnel information system be developed to maintain complete, accurate, and up-to-date information on the educational attainments and training of all staff.

Information on the training of all staff is essential for purposes of monitoring the progress of GAO's technical capabilities and employees' progress with regard to continuing education requirements. This system would retain information on both GAO-sponsored training and on continuing education GAO employees have obtained at their own expense.

In addition to the preceding specific recommendations, the task force suggests that the Comptroller General give further consideration to the following initiatives:

1. Make courses on auditing and accounting available to technical staff on a voluntary basis.

Such courses could supplement basic orientation courses for those technical staff desiring to take them. They would provide technical staff with a way to deepen their understanding of GAO by learning the logic behind agency norms and working procedures. The Training Institute can best determine whether existing courses would fulfill this purpose and how best to make them available to technical staff.

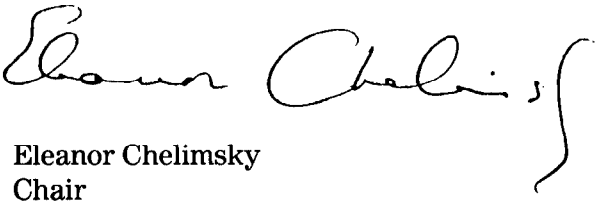
2. In developing courses focusing on supervision skills, emphasize issues in the management of technical staff.

The Training Institute currently is planning a revision of GAO's general courses on supervision and management. As part of this process, it would be useful to prepare segments focusing on issues specifically related to the management of technically-trained staff. For example, one could describe strategies for setting and applying performance expectations in situations where the assignment included development of the methodological approach to be employed.

These conclusions and recommendations have emerged from a systematic examination of GAO's management, training, and utilization of technically-trained staff. This effort did not derive from a perception of critical problems demanding immediate action. Rather, it was motivated by an understanding of the importance of the evolutionary but fundamental changes that have been taking place in the agency, signified by its increasing reliance on technically trained staff to bring sophisticated methods to bear on complex questions. Even without indications of major problems, the task force worked from the presumption that current improvements in the recruitment and use of technically-trained staff could substantially enhance GAO's future effectiveness in providing information and analysis to the Congress.

Therefore, the relevance of these analyses goes far beyond the not quite 500 individuals identified as technical staff at this specific point in time. The task force recommendations aim at expanding the technical capabilities—broadly defined—of GAO's entire professional work force. Much of GAO's future success will depend on providing all its employees equal opportunities to develop and use such skills, and on providing equitable recognition and rewards to those who do so.

There will always be concerns to raise and improvements to be made in the area of human resource management. Some have to be dealt with hastily, under duress. In this case, the task force had the rare opportunity to study an important management issue of the future without the pressure of an immediate burning problem to address. Thus, it should be borne in mind that the concerns uncovered by the task force are almost all products of GAO's success in adjusting and diversifying its staff resources to meet changing congressional mandates. However, no agency can afford to become complacent. By recommending that GAO move forward in optimizing the management of its staff's technical skills, the task force recognizes both the advantages of GAO's current situation and the areas where improvements are needed.



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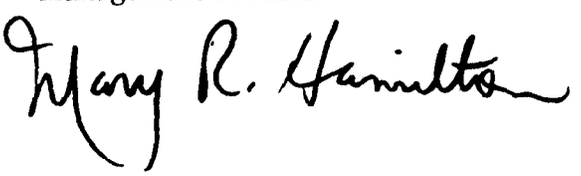

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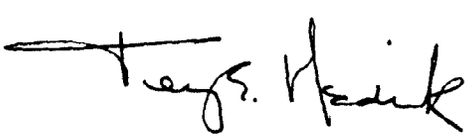

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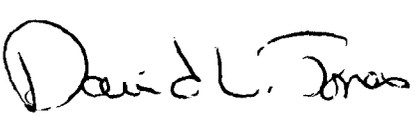

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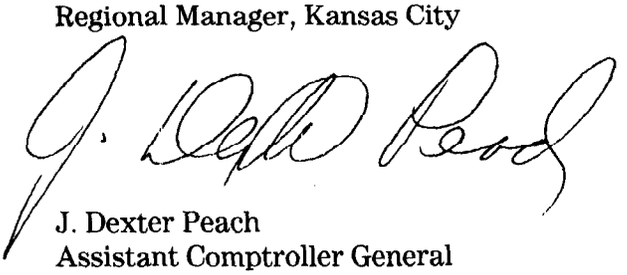

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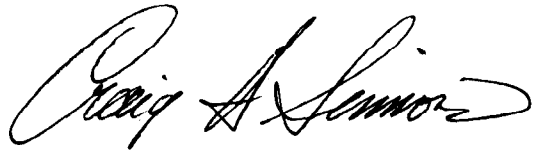

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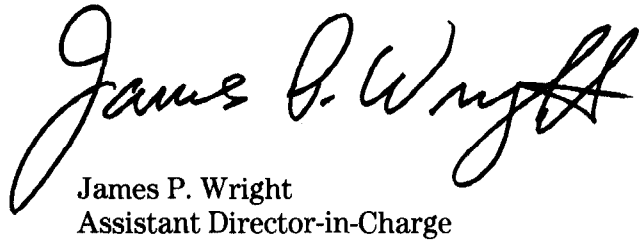

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*Mr. Thurman passed away on September 26, 1989, during the drafting of our report. He had done important work for this task force, leading the effort to develop an operational definition of technical staff and directing the implementation of the census.

The task force members are grateful to all the people from across GAO who helped in various ways to produce this report, in particular:

Irma Arispe
Timothy Bowling
Richard Burger
Gerard Burke
Lois-ellin Datta
Sara Denmon
Janet Dolen
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Appendixes of the Report of the Comptroller General's Task Force on Interdisciplinary Management

April 1990

Diversifying and Expanding Technical Skills at GAO

GAO/PEMD-90-18S Volume 2

Preface

This report is published in two volumes. Volume 1 contains the analyses and recommendations of the task force. Volume 2 provides more detailed descriptions of the various data collection efforts conducted by the task force. The appendixes in volume 2 were written by different authors at different times during the course of the task force's work, and thus exhibit variations in style and usage.

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Abbreviations

ACG	Assistant Comptroller General
ADP	Automated Data Processing
AFMD	Accounting and Financial Management Division
ARCO	Atlantic Richfield Company
ARM	Assistant Regional Manager
BARS	Behaviorally Anchored Rating Scales
BOB	Bureau of the Budget
CAPS	Central Assignment and Payables System
CEO	Chief Executive Officer
CPA	Certified Public Accountant
CTC	Corporate Technical Committee
DELTA	Database for Entry-level Tracking
DMTAG	Design and Methodology Technical Assistance Group
EAG	Economic Analysis Group
EEO	Equal Employment Opportunity
GAO	General Accounting Office
GGD	General Government Division
GPA	Grade Point Average
GS	General Schedule
GWU	George Washington University
HHS/IG	Department of Health and Human Services Inspector General
HIS	House Information System
HRD	Human Resources Division
IBM	International Business Machines
ICI	Imperial Chemical Industries
IMTEC	Information Management and Technology Division
MIS	Management Information System
MIT	Massachusetts Institute of Technology

Abbreviations

NFC	National Finance Center
NIH	National Institutes of Health
NIST	National Institute for Standards and Technology
NSIAD	National Security and International Affairs Division
OCE	Office of the Chief Economist
OIRM	Office of Information Resources Management
OJT	On-The-Job Training
OPM	Office of Personnel Management
OR	Office of Recruitment
PAES	Personnel Awards/Education System
PC	Personal Computer
PEMD	Program Evaluation and Methodology Division
PFP	Pay for Performance
RCED	Resources, Community, and Economic Development Division
RFF	Resources for the Future
SES	Senior Executive Service
SMIS	Staff Management Information System
TAG	Technical Assistance Group
TI	Training Institute
TRS	Training Registration System

Literature Review

Introduction

Professional/technical employees are better trained and educated than ever before and are entering organizations at higher levels than they have in the past. When they arrive, they bring professional affiliations and values that may reach far beyond the organizations they work for.

Private and public sector demand for professional/technical workers and their expertise has grown and continues to grow at a phenomenal rate. As more and more professional/technical specialists enter organizations, stress is created between the organization's values and those of the professional/technical community. Private sector organizations, such as IBM, ARCO, Cray, and Honeywell, have been dealing with these issues for many years.

The Task Force on Interdisciplinary Management established a subgroup to conduct a literature review on interdisciplinary management and related issues. The purpose of this review was to determine what is known about successfully managing an interdisciplinary workforce.

In conducting the literature review, we used keywords to search through several bibliographic files available in GAO's library. We screened more than 150 titles and identified about 70 we felt were most germane to GAO's interest. The articles were reviewed and summarized by four teams of GAO evaluators.

Our review confirms that the task force has identified the key interdisciplinary management issues and is focusing on the most critical areas. We did not find a "critical mass" of knowledge on the subject nor a definitive approach for managing successfully in an interdisciplinary environment. The literature we reviewed was primarily descriptive in nature and generally lacked hard data or strong methods that could support drawing firm conclusions. However, we believe the literature does provide helpful insights into how one might approach improving interdisciplinary management.

This appendix presents a summary of our analysis. First, we discuss the conflict and tension that exist between professional/technical and organizational value systems, especially in large and highly structured organizations. Second, we examine issues related to the job satisfaction and motivation of professionals and technical specialists. Third, we describe the literature on the dual career ladder concept. (This approach has been used by a number of organizations.) Finally, we review issues relating to interdisciplinary management team dynamics that have relevance

for the management of teams of evaluators and technical specialists at GAO.

At the end of this appendix is our bibliography of documents reviewed.

Conflict and Tension Between Professional/ Technical and Organizational Value Systems

Professional/Technical Values

Professional and technical employees receive extensive training and socialization in their fields of expertise, inculcating a set of values that predate organizational experiences. These values include

- autonomy in decisionmaking and task operations, or the habit of exercising individual professional judgment about what should be done and how it should be done;
- conformity to professional standards and practices;
- emphasis on peer review, that is, a preference for having performance judged by individuals possessing appropriate expertise and professional competence; and
- assumption of personal responsibility for performance, exercising professional judgment, and maintaining ethical standards and professional integrity.

Organizational Values

Upon entering the workforce, professionals and technical specialists must integrate their professional values with those of the organization/ workplace. Much of the literature focuses on the dynamics of this critical interaction in bureaucratic organizations. Bureaucratic values most often cited include

- organizational loyalty;
- hierarchical control and authority; and
- adherence to internal management processes and procedures.

Much of the literature suggests that when faced with organizational and professional value conflicts, professional/technical employees tend to choose professional over organizational values. But hierarchical control and authority are common characteristics of large, highly structured, and complex organizations. These two facts, taken together, create opportunities for conflict between management practices and professional and technical values (especially in the areas of autonomy in decisionmaking and the preference for peer review over hierarchical review in measuring performance). To help resolve these conflicts, the literature suggests using peer evaluations to augment traditional hierarchical reviews.

Large organizations, by necessity, have a myriad of internal management processes and procedures. Multiple operating rules and regulations, competing organizational priorities, resource limitations, and organizational boundaries frequently conflict with professional/technical values, creating individual and organizational tension. Organizations need to pay close attention to this environmental condition and develop appropriate strategies to reduce its negative effects.

Achieving a Balance Between Professional/ Technical and Organizational Values

Value conflicts cause dilemmas for professional/technical employees and create counterproductive levels of personal and organizational tension. Over time, these can result in serious problems for both the organization and the employee. Examples include

- increased levels of employee job dissatisfaction, anxiety, and turnover;
- increased use of sanctions against employees; and
- reduced organizational productivity and competitiveness.

The literature documents that the integration of the professional/technical and organizational value systems is not always successfully or painlessly achieved. The argument is often made that the increasing numbers of professional and technical employees in the workforce require all organizations to recognize and be more sensitive to the existence of these different value systems and their inherent conflict. Organizations are encouraged to be proactive so as to anticipate, avoid wherever possible, and generally minimize situations where professional and technical employees are forced to choose between organizational and professional/technical values.

Job Satisfaction: Motivating Professionals and Technical Specialists

The management techniques and practices identified in the literature to improve professional/technical employee job satisfaction and motivation are not unique to this group of employees. For the most part, they represent the range of methods advocated in contemporary human resource management for motivating all employees. However, a number of articles emphasized that applying these management practices to the professional and technical specialist workforce is particularly important because of their capacity to contribute to the success of the organization. Three themes were emphasized:

- giving these employees greater participation in job planning and organizational goal setting;
- maximizing their autonomy and the feedback they receive; and
- investing in their professional/technical development.

Job Planning and Organizational Goal Setting

Expanding opportunities for professionals and technical specialists to participate in job planning and organizational goal setting was thought to significantly improve their job satisfaction and organizational performance. Management and professional/technical employees are encouraged to work together to identify projects and determine how resources can best be used to benefit the organization and meet mission objectives.

Suggested management actions include the following:

- Professional and technical specialist representation on the organization's policymaking groups was advocated as a constructive way to improve communications and elicit professional and technical employee input in making critical management decisions.
- Take greater care in identifying and developing project assignments. Consult with professional/technical employees regarding their desires, interests, and priorities before making job assignments.
- Expand professional/technical employee organizational involvement by providing opportunities for temporary management assignments. It is argued that such temporary assignments provide the participant with an opportunity to gain additional organizational insights and perspectives and, under certain circumstances, may relieve professional stagnation and provide an opportunity for professional renewal. In addition, temporary assignments provide a form of recognition and allow continued testing and development of skills in different work situations. Such assignments also afford the opportunity to test an individual's interest and performance in a management position. This can work to the benefit

of both the individual and the organization in making future career decisions.

Maximizing Autonomy and Feedback

Professionals and technical specialists place great value on autonomy. They desire maximum flexibility to exercise professional judgment. In large organizations, the necessary constriction of professional autonomy can reduce the meaning and significance of work, leading to reduced commitment and productivity.

Feedback is a strong motivator for professionals and technical specialists. Some studies suggest that feedback/recognition is a more effective motivator for these staff than financial rewards. Professional and technical employees need frequent feedback on the quality of their work and assurances that their work is recognized and appreciated.

Investing in Professional Technical Development

Professionals and technical specialists are particularly sensitive to the need to maintain and expand their skills. Management must provide the time and funds for training and other professional development activities. Failure to do so will contribute to employee dissatisfaction and will ultimately reduce the organization's effectiveness due to static or declining professional/technical skills.

Professional activities and peer recognition are important to professionals and technical specialists, and organizations should encourage publishing and other outside professional involvement. Organizations are also encouraged to avoid creating a work environment with an undue emphasis on secrecy, which interferes with the professional's desire to communicate with outside colleagues.

Finally, giving professional and technical employees access to the full range of state-of-the-art tools to do a professional job is recognized as an important determinant of employee job satisfaction.

Dual Ladder Concept

One of the suggested solutions to the problem of managing technical staff that has been tried by a variety of public and private sector firms is the dual ladder concept. The concept is approximately 25-30 years old and has been tried both in the U.S. and Europe; however, the research literature on the topic is sparse.

In this section, we will cover three points concerning the dual ladder concept. First, we describe what the concept is and its purpose. Second, we examine its system components. Finally, we discuss what the literature has to say about its effectiveness.

What Is a Dual Ladder?

The dual ladder is an umbrella term that generally describes an organizational structure allowing professional/technical staff to advance on a separate career path from that of management. Generally speaking, staff are not prevented from pursuing management positions but are provided an opportunity to advance while continuing to pursue their technical specialties. For example, Imperial Chemical Industries, Inc. (ICI), (Moore and Davies, 1977) stated that its scientific ladder was established

> "in order that really able scientists could see a stable scientific career open to them, leading to jobs that are valued in terms of status and financial reward as are those in senior administration and managerial jobs in research and other functions, and in order that ICI could attract and then keep such able people on purely scientific work . . . ."

In Roth (1982), the dual ladder concept is defined using a quote from Golder and Ritti (1967, p. 489):

> "The dual ladder refers to the side-by-side existence of the usual ladder of managerial positions leading to authority over greater and greater numbers of employees and another ladder consisting of titles carrying successively higher salaries, higher status, and sometimes greater autonomy or more responsible assignments."

In establishing dual ladders, many organizations (such as IBM, ARCO, ICI) employ panels of experts to review appointments to the technical ladder. These experts can include persons from inside the organization as well as renowned outsiders from academia or elsewhere. The criteria used to make promotion decisions vary depending on the organization and its mission. However, the six criteria used by ICI for its "scientific ladder" provide an example of what such criteria might look like.

ICI criteria:

- both the company's and the individual's best interest must be served;
- evidence that exceptional technical ability is being brought to bear successfully on the organization's problems;
- potential of the individual to continue contributing to the organization in the future;

- special expertise in a subject of vital interest to the organization;
- evidence of an international, national, or organizational reputation;
- evidence of publication in scientific journals.

Designing a Dual Ladder System

While the concept of a dual ladder system appears relatively clear, its implementation in a manner consistent with its theoretical underpinnings seems to be quite difficult. A few of the problems identified in the literature include a failure to define and document (Roth, 1982)

- performance standards;
- qualification criteria; and
- accountability standards.

In addition to these definitional problems, it was not uncommon to find that the technical ladder was not equal to the management ladder in terms of status, recognition, or reward.

Although the literature presents few examples of dual ladder systems that appear to work well, the following are given as minimal requirements for any dual ladder system to be successful:

- perceived equality of status, recognition, and reward between technical and managerial ladders;
- clear relationship between technical performance and promotion on the technical ladder;
- involvement of the top rungs of the technical ladder membership in top-level strategic management decisions;
- increasing opportunities for independence, autonomy, and outside professional contact up the technical ladder;
- peer review as a vital part of the evaluation process.

Effectiveness of the Dual Ladder System

The dual ladder system has allowed professional/technical employees to advance in an organization, without moving to a management role. Levels of financial reward and titles which were only achievable through management roles have now been made available to technical staff in some organizations. However, literature on effectiveness is sparse, and we could find no data showing whether these enhanced opportunities have in fact served to retain key scientists and other professional people at these organizations. Further, there is little information on employee reactions to the system or on whether it creates divisive effects within an organization.

Roth (1982) has reviewed literature critical of the dual ladder and cites authors who have described the concept as: a dubious reward system that suffers from flaws in its logic and application (Kaufman, 1974); a system based on incorrect assumptions concerning the career orientations of most professional groups (Goldner and Ritti, 1967); a poorly operationalized system that fails to accomplish its intended goals of providing increased status and compensation as well as more freedom for individual participants (Daly, Thompson, and Price, 1977). Perhaps the strongest of these criticisms suggests that the dual ladder is a solution looking for a problem since most professional/technical staff are really interested in progressing up the managerial ladder. Professional/technical staff feel this way, the authors say, because they understand that managerial ranks have the greatest influence on the work of an organization. Since professional/technical staff desire to participate in decisions affecting their work, advancement along a dual ladder works against them because they become progressively more isolated from the decision-making structure. Technical ladders are seen as inferior in status because they do not "provide the power to allocate limited resources or to pursue alternative goals. . ." (Goldner and Ritti).

Interdisciplinary Team Dynamics

The literature makes clear that achieving true interdisciplinary teamwork is difficult. Typically, a team of individuals from different backgrounds brought together to work on a specific project is much more likely to arrive at a multidisciplinary approach (where individuals work side-by-side without interacting) than an interdisciplinary one (which involves an integrated group). The reasons given for this in the literature include the following:

- individual team members have difficulty agreeing on the group's collective purpose or objective;
- respective roles and responsibilities are not well delineated;
- differing, unshared values inhibit team cohesion;
- issues of authority and leadership are difficult to resolve: e.g., should hierarchical modes dominate or should expertise be the guiding factor?
- intra-team communication is hindered by lack of agreement on definitions and an unwillingness to accept the positions of others as being credible;
- prior experiences of failure weaken members' commitment to major efforts.

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Interviews With Experts on Interdisciplinary Management

GAO is not alone in seeking to confront issues of interdisciplinary management. The task force's literature review (appendix I) showed that many public and private organizations have attempted to integrate technical staff from various disciplines into their workplaces. In some cases, these staff work together with nontechnical personnel; in others, they collaborate with technical personnel from quite different disciplinary backgrounds. The task force's objective in this study was to cull, from the experience of managers in organizations that have dealt with these issues, those formal or informal lessons that could prove useful to GAO in strengthening its own interdisciplinary management.

How We Did Our Work

We selected seven experts to interview, based on their personal involvement with issues of interdisciplinary management and the types of organizations they had worked in. Each interview covered a set of standard questions, sent to the interviewee in advance. These questions focused on the particular context in which issues of interdisciplinary management arose for the organization, the identification of specific problems associated with such management, and the assessment of any strategies or solutions that had been tried.

Who We Interviewed

The seven people we interviewed were:

- John Ahearne (Vice President, Resources for the Future),
- Charles A. Bowsher (Comptroller General of the United States, formerly a partner at Arthur Andersen and Co.),
- Lewis M. Branscomb (Director, Science, Technology and Public Policy Program at the Kennedy School of Government, former Chief Scientist at IBM),
- William D. Carey (former Assistant Director of the Bureau of the Budget, former Vice President of Arthur D. Little, and former Executive Officer of the American Association for the Advancement of Science),
- Richard P. Kusserow (Inspector General for the Department of Health and Human Services),
- Gustave H. Shubert (Senior Fellow and Corporate Advisor, former Senior Vice President of The RAND Corporation), and
- Suzanne Woolsey (Partner at Coopers and Lybrand, former Associate Director at the Office of Management and Budget).

Collectively, the experience of these managers spans four government agencies, four private for-profit firms, and two nonprofit research organizations. Some of these workplaces resemble GAO's in that they are

staffed predominantly by members of a particular "mainstream" profession, such as auditors or budget examiners, whose "generalist" orientation strongly influences the culture of the organization as a whole. The HHS Inspector General's office (HHS/IG), Arthur Andersen, Coopers and Lybrand, and the Bureau of the Budget (BOB, now the Office of Management and Budget) exemplify this pattern. Another type of situation is represented by an organization which is dominated by a single technical group. Here, the example is that of economists at Resources for the Future (RFF). Finally, other organizations (e.g., RAND and IBM) have recruited staff coming from a wide range of disparate technical disciplines.

Organizational Contexts

It appears both from the literature (see appendix I) and from our seven interviews that the issues of integration we are confronting at GAO represent a classical problem in organization that is neither new nor unique to us. The Bureau of the Budget, for example, possessed what it called four technical centers just after World War II. These centers were devoted to statistical policy and methods, accounting principles and standards, fiscal policy and economics, and administrative management. However, all of these activities were considered peripheral to the budget function—including program analysis and review—which dominated BOB's work program. Separating the technical centers from the budget divisions and making them staff (rather than line) functions reinforced this distinction and made it an organizational fact of life.

In our interview with Mr. William Carey, he told us he viewed this separation as having had two important advantages:

- it built a kind of "concentrated quality" in the technical centers, and
- it successfully accumulated a critical mass of top-flight specialists.

But he thought the separation also brought a major disadvantage. It led to an organization in which communication became much more difficult and technical staff felt excluded. As Carey put it,

> "The budget people sat at the table during the Director's reviews, but the technical people had only backbench chairs and very limited possibility to participate in the discussions. When they did speak, their comments were considered intrusive. Promotions and supergrades went to line, not staff, personnel. BOB Directors had little time or interest in the technical work, and technical staff had little or no access to them. On their side, technical people tended to look down on budget examiners as journeymen of very average capabilities."

To remedy this developing rift within the organization, BOB moved in the early fifties to dissolve two of the technical centers and scatter their personnel across the program divisions. In this way it was hoped that organizational cohesion and communication could be improved and that the work of the program divisions would be enriched by the closer proximity of the technical staff's expertise.

In Carey's view, this move was a mistake, and its results unfortunate, for three reasons:

1. The same problems reappeared, but at the lower, divisional level. The scattered technical staff continued to feel they were second-class citizens, and now the situation was worse in that they had no organizational voice; their sense was that they had to keep proving their worth (as technical people in a budget division) and that they were no better off in terms of having direct inputs into organizational decisions and products.

2. The professional quality of the technical staff weakened over time because the technical centers which had attracted some of the brightest people in their respective fields were no longer there and the technical people were now dealing with budget, not technical, problems.

3. Finally, the dispersed technical personnel did not appear to have any visible effect on the work of the budget divisions.

At Arthur Andersen, the perceived need for integration of technical people in the workplace arose from an effort by the auditing firm to move to a broader range of services. In our interview with Mr. Charles Bowsher (now the U.S. Comptroller General), he noted that Arthur Andersen was aware early on of the need to focus on "systems"—first using manual machines and then automated computer systems—and that the company had moved into this area by helping to develop an accounting system for General Electric in the early fifties that used modern technical equipment. The system once completed, Arthur Andersen proceeded to familiarize its accountants with the new techniques and to set up teams in various U.S. cities and overseas. Then the firm took on the generalized task of training all its new consulting business recruits in the methods it had developed.

In expanding its business overseas, Arthur Andersen found it was unable to find business school graduates there of the type it had been recruiting in the United States, and so it turned instead to training staff

from widely differing educational backgrounds in auditing methods. Since this proved successful, the firm decided to hire liberal arts and engineering graduates in the United States as well, and provided basic auditing and systems training for all new staff as a way to integrate its workplace. The advantage of this approach was homogeneity: no rift developed in the organization since all members of future teams were trained in the same way, and teams could be formed very quickly from any of the firm's offices anywhere in the world, because everyone approached jobs using the same methods.

Thus, instead of bringing in technical experts and setting them apart from the mainstream of the organization, Arthur Andersen did three things:

- trained new staff at one location, so that people got to know each other early in their careers;
- standardized and streamlined its audit methods and procedures to achieve greater efficiency; and
- put heavy emphasis on mutual commitment: that is, the firm's personnel were indoctrinated with the idea that once the firm's name was signed to a document everyone in the organization was accountable.

No technical centers or technical assistance groups developed; instead, operations research and other technical or quantitative personnel "faded into the overall organization" within a few years. The Comptroller General gave us four reasons for this:

- many mainstream auditors developed quantitative capabilities;
- new staff came into the firm with the same technical background and training;
- technical staff tended to want to run jobs rather than be advisors; and
- people who wanted to do more advanced technical work ended by leaving the firm.

According to the Comptroller General, this thoroughgoing approach to the integration of technical and nontechnical skills worked very well for a long time in integrating personnel from widely varying backgrounds within the Arthur Andersen workplace. However, the approach was not intended to result in the development of a critical mass of first-rate technical expertise and did not do so. Indeed, Arthur Andersen lost about one-third of the technical people it recruited. Thus, the approach—

whose key advantage is the maintenance of strong organizational cohesion—is not readily generalizable to organizations like the RAND Corporation or IBM, whose chief goal is to optimize their leading-edge technical capabilities in support of a tremendously diverse and complex mix of activities.

The RAND Corporation, for example, has adopted a matrix organization to provide a framework for its multidisciplinary, highly technical personnel, in an approach that is radically different from that of BOB or Arthur Andersen. A new recruit at RAND is brought in as a professional with advanced training in a specific discipline. That gives him or her a home in a specific department which is headed by someone who is at least the recruit's peer in terms of academic qualifications. In our interview with Mr. Gustave Shubert, he told us that all department heads continue to engage in research for at least half their time. The department head thus serves as a role model for new staff, doing basically the same kinds of things that the recruit was hired to do.

The other side of the RAND matrix is made up of programs (health care delivery, or defense programs, for example) which are organized into divisions. Each division is headed by a vice president.

Shubert told us there is constant tension between departments and divisions. Although the departments are supposed to broker staff assignments, the individual also has a great deal to say about what he or she does, and it is the divisions which are accountable for producing high quality research. According to Shubert, this tension has caused the matrix system to go through some wild swings, from one extreme to the other, over the years. Prior to 1959 there had been four "divisions" that were actually disciplinary in nature—engineering, social science, etc.—with sub-departments within them. But these were viewed as having developed into baronies: all the existing incentives pushed people to stay within their own fields; merit reviews took place entirely within divisions/departments and there were few incentives—financial or other—to lead staff to participate in interdisciplinary projects. These were, for all practical purposes, non-existent. (It is, however, important to note that despite these organizational and bureaucratic obstacles, a number of successful interdisciplinary research projects were conducted and completed at RAND during this period.)

The four divisions were then broken up into 11 departments. These largely perpetuated the insularity of the divisions, but RAND did experiment in 1959 with one new organizational mechanism—the Office of the

Director of Projects—that was intended to facilitate interdisciplinary research. This was the first formal organizational attempt to reinforce the other side of the matrix. But after successfully completing one major interdisciplinary project, and following an unsuccessful attempt to do another, the Office was disbanded and the research departments regained their former dominance.

In 1968-69, RAND made a conscious decision to create a domestic division to diversify from its heretofore largely defense-oriented work. This had an unanticipated effect on the management structure, swinging the balance in the matrix from disciplinary departments to functionally-oriented programs and project managers. This occurred because the diversification into domestic work was not readily accepted by all existing RANDstaff. To get things moving, Shubert said, RAND's top management had, in many cases, to work around the preferences of the department heads. There were serious disagreements over hiring, and some domestic division heads began to do some of their own recruiting. In this way, RAND began to bring in new types of researchers (e.g., experts in social experimentation).

Ten years later, Shubert told us, the matrix on the domestic side of RAND had swung completely around to the divisional dimension and the same trend began to take hold on the national security side. Every member of the domestic division was housed in the "new building," that is, physically separated from the staff doing military or national security work. At that point, Donald Rice came in as president of RAND and rebuilt the department cores. He relocated everyone so that all individual disciplines were housed together. He rented "the biggest tent available" so that they could reshuffle all of the office assignments between the two buildings. As a result, all the buildings and all the departments now have secure and non-secure areas (for military and domestic work) that adjoin each other. All this was done to promote intra- and inter-disciplinary exchange, and to reduce friction between the domestic and defense divisions. (The main RAND building had itself been designed years earlier by a mathematician so that there were a maximum number of corridor intersections, with the explicit purpose of promoting informal exchanges among researchers.)

Shubert believes that RAND now has a reasonable balance between departments and divisions. Nonetheless, the resources go through the divisions. This makes it hard for department heads to intervene on resource allocations. In principle, though, the intent is to have both sides of the matrix participate in these decisions.

RAND has, from the beginning, tried to create an interdisciplinary workplace. At first, the idea was to bring together scientists and engineers. In 1948, economists and political scientists were brought in. The expansion into domestic work in the late sixties brought in sociology, psychology, law, medicine, etc. Now RAND has at least "one of almost everything." About 58 percent of the staff are technical, compared to 42 percent support.

Although the matrix system is not easy to manage—it can be argued that it is both cumbersome and volatile—Shubert thinks it has worked quite well in safeguarding the quality of RAND's work over the years by attracting prestigious researchers and retaining them to do the work of the corporation. The effort here was not so much to promote efficiency, as with Arthur Andersen, but rather to optimize creativity and originality among staff. This involved recognizing that a key function of management is to develop and sustain an environment that can attract and retain such people, while at the same time exercising responsible management control. On the other hand, both RAND and Arthur Andersen stress the commitment and responsibility of all their professional people for every corporation product. Again, as with Arthur Andersen, the RAND effort at integration appears generalizable mainly to organizations like itself: that is, organizations that have very varied work programs, and personnel with advanced training and expert skills in many different disciplines.

In the Inspector General's office at the Health and Human Services Department (HHS), and at Coopers and Lybrand, auditing and evaluation staff have not been integrated, but work in separate units. Mr. Richard Kusserow, the HHS Inspector General, told us his essential concern is to ensure the availability of the skills needed for the work of his office. He believes, however, that organizational integration of auditing and evaluation personnel is unwise for two reasons. First, each group's special professional proficiencies and different approaches to work need to be preserved through separation. Second, Kusserow thinks evaluators would be "consumed" by auditors if they were merged and required to use the "yellow book" standards and audit process. He feels it would be only a matter of time, given such integration, before evaluators would depart from an organization, "leaving those who remained to be assimilated as less than qualified auditors." Thus he has tried to develop the needed pools of evaluators and technical "specialists" while minimizing or allaying conflict with auditors to the extent possible. Evaluators and auditors do not work together on jobs; instead, all evaluators work out of one specialized unit. However, other technical staff (e.g., computer

programmers, statistical samplers, economists, etc.) do work with auditors, but on an advisory basis: the auditors run the jobs and the technical staff function largely as technical assistants.

At Coopers and Lybrand, Ms. Suzanne Woolsey directs a consulting group which reports to a different set of managing partners than do the auditing and tax groups. There is a separate (dual track) career path for technical people. Woolsey believes this has pluses and minuses:

"The pluses are that your appraisal is done by people who are doing the same kind of work you do. So for individual mobility, I think it helps. The problem is that it's difficult with the dual track to manufacture incentives for people to work together and therefore to break down problems of misunderstanding and communication in the organization as a whole."

The dual career path carries separation (i.e., non-integration) one step further, but it is a way for Coopers and Lybrand to attract and retain strong technical staff. It also distinguishes Coopers and Lybrand from the Inspector General's office, where the expectation appears to be that technical people may stay only 2 or 3 years, and where there is consequently little or no investment in their long-term careers.

At Resources for the Future (RFF) the approach is different once again. There is a mainstream at RFF, but it is a technical mainstream: 80 to 90 percent of the staff have the Ph.D. in economics. In our interview with Mr. John Ahearne, he told us that the need to integrate technical and nontechnical staff occurred largely as a result of changes in the funding and sponsorship of the organization. The Ford Foundation had founded RFF some 25 years ago, and funded the organization's work in 5-year increments, with renewal based on a review of the previous 5 years' work. The organization's main preoccupation was therefore with the quality of its product, rather than with its use or impact, and the audience targeted by staff was essentially other economists. But in the last 10 years, Ford cut back its support and RFF turned to other funding sources whose officials are concerned not only with the quality of RFF's product, but also with its impact on public policy decisions.

As Ahearne put it,

"this meant we had to think about a new kind of audience—that is, policymakers—and about how to make our products sufficiently readable and understandable to them that they would be likely to use them in policymaking. We decided to bring in non-economists, for example, people with degrees in public policy and people from

the publishing world, to produce material that would translate RFF work for a wider audience."

It was at this point, then, that RFF first confronted an integration issue which is different from every other one we heard about during our interviews. Ahearne sees it as the mirror image of GAO's, "where the tensions are along the lines of experts defending themselves against non-experts. RFF's problem has been in getting technical staff to accept and adjust to non-technical staff."

At IBM, the organizational context is again different. In our interview with Mr. Lewis Branscomb, he explained that the particular tension IBM faces is how to keep attracting, recruiting, integrating, and retaining leading-edge technologists and researchers when the IBM workplace is optimized for current business and current development. Although disciplines are multiple and disparate at IBM, and although there are both technical and nontechnical staff, it seems clear that the most important interdisciplinary issue there is the integration of extremely advanced researchers and engineers into the life of the corporation.

Branscomb told us that it was an IBM Chief Executive Officer (Tom Watson, Jr.) who had first explicitly pointed out the need to enable top researchers and technologists within the company to react against the very business pressures that he himself, as CEO, was exerting on them. That is, his concern was that a management system which optimizes current competitive strength may prevent an organization from doing the things it should do for the sake of its own future. The integration need at IBM was thus essentially that of making sure that integration was not so successful, or so complete, that leading-edge dissenters could not be heard. This meant giving technical people a voice powerful enough to be picked up by top management, if the company was to benefit from their best research or technological contributions.

GAO's own context is one in which more and more complex public policy questions posed by the Congress are moving the organization toward a workplace that includes multidisciplinary personnel. The situation is the same as that of BOB, HHS/IG, Coopers and Lybrand, and RFF, where a mainstream group of professionals—in this case, auditors—has long dominated the culture of the organization.

Since 1984, GAO's approach has been to make use of three simultaneous ways to integrate technical staff. First, three separate technical divisions seek to build a critical mass of top-rated high-quality staff, some of

mainstream staff in divisions. This allows technical staff to receive the same promotions and perquisites as mainstream staff, while drawing upon their technical training to enrich the product of the mainstream activity. The idea here is to have your cake and eat it: the dual thrust allows the separate centers to continue to attract and maintain quality, while the organization as a whole moves toward more equal treatment for technical staff over the longer term.

At BOB, the integration problem that arose because of the creation of technical centers was accompanied by a problem of technical staff access to top management. Branscomb told us this was true as well at IBM: technical people there felt they needed "to have more of a voice," to be able to state their concerns to the CEO. But in contrast to BOB's Budget Directors, IBM's CEO was as concerned as his technical staff that they should feel free to raise their concerns with him, especially on what might be unpopular but important issues. The IBM solution was to do two things. First, they set up a group called the Corporate Technical Committee (CTC), which Branscomb chaired. It had no formal corporate responsibility, no obligation, for example, to track the execution of the current business plan. Instead, the CTC's purpose was to guide the long-term science and technology strategy of the company. To do this, the committee became involved with technical people across the divisions and served as a conduit between them and top management. Branscomb told us that the CTC worked directly with IBM line managers on the handling of their overall technical responsibilities: "If they were recruiting the wrong people, mismanaging them, not talking to each other, all of those things were legitimate interests of ours." The access purpose was accomplished by locating the CTC in the office of the CEO. As Branscomb said, "it was the virtual power to meet with the CEO about technical concerns that gave the Committee its influence at IBM and, by the same token, opened up technical staff access to top management."

Second, IBM set up a "Fellows" program which rewarded technical people who had made exceptional intellectual contributions to the business. IBM Fellows are chosen from among technical staff who not only have had important ideas—ones which have clearly served IBM's business interests—but also have developed to the point of impact that is measurable (in terms of market effect, company reputation, etc.). Among the most important privileges extended to Fellows (there are now 53 at IBM who have been selected at the rate of 2 to 3 a year) is that of being able to raise technical concerns with top management whenever they feel the need to do so. "There has never been a time," said Branscomb, "when an IBM Fellow asked for an appointment with the CEO that he didn't get it."

Table IV.1: Location of Technical Staff

Group	Total number	Percent of total population
DMTAG/TAG	141	29
EAG	28	6
OCE	11	2
PEMD	78	16
IMTEC	90	19
AFMD	14	3
Other	119	25
Total	**481**	**100**

The staff are spread from GS-9 through GS-15, with about 90 percent in GS-12 and above.

Table IV.2: Grade Structure of Technical Staff

Grade	Number	Percent
GS-15	83	17
GS-14	135	28
GS-13	127	26
GS-12	93	19
GS-11	22	5
GS-9	21	4
Total	**481**	**99[a]**

[a]Percentages are rounded.

There are 153 people, or about 32 percent, with Ph.D.'s in this group, as shown in table IV.3.

Table IV.3: Technical Staff With Ph.D.'s, by Grade

Grade	Number with Ph.D.'s	Percent of total Ph.D.'s
GS-15	35	23
GS-14	46	30
GS-13	39	25
GS-12	29	19
GS-11	4	3
GS-9	0	0
Total	**153**	**100**

There are 21 job series represented in the census. Job series 347, Supervisory GAO Evaluator/GAO Evaluator, has 219, or 45 percent of the population in the universe. Job series 110, Supervisory Economist, job series 334, Computer Systems Analyst/Specialist/Programmer, and job series

Table IV.5: Technical Staff by Grade Level (Including Number of Staff With Ph.D.'s)

Series	AFMD	GGD	HRD	IMTEC	NSIAD	PEMD	RCED	Other	Regions	Total
Total # GS 15's	**3**	**10**	**11**	**20**	**10**	**16**	**8**	**5**		**83**
Number with Ph.D.		5	7	3	6	5	6	3		**35**
Total # GS 14's	**6**	**9**	**18**	**30**	**18**	**13**	**18**	**6**	**17**	**135**
Number with Ph.D.	1	3	9	2	9	4	12	5	1	**46**
Total # GS 13's	**3**	**17**	**19**	**16**	**12**	**13**	**8**	**3**	**36**	**127**
Number with Ph.D.		4	8	2	7	8	6	2	2	**39**
Total # GS 12's	**1**	**8**	**7**	**7**	**4**	**24**	**5**	**2**	**35**	**93**
Number with Ph.D.		3	2		3	15	2	1	3	**29**
Total # GS 11's		**4**	**1**	**8**		**8**			**1**	**22**
Number with Ph.D.						4				**4**
Total # GS 9's	**1**	**4**		**9**		**4**			**3**	**21**
Number with Ph.D.										**0**
Total	**14**	**52**	**56**	**90**	**44**	**78**	**39**	**16**	**92**	**481**
Number with Ph.D.	1	15	26	7	25	36	26	11	6	**153**

Table IV.6: Technical Staff by Job Series

Series	AFMD	GGD	HRD	IMTEC	NSIAD	PEMD	RCED	Other	Regions	Total
GS-101 Social Science Analyst/ Program Specialist	0	5	9	0	4	34	6	2	0	**60**
GS-110 Supervisory Economist/ Economist	0	12	13	0	11	1	13	11	0	**61**
GS-180 Personnel Psychologist	0	0	0	0	0	0	0	1	0	**1**
GS-301 TAG Manager (and one SES Candidate)	0	0	0	0	0	0	1	0	11	**12**
GS-334 Computer Systems Analyst/ Specialist/Programmer	7	5	3	9	1	1	1	2	34	**63**
GS-343 Mgmt Analysis Officer/ Supvy Mgmt Analyst	0	1	0	0	0	0	0	0	0	**1**
GS-347 Supervisory GAO Evaluator/ GAO Evaluator	6	25	28	65	17	28	8	0	42	**219**
GS-501 Financial Specialist Admin/ Cost Analyst	0	0	0	0	1	0	0	0	0	**1**
GS-510 Systems Accountant	1	0	0	0	0	0	0	0	0	**1**
GS-801 Transportation	0	0	0	0	0	0	1	0	0	**1**
GS-855 Electronic Engineer	0	0	0	0	2	0	0	0	0	**2**
GS-861 Aerospace Engineer	0	0	0	0	1	0	0	0	0	**1**
GS-880 Natural Resources Manager	0	0	0	0	0	0	1	0	0	**1**
GS-1080 Psychologist	0	0	1	0	0	0	0	0	0	**1**

(continued)

Interviews With Staff Who Have Left GAO

Introduction

We interviewed technical and nontechnical staff who left GAO in order to address in part the second of the task force's three questions: What is the present status of interdisciplinary management at GAO? We explored the reasons technical and nontechnical staff left GAO; what the first year at GAO was like for technical and nontechnical employees; their perspectives on how technical work and technical staff have been integrated into GAO; what communication problems they encountered; how the career path worked for each of them and their perspectives on their career opportunities; and the kinds of training they received.

As described in chapter 2, in volume 1 of this study, these interviews had two purposes in addition to helping explain departures: to distinguish experiences common to most GAO staff from those unique to technically trained staff; and to refine the focus of the two comprehensive technical staff and middle-manager surveys.

Objectives, Scope, and Methodology

We selected all of our interviewees from staff who left GAO during fiscal years 1986, 1987, and 1988. We obtained from the Office of Personnel lists of all staff who left GAO during that period, by unit. Among the included units were: all divisions; all regions, overseas offices and the Washington Regional Office; and three staff offices—the Office of the Chief Economist, the Office of Information Resources Management, and the Office of Organization and Human Development.

To develop our universes of technical and nontechnical staff, we provided the list for each unit to a member of unit management (i.e., Regional Manager, Division Deputy for Operations, Assistant Regional Manager (ARM) for Operations, or office head) and asked them to identify those persons they considered technical according to the task force's definition (see chapter 2). We then asked them to identify all nontechnical staff. Once they had, we eliminated all staff who had retired (with two exceptions), or who had died. Then we asked each manager to designate which of the staff—both technical and nontechnical—they would have preferred to retain. (The purpose here was to exclude staff who had not performed well at GAO.) Our final list for each unit included only those technical and nontechnical staff that unit management said they would like to have retained.

In the course of these conversations with unit management, we discovered that four of the technical staff who had left GAO during our sample period had subsequently returned, so we decided to interview them as well.

Concerning GAO's approach to work, one technical person told us that upon joining GAO, she found that her training and experience in questionnaire design and writing differed from the way GAO does these things. A nontechnical staffmember said that he became really frustrated when substantive sections, recommendations, and conclusions were deleted or "watered down" in his report drafts. Another nontechnical person told us that GAO's "obsession" with "form over substance" surprised her. She said that GAO is overconcerned with workpapers, referencing, and findings. As a result, she stated, GAO neither probes deeply into the subject under review nor uses a "big picture" approach.

Three of the nontechnical staff interviewed said they had been misinformed or misled when they were recruited. They were given assignments that did not match their interests and backgrounds. For example, one nontechnical person was told that in order to obtain the types of assignments she preferred, she would have to relocate to a specific region. When she did relocate and joined GAO, she was told that the work of her choice was not as plentiful as she had been told, and that she could not be guaranteed those assignments.

First-Year Experiences

We asked the respondents whether there were any specific incidents or experiences in their first year that shaped their perceptions of GAO thereafter. Technical and nontechnical staff recalled both negative and positive experiences with supervisors and assignments. For example, a technical person said she had a disagreement with her supervisor because he did not want her to discuss the job with people who were not working on it. A nontechnical staffmember said that his first supervisor "watered down" his findings and conclusions. Another nontechnical staffmember expressed surprise at how little actual supervision he received from his supervisor in his first year. He believed he was too "green" to be left alone and, as a result, had made mistakes. On the positive side, one technical person said he received positive reinforcement on one of his projects which had encouraged him to stay with GAO. Another technical person said her supervisor was her mentor and supported outside training for her; she received an award. A nontechnical staffmember told us that her supervisor provided opportunities to make her work interesting. Another nontechnical person said that her supervisors during her first year were excellent.

Regarding assignments, a technical person complained that GAO did not keep a commitment to rotate Presidential Management Interns. Another technical person said that when she was hired she was told that she

their technical counterparts in saying that GAO could improve its application of computer technology.

Four technical and four nontechnical respondents mentioned time constraints as impeding their ability to do high-quality work.

Most of the respondents in both groups said they were compelled to change the way they worked to satisfy GAO requirements. However, most said the changes had either little or no effect on the quality of their work. Some believed the quality of their work improved.

Most respondents—both technical and nontechnical staff—were generally satisfied with management's receptiveness to their technical input and with their own involvement in the work. A majority of both groups said that managers rarely overruled their professional judgment on job-related issues. When managers did overrule them, most respondents indicated that the consequences were not serious. They also said that their work assignments permitted them to take advantage of their training and background at least to some extent.

About half of both groups said that GAO managerial review is much more intense than what exists outside of GAO. They believed that managers focused on important issues and conveyed consistent messages (nontechnical people said they did this most of the time; technical people believed it was at least half the time). A majority of both groups said they received the material support they needed to conduct high quality work, and that tools were available (e.g., computers, books, journals, and consultants) at least to a moderate extent.

Reactions to GAO's Approach to Work

We asked respondents to cite any aspects of GAO's work that they found either strange or unreasonable and aspects that they found made the most sense. Responses varied so widely that no point stood out for either group. Referencing was cited by members of both groups as being strange and unreasonable at first, but also was considered by many in each group to be the thing that made the most sense after they had been at GAO awhile. Items cited as strange and unreasonable included multiple layers of report review and the length of assignments. Making the most sense were documenting and verifying evidence and providing balance in reports.

Performance Appraisals

Most respondents from both groups said they generally received accurate and well-justified performance appraisals. Some technical respondents however, said that the BARS system applied more to generalists and did not adequately measure technical performance.

Technical staff comments on BARS included:

- The BARS system criteria are inadequate for measuring technical performance.
- As an auditor, one is rated by BARS; as a computer specialist, one is rated by BARS as well as by a different set of rules and circumstances. The BARS system is inequitable because it requires technical staff to perform at a higher level than evaluators.
- Technical staff are at a disadvantage when rated by BARS because they do not get as much opportunity to write as evaluators.

Some nontechnical staff who cited BARS as a problem in getting accurate appraisals contended that it was the application of the BARS system that caused problems, not the BARS system itself. One nontechnical respondent said that time constraints and insufficient priority given ratings affect the BARS appraisal process and that GAO needs to give supervisors more time to prepare ratings. Another nontechnical person said "BARS is a wonderful tool." The problem, he said, is supervisors' reluctance to apply BARS consistently. He said he had observed people getting the same ratings despite differences in performance. And he said he was aware of staff who were getting fully successful ratings when they deserved less. He believed supervisors did not want to do negative ratings because they would have to justify them to management.

Rewards

Most of the respondents in both groups said that the rewards they received (bonuses, verbal recognition and reinforcement from supervisors, etc.) affected their morale to a moderate or great extent. Four of the technical staff and one nontechnical staff said their morale was negatively affected by the awards they received. One technical respondent said the amount of money was too small. Another technical respondent said she received awards as an evaluator but not as a TAG member. She said that auditing assignments lend themselves to more job recognition. Another technical person said that GAO never recognized him with cash, only certificates. He said others in his profession outside GAO appreciated his talents more. The fourth technical person felt that the awards system could be improved, but did not say how.

GAO lacked the in-house expertise, especially at the management level, to conduct technical work. Some said the appraisal system should be changed to better measure technical staff performance.

In addition to better promotional opportunities, three nontechnical staff would have liked a better matching of their interests to their assignments. Three regional people (two nontechnical, one technical) would have liked less travel.

Recommend GAO to Others

We asked people if they would recommend GAO to someone with comparable skills and experience. Of the technical respondents, 5 said yes, and 13 either said no (6) or provided conditional responses (7). Of the nontechnical staff, 11 said yes, and 10 either said no (7) or provided conditional responses (3). Thus, 52 percent of nontechnical staff were willing to recommend GAO to others with comparable skills and experience but only 28 percent of technical staff were willing to do so.

Of the six technical respondents who said they would not recommend GAO to someone with comparable experience, three of them said technical people would become frustrated with GAO's management of technical issues. The following other reasons were cited by individual technical people: no TAGS in certain regions; limited promotions for technical staff; and a feeling that someone with a social science research background who is interested in federal employment should go to another agency.

Of the seven nontechnical staff who also said they would not recommend GAO, some individual reasons given were as follows:

- GAO management does not consider employee interests when making assignments.
- GAO does not take risks. Hard work on a report is often negated or diluted.
- GAO does not have seasoned supervisors who can train new people properly and establish role models.

Attractive Characteristics of GAO

Technical and nontechnical respondents generally agreed on what characteristics of GAO were attractive to them. Most often cited were the following:

- Varied work experience with a broad exposure to government operations (20 of 39 people).

Survey of GAO Technical Staff

Background

As part of the work of the task force on interdisciplinary management, we conducted a mail survey of the members of the GAO staff identified by the census (see appendix IV) as meeting at least one of the criteria established by the task force for being considered "technical staff." We sought to learn of the experiences of these staffmembers in GAO, as well as their views on the quality of their work lives in GAO.

The Survey

The areas to be explored in the survey were developed from the issues identified in the task force's study plan and from discussions held during meetings of the task force. After deciding upon a first draft of the questionnaire to be used in the survey, we pretested it with six members of the technical staff. After the pretests, we revised the questionnaire to eliminate some ambiguities that we encountered during the pretests. We mailed the questionnaire to staffmembers at their office locations in April 1989 and sent out a follow-up letter in May.

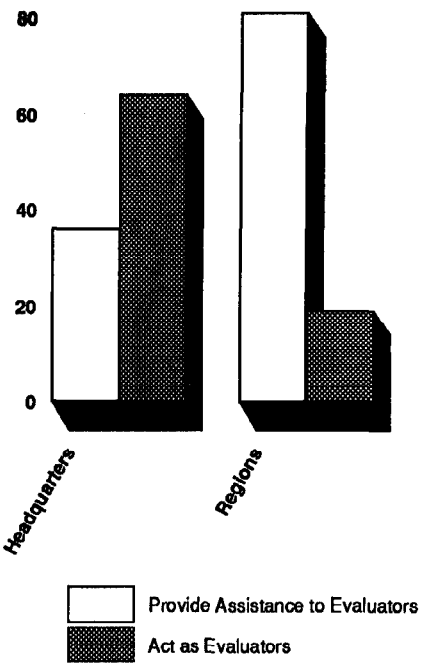
Managers of GAO units had identified a total of 481 staffmembers as fitting the task force's definition of "technical." Of these 481, seven responded to our initial mailing by informing us that they did not consider themselves part of GAO's technical staff, but rather were GAO evaluators. In addition, we learned that six of the identified staffmembers were no longer employed by GAO. On the other hand, we also discovered that two DMTAG staffmembers had been overlooked by their divisions when completing the technical staff census. After adjusting our population total in response to these developments, we arrived at a final population size for the technical staff of 470, rather than the original figure of 481.

In total, we received 431 completed questionnaires, for a response rate of 92 percent. The response rate was high in every one of the GAO units having technical staffmembers. Thus, in general, we believe that our survey results are representative of the views of the population of GAO's technical staff.

Technical Staff

The GAO technical staff is a heterogenous group in terms of education level, professional specialty, role, and organizational location within the agency. In view of these differences in background and possible perspective, it seemed likely to us that the issues being addressed by the task force might be of varying levels of significance to different segments of the technical staff population. Throughout this

Figure VI.1: Role of Technical Staff at Headquarters and in Regional Offices

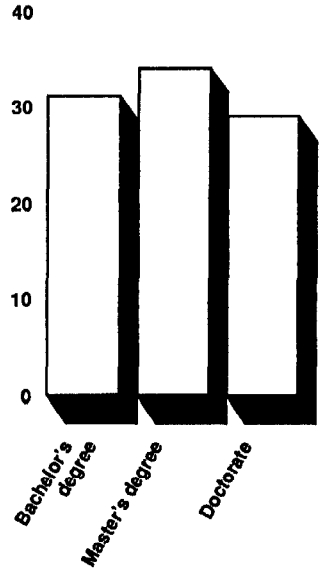


Apart from the roles they perform, members of the technical staff differ in professional specialty. The predominant job title among them is the job title "evaluator," with 44 percent of the technical staff being so designated. Other job titles present in some numbers are social science analyst, economist, statistician, operations research analyst, and a variety of titles that could be grouped under the general category of computer science specialist. Nearly three-fourths of the assistance staffmembers are in one of the series other than evaluator, while the majority of those performing evaluator functions carry the evaluator job title.

The staff providing assistance are predominantly those with computer science training. This is especially true in the regional offices, where 61 percent of those providing assistance indicated that they provide primarily computer-related assistance. In headquarters, although many assistance staff see their role as that of providing computer-related assistance, these staff encompass a wider variety of technical and methodological specialties, with 22 percent of the respondents citing economics as the primary area in which they provide assistance. Thus, a

master's, and doctoral degrees. We believed that a group that, in particular, might be likely to encounter problems would be those holding doctorates. We hypothesized that, in view of the extent of their professional training, those with doctorates might have particular difficulty in adjusting to GAO's policies and practices regarding documentation, and other aspects of work, and thus might be among the least satisfied with GAO as an employer. Therefore, we examined the responses of Ph.D.'s separately.

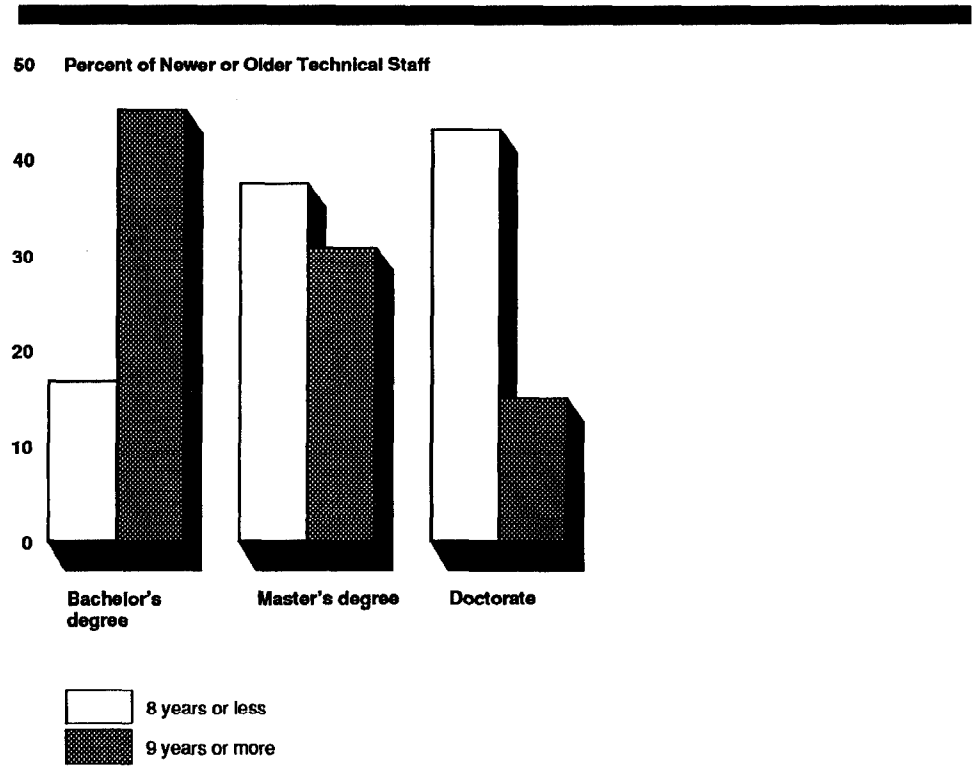
Figure VI.3: Highest Academic Degree Held



Finally, a distinction that seemed useful in examining survey responses is that of length of time in GAO. Presumably, staff who have been here for a long time would have accepted GAO's work requirements and cultural norms, whereas it might be less likely that newer staff would have reached that same level of accommodation.

The median length of time technical staffmembers had been with GAO when we conducted the survey was 8 years (see figure VI.4). Six percent of our survey respondents were in their first year with the agency.

Figure VI.5: Highest Academic Degree Held, by Length of Service at GAO



Use of the Work of Assistance Staff

To help assess GAO's progress in integrating a variety of disciplines into its work, the survey asked assistance staff the extent to which, in their own view, the work of the various assistance groups is used by the evaluator staffmembers that they support. In so doing, we believed we would be obtaining, also, an indication of the degree of professional satisfaction felt by the assistance staff regarding their contributions to GAO. In general, the assistance staffmembers seem to believe that their work has been accepted and used extensively by the evaluator staff. There are indications, however, of considerable ambivalence in the staff's view of how strongly top management is committed to the role of assistance groups.

In questioning the assistance people in our survey, we asked about the consideration given their job advice by the evaluator staff, the use of their work in report products, and the settlement of disagreements between the evaluator staffmembers and themselves. A large majority of the assistance people, particularly those in regional offices, reported that their advice is usually given serious consideration by the evaluator

percent reported that such disputes are usually settled in what they would consider to be a technically adequate way.

Resolution of Disagreements

Although the resolution of differences may, in most instances, be satisfactory, there are indications that sometimes it is not reached easily. Four assistance staffmembers commented in their questionnaire that their interactions with evaluator staff have on occasion caused them what they consider to be an unacceptable level of stress.

On this same subject of professional disagreements, the members of the assistance community were about equally divided on the question of whether there is a need, within their units, for a formal mechanism for settling substantive disagreements. They were much less noncommittal about the preferred nature of such a mechanism, if one were to be established, however. By a margin of 2-1/2 to 1, they favored relying on someone in GAO, rather than an outside authority, to settle such disputes.

Acceptance of Assistance Groups

When we asked assistance staff about the situation regarding the degree of acceptance of their group as a whole, rather than of their own individual work, the responses were not quite as positive. We asked their opinion concerning the degree of authority accorded the views of the assistance group of which they are a member. Overall, nearly half felt that the views of their group are typically accorded great authority by the evaluator staff. A higher proportion of regional staff (64 percent) felt this way than headquarters staff (41 percent). The assistance staff's assessment of the degree to which it is supported by top management of its unit matches, to some extent, its assessment of the degree of authority accorded group views. Slightly over half felt that top management was noticeably supportive of their group, but a larger proportion of regional than headquarters staff had that opinion.

The distribution of the assistance staff's views of the degree to which its unit's management is supportive of their group is presented in figure VI.7.

- experience with immediate supervisor,
- GAO documentation requirements,
- receptivity of GAO evaluator staff to new ways of doing work, and
- professional isolation.

The responses to our questions on these topics did not indicate that serious difficulties in this regard have been encountered by large numbers of staff.

Our survey found that although many technical staffmembers performing evaluator functions have immediate supervisors with backgrounds and training different from their own, these differences do not seem to be causing widespread problems. A large majority of the staffmembers characterized their experience with their current supervisor as more good than bad. Only 13 percent reported that, on balance, their experience with their immediate supervisor has been negative.

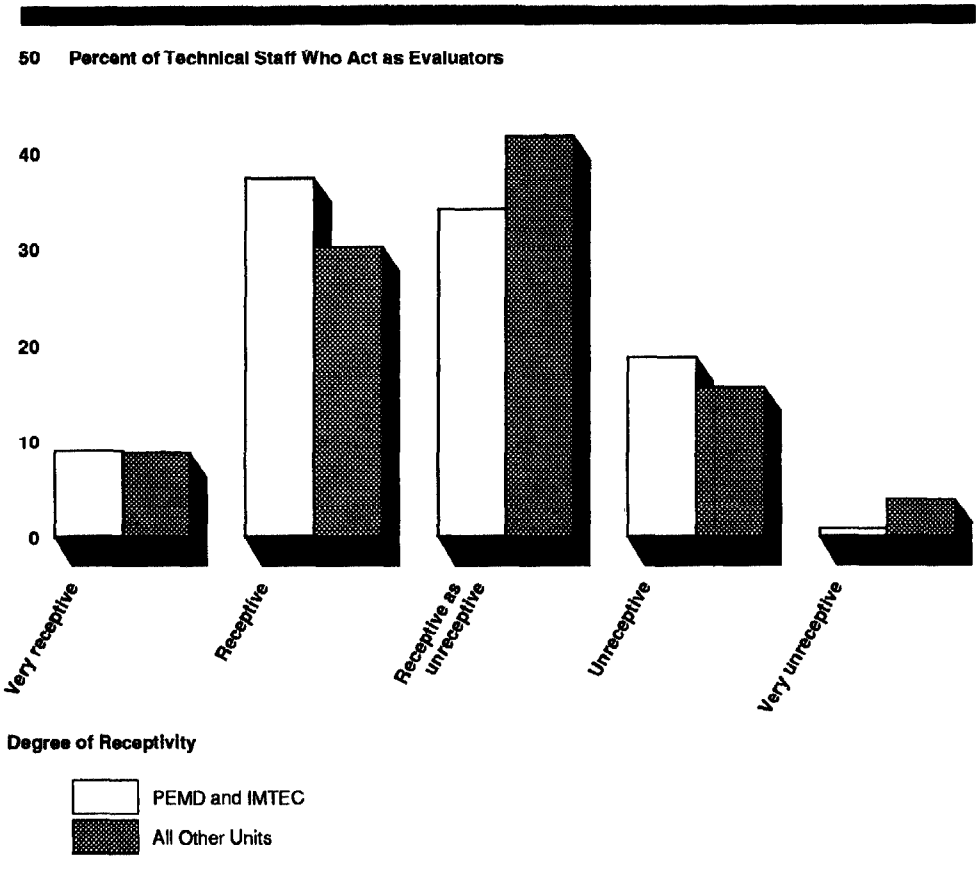
Documentation Requirements

An area that has often been mentioned as being troublesome to technical staff in GAO is that of the agency's documentation requirements. Given that the members of the technical staff who perform evaluator functions are likely to be confronted directly with those requirements in trying to complete their jobs and publish their reports, we believed that their view of the reasonableness of those requirements would provide another useful indicator of the extent to which technical staff have become integrated into GAO and have accepted its cultural norms. We found that most of those staffmembers were not significantly upset by the documentation requirements. Of the technical staffmembers whose role is to manage or work on jobs for which their group has reporting responsibility, only 20 percent characterized the documentation requirements as unreasonable. On the other hand, 52 percent viewed them as either very reasonable or reasonable. Staff performing evaluator functions in IMTEC and PEMD were somewhat more tolerant of GAO's documentation requirements than were those in the program divisions. Figure VI.8 compares the responses of staff performing evaluator functions in the two technical divisions to those of similarly functioning staff in the program divisions.

Receptivity to New Methodologies

On the question of the receptivity of GAO evaluators to new or different ways of doing their work, the responses were mixed. About 44 percent of the technical staffmembers who perform evaluator functions felt that evaluator staffs are receptive, but nearly as many, 37 percent, characterized them as being "as receptive as unreceptive," hardly a ringing endorsement. Since many staff in the technical divisions might work on a day-to-day basis only with other "technical" evaluators, we thought that, to some degree, they might have used other members of the technical staff as the frame of reference for their response. We were, therefore, particularly interested in the responses of the technical staffmembers performing evaluator functions in the program divisions. We found that the assessments made by that group were quite similar to those made by staffmembers in the technical divisions. Figure VI.9 provides the details on the two sets of responses.

Figure VI.9: Receptivity of Evaluators to New Ways of Doing Work



expected. In posing this question, we presented the respondents with a pair of opposing statements about each of several aspects of work. For example, concerning the question of how extensively their work was reviewed, the questionnaire contained the two statements, "work was more thoroughly reviewed" and "work was less thoroughly reviewed." We asked the staffmember to check all statements that applied to his or her first-year experience. The aspects of work about which we presented statements were:

- the degree to which the work was technical,
- the degree of control the staffmember had over how to do his or her work,
- the extent of review of the staffmember's work,
- documentation requirements,
- frequency of use of the staffmember's specialized skills,
- degree to which the work was challenging to the staffmember, and
- the amount of visibility afforded his or her work.

In general, among those staffmembers who did not perceive a great match between their first year in GAO and what they had anticipated, the feeling was that, as compared with what they had expected,

- the work was less technical,
- they had less control over how to do their work,
- their work was more thoroughly reviewed,
- there were more documentation requirements,
- they used their specialized skills less often,
- they found their work less challenging, and
- their work had less visibility.

As can be seen quite clearly in figure VI.10, for each of the aspects on which the staffmembers had an opportunity to comment, an overwhelming majority were surprised in the same way. For example, 59 percent of the respondents indicated that they experienced less control over how to do their work than they had expected, while only 12 percent reported experiencing more control than they had anticipated. The remaining 29 percent did not cite the control area as one in which they were surprised in either direction. Thus, 71 percent were surprised in one way or the other by the degree to which they had control over how to do their work. The fact that 59 percent reported that they experienced less control than they had expected means that of those who were surprised in the area of extent of control over how to do their work, 83 percent (59 percent of the 71 percent) said that the mismatch between expectation

First Supervisor

The second aspect of their introduction to GAO about which we questioned technical staff hired during the 1980's was that of their experience with their first supervisor. Although nearly half of the respondents reported that their first supervisor in GAO was dissimilar in background and training to themselves, 65 percent assessed their experience, overall, with that supervisor as positive, while only 17 percent characterized it as negative.

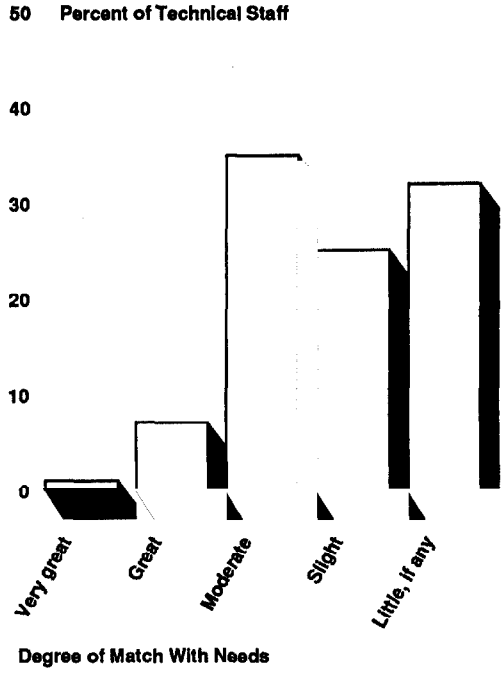
GAO Procedures

We next inquired into the degree to which in the 1980's new staffmembers had been trained in GAO procedures. We began by asking if during their first 6 months with the agency they received 24 hours or more of classroom training on GAO's methods of carrying out its audit/evaluation work. Forty-three percent said they had, 9 percent did not remember whether they had or had not, and the remaining 48 percent said they had not received such training. We then asked whether during their first 6 months with the agency they had received, through either classroom or on-the-job training, an adequate understanding of each of the following:

- workpaper preparation,
- indexing,
- referencing, and
- reporting style.

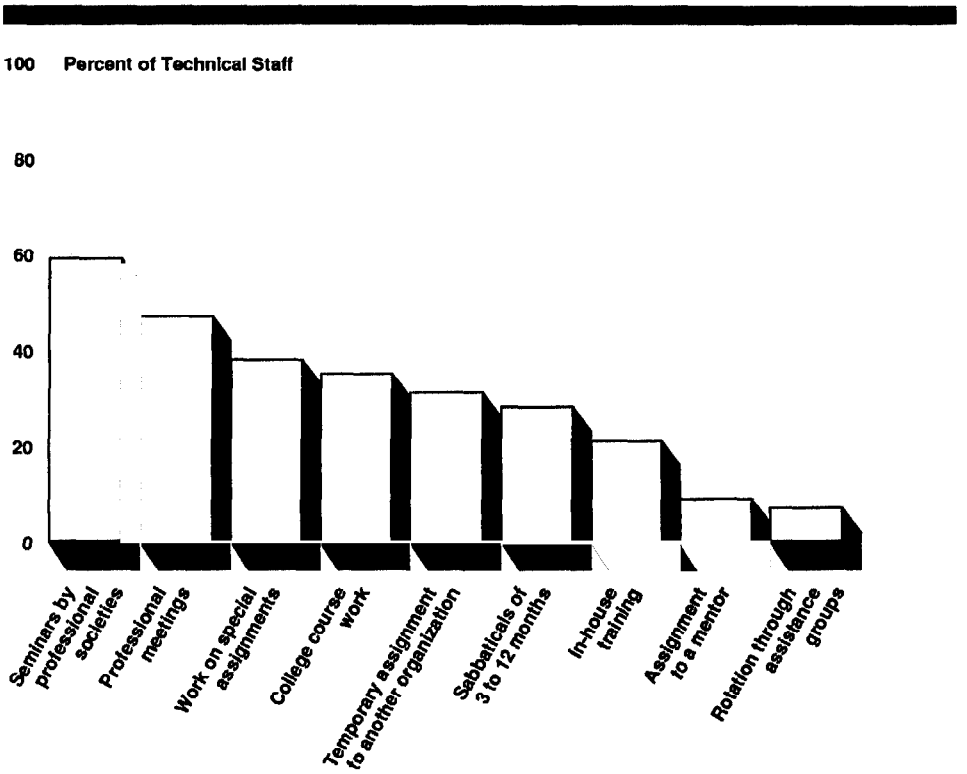
Over 40 percent of the respondents felt that they had not received an adequate understanding of any of the topics, and, as figure VI.11 shows, for none of the topics did a large proportion feel that they had received an adequate understanding.

Figure VI.12: Match Between GAO Training and Staff Needs



Next, we listed four possible training areas and asked the staffmembers to indicate any of those in which they wished to receive training within the next 12 months. As can be seen in figure VI.13, there was considerable interest in each of the four areas.

Figure VI.14: Method of Training Preferred



There was some disparity between the preferences of assistance staff and those of staff performing evaluator functions. A considerably higher proportion of those performing evaluator functions than those providing assistance preferred temporary assignment to an external organization, while a higher proportion of assistance staff than others preferred in-house training and college course work.

Because there has been some concern that technical staffmembers had particular difficulty in obtaining needed training, we asked about constraints on training that have been encountered, and the degree to which technical staff are more constrained in obtaining training than are members of the evaluator staff. Nearly three-fourths of the technical staff reported that on at least one occasion within the past 3 years they have missed attending a desired training course, seminar, or meeting. GAO time/work constraints was the category most frequently cited as precluding attendance. When asked to compare the extent to which their ability to obtain training has been constrained with the extent to which a typical evaluator's has, 77 percent of the survey participants replied that the typical evaluator had been constrained just as much or more.

Training was the subject of narrative comments from 14 staffmembers. Several expressed the definite opinion that the current selection of in-house courses does not meet the needs of technical staff, while a few expressed concern that GAO might not provide adequate financial support for external activities of a professional development nature.

The survey responses to the questions related to training seem to communicate the following messages:

- Current in-house courses do not meet needs.
- Other methods are preferred by most of the staff.

These views seem to suggest that in the future GAO might wish to emphasize the assurance of sufficient funding for external training for technical staff rather than seeking to develop in-house courses for that group.

Quality of the GAO Work Environment

To learn of the general feelings of technical staff toward their experience at GAO as well as to better understand the reasons for those feelings, the survey inquired into the question of what is important to staff in choosing an employer and how they would assess GAO on various aspects of employment. The responses establish that, as might have been expected, the members of the technical staff want work that is challenging, in an area of interest to them, and for which they are well compensated. They rate GAO as an employer most favorably in providing

- stable employment,
- a variety of areas in which to work, and
- employment in an organization with an excellent reputation.

On the negative side, they give GAO the lowest ratings in providing

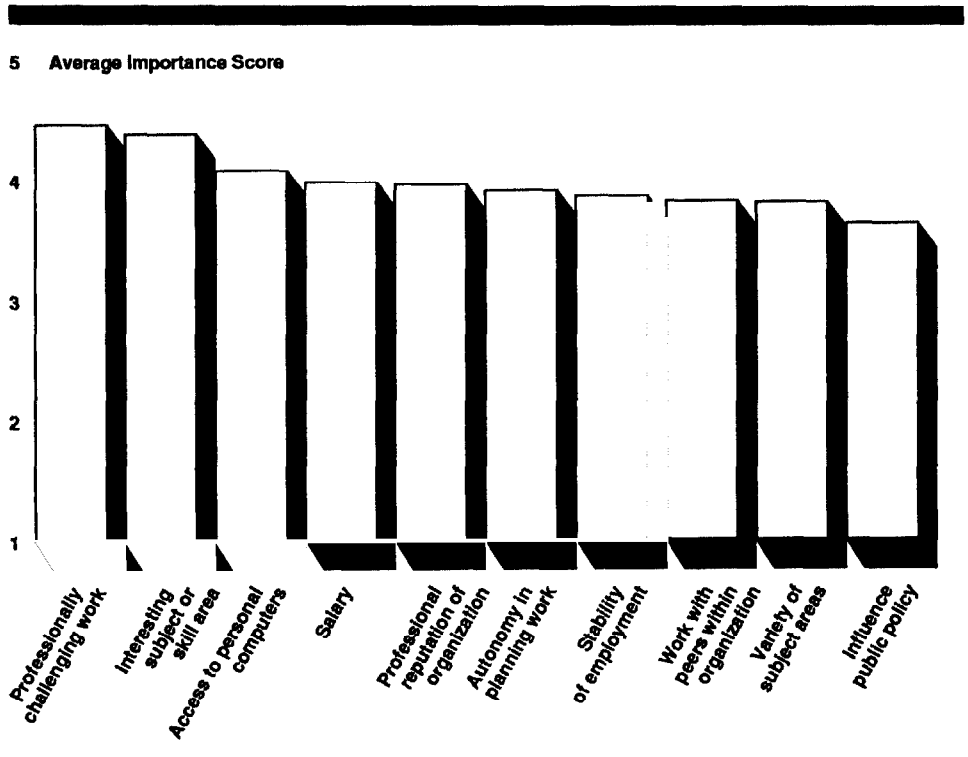
- an opportunity for advancement without going into management,
- individual authorship of products,
- an adequate level of administrative support, and
- an adequate level of research assistance support

To carry out this inquiry, we listed 28 employment-related factors and asked the survey participants to indicate, for each, how important that factor is to them in choosing a place of employment.

In general, the technical staff tended to view a large number of factors as being of considerable importance in assessing the desirability of an

organization as an employer. Of the 28 factors we listed in the questionnaire, six were considered by 70 percent or more of the respondents to be of great or very great importance, and an additional 10 were so considered by at least half of the survey participants. With so many areas being of great importance, we ranked them so as to permit a determination of the relative importance of each. We ranked the factors on the basis of their average score on a response scale of 1, for the lowest point on the scale, "of little or no importance," to 5, for the highest point, "of very great importance." Figure VI.15 shows the average importance scores of the 10 factors ranking highest in importance.

Figure VI.15: Ten Most Important Work Factors Desired in an Employer



Consistent, but with some notable differences, were the importance rankings of the factors among various subgroups of the technical staff population. For example, when comparing the "importance" rankings of technical staff providing advice and assistance with those of other technical staffmembers, we found that the rankings of the two groups were identical through the first three positions. After that, there continued to be a high degree of consistency, except for the ranking of five factors.

Of noticeably greater comparative importance to assistance staffmembers than to other members of the technical staff are:

- ease of access to a mainframe computer,
- availability of financial support for outside training, and
- the ability to advance in a career without going into management.

Ranked noticeably higher by staff performing evaluator functions than by assistance staff are:

- the ability to play a role in influencing public policy, and
- the degree to which the work is of importance outside of the organization.

There was almost the same degree of consistency on importance assessments between headquarters staff and field staff. In that comparison, we found that the two groups were in agreement on the first, second, and third most important factors, and were quite consistent on most others. Where they differed was on the relative importance accorded four factors. Considered relatively more important by headquarters staff are:

- the importance of the work outside of the organization, and
- the ability to play a role in influencing public policy.

Ranking higher in importance among field staff than among headquarters staff are:

- ease of access to a mainframe computer, and
- the opportunity to work in a variety of subject areas.

Neither of these two sets of differences in priorities among groups within the technical staff is surprising. The assistance staff is to a great degree made up of staff with computer-related specialties, especially so in the regions, and has been so since before the advent of the microcomputer. Thus, access to a mainframe computer would logically be of importance to the assistance and regional office groups.

With regard to the difference in degree of importance accorded the availability of financial support for outside training, assistance staff are considerably less well represented at the doctoral level than are those performing evaluator functions. Therefore, additional training would be expected to be an item of greater interest to them. In addition, because

such a large portion of the assistance staff specialize in fields related to computers, there would seem to be a greater need in that group than in the evaluator function group for continuing education of a classroom nature in view of the rapidly changing technology in the computer field.

By definition, regional office staff work in a variety of subject areas. Although there is some opportunity for subject matter specialization in regional offices, in general, the tradition of the subject matter generalist has always been strong there. Thus, the great degree of importance afforded the variety factor by regional staff is not surprising.

Assistance staff place a greater relative importance upon the ability to advance in their careers without going into management than do technical staffmembers performing evaluator functions. For the assistance staff, the factor is the 12th most important, while those technical staffmembers performing evaluator functions rank it only 19th in importance. Members of the latter group are presumably on the path that leads to management positions or are already managers. Thus, it can be assumed that they do not have a strong aversion to management.

Ratings of GAO

When asked to rate GAO on each of the employment-related factors listed in the questionnaire, on nine of the factors, led by "overall stability of employment" and "opportunity to work in a variety of subject areas," the agency was rated as good or very good by more than half the technical staff, while on four of the factors more than half the staff rated GAO as poor or very poor, with "ability to advance in career without going into management" the lowest rated. Figures VI.16 and VI.17 list these two sets of factors and show the average rating score (on a scale of 1 for "very poor" to 5 for "very good") for each factor.

Figure VI.16: Ten Highest Rated GAO Work Factors

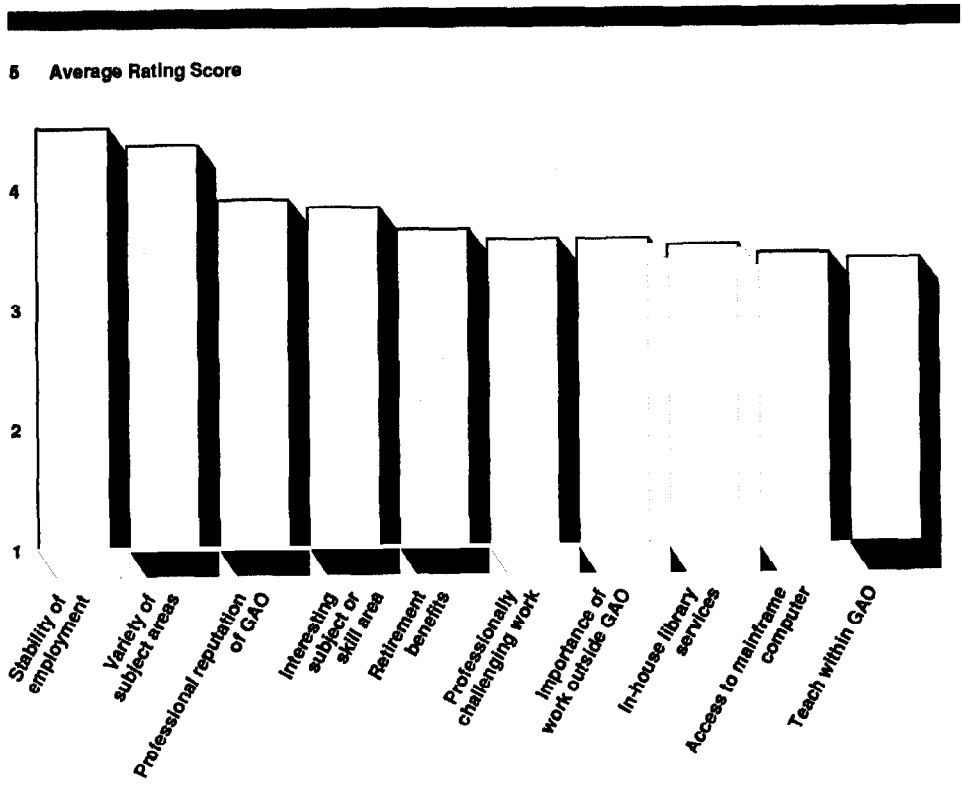
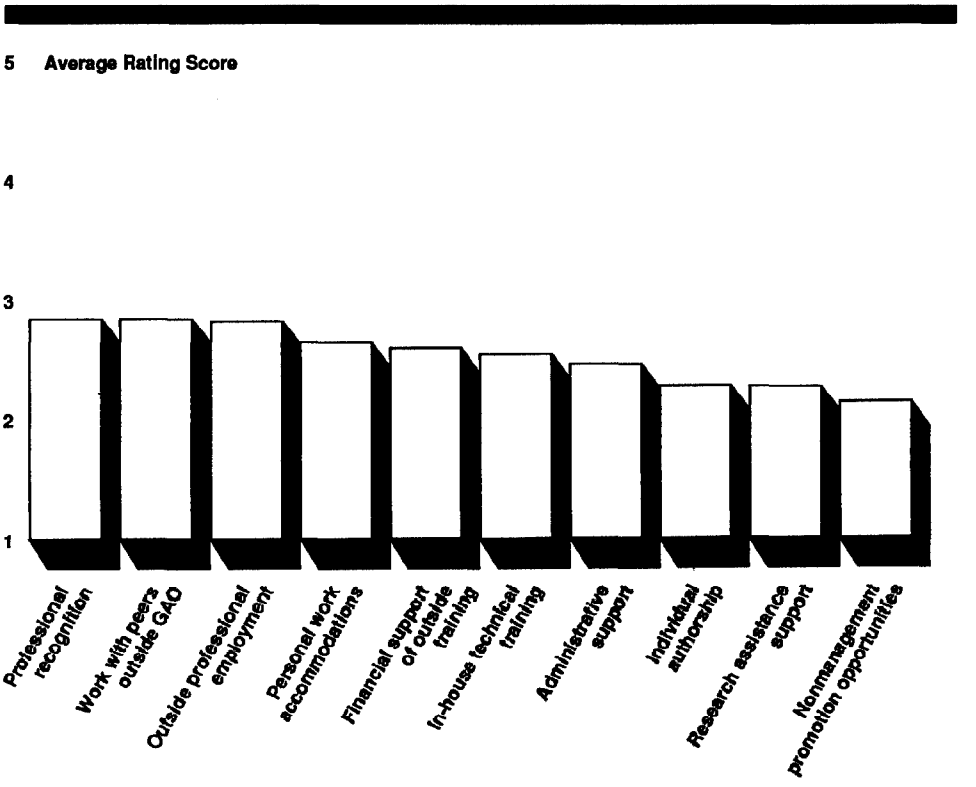


Figure VI.17: Ten Lowest Rated GAO Work Factors



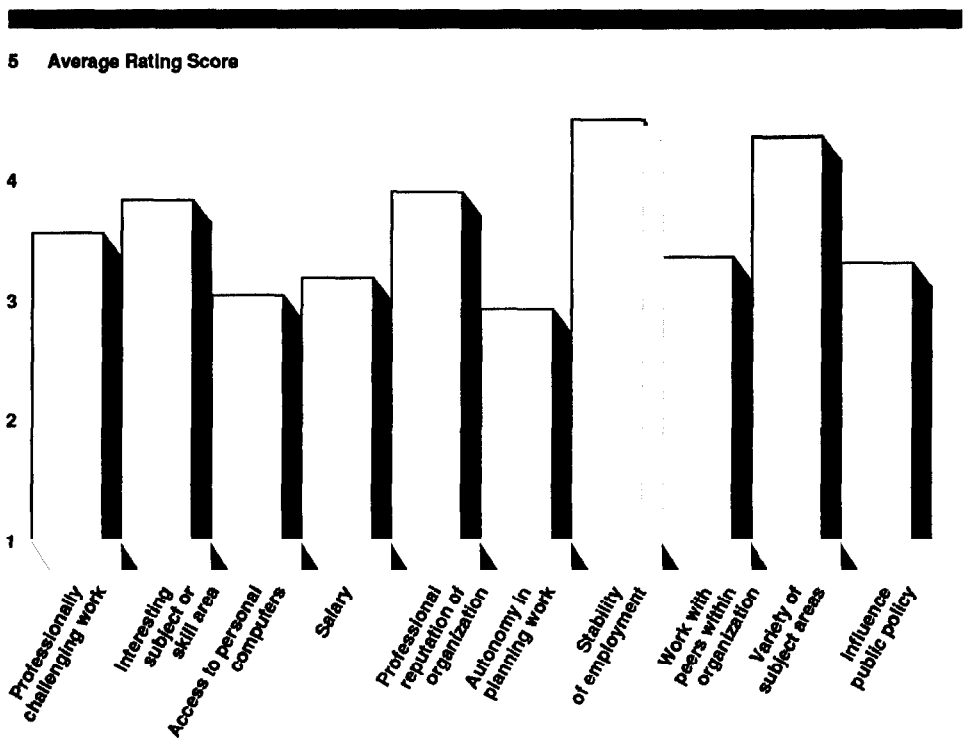
Two of the factors on which GAO was rated lowest, those concerning level of administrative support and research assistance support, were the subject of narrative comments by 18 staffmembers on their questionnaires. One suggested that there is a need for a new job series at GAO, with duties that lie somewhere between those of a secretary and those of a junior-level evaluator.

Although the agency may be rated highly on some aspects and low on others, a critical question would seem to be how well it is rated on the factors considered important by the technical staff. Looking first at the 10 factors that were viewed as the most important by the technical staff as a whole, we found that the ratings of GAO on those factors were among the more positive of all the ratings given. Eight of the top 10 in importance were in the top half in terms of the ratings given to GAO.

On the factor "degree to which the work is professionally challenging," which ranked as the most important factor, 58 percent of the technical staff rated GAO as good or very good, while only 12 percent rated it poor or very poor. In the case of the second most important factor, that

related to the work being in a skill or subject area of interest, 69 percent rated GAO as good or very good while only 7 percent rated the agency on the poor side. There were exceptions to the rule of the most important factors being among those for which GAO received its more positive ratings, however. For example, for both "access to a personal computer," and "degree of autonomy in deciding how work will be done," a third of the technical staff rated GAO poor or very poor. Figure VI.18 shows the average rating score accorded GAO on each of the 10 most important factors. The median average rating score for all 28 employment-related factors was 3.11.

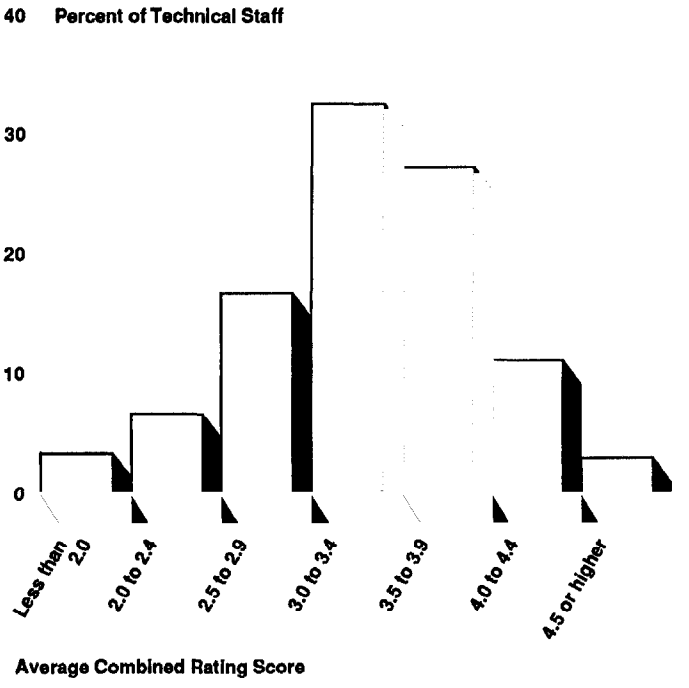
Figure VI.18: Technical Staff's Rating of GAO on Ten Most Important Work Factors



Changing our focus from the employment factors to the staffmembers, we again sought a picture of the ratings given to GAO on factors considered important. In this case we confined our analysis to those instances in which a staffmember had assessed a factor as being of great or very great importance. This time, however, we computed for each staffmember the average rating score, again on a 5-point scale, that the staffmember had given to GAO on all of the factors the staffmember considered important. That average score we viewed as an indicator,

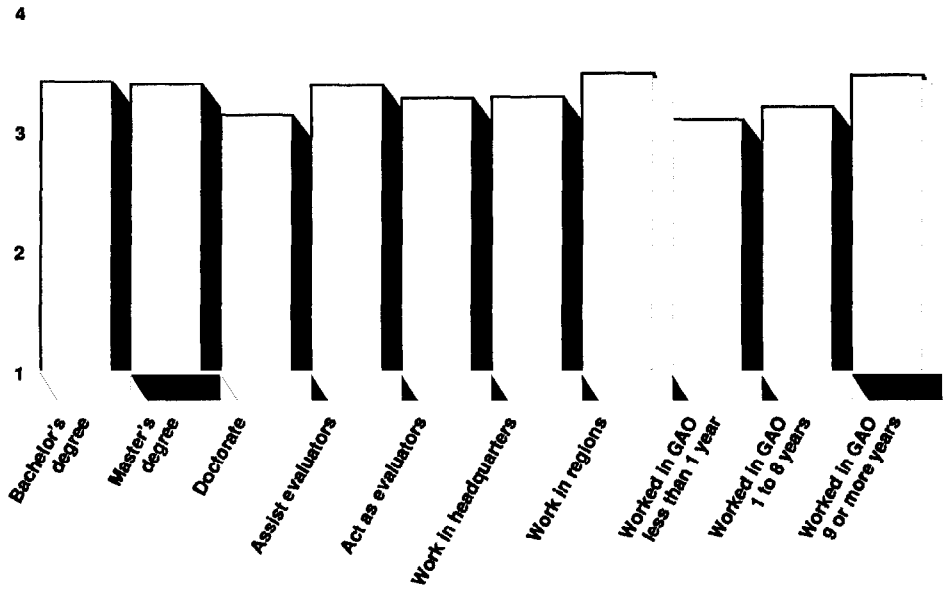
although admittedly imprecise, of the staffmember's overall view of his or her employment situation at GAO. Figure VI.19 portrays the distribution of the average rating scores among all members of the technical staff.

Figure VI.19: Distribution of Staff's Combined Ratings of GAO's Work Environment



Assistance staffmembers' scores were somewhat higher than those of staff performing evaluator functions. The mean score for assistance staff was 3.38, while that of the other group was 3.28. By a larger margin, the scores of regional staff were higher than those of staff at headquarters, with the regional average being 3.49, and that of headquarters being 3.28. More dramatic, however, is the difference we found when we compared the scores of staff with differing educational levels. The average score for those without doctorates was about 3.4, while those with doctorates had an average score of 3.13. Figure VI.20 shows the average rating scores of various groups within the technical staff population.

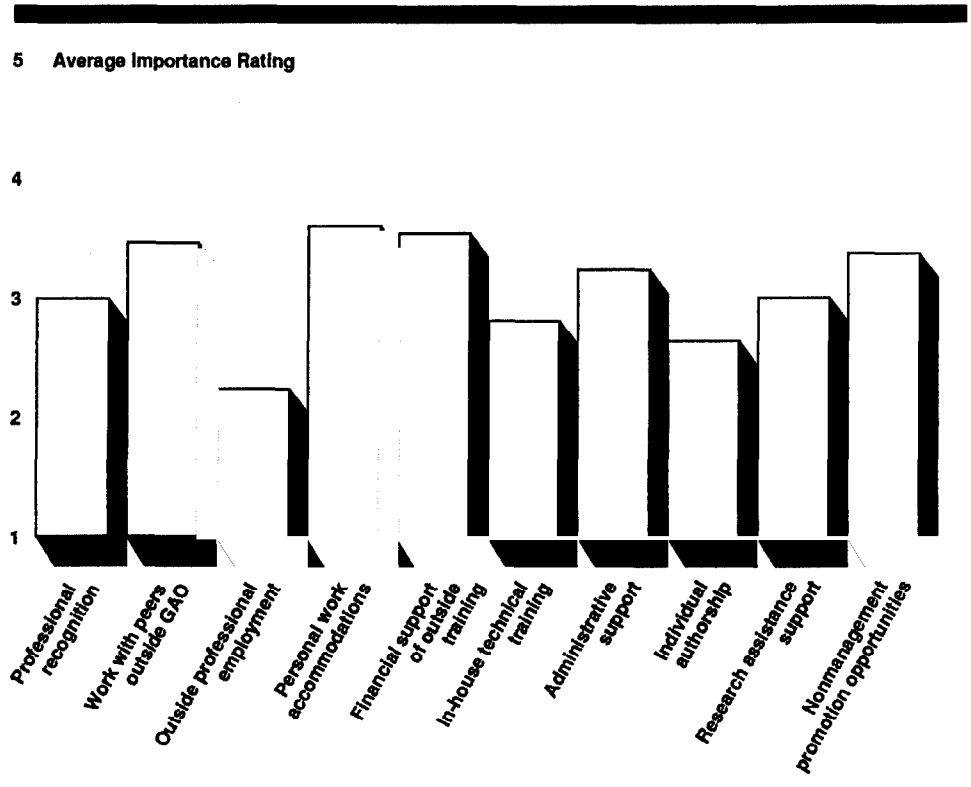
Figure VI.20: Average Combined Ratings of GAO by GAO Staff Education Level, Role, Location, and Years of Service



Consistent with the finding that on important factors the ratings of GAO tended to be among the more positive is our finding that the 10 factors on which GAO was rated the lowest tended to be among those considered of lesser importance.

Although for several of the 10 factors there was a large number of respondents who considered the factor to be of great importance, when compared with the importance assessments of the other factors, those on which GAO received the lowest ratings were not among the most important. Of the 10 lowest rated factors, only two, "adequacy of personal work accommodations," and "availability of financial support for outside training," were in the top half of the importance ratings. Each was deemed to be of great or very great importance by about 56 percent of the respondents. Figure VI.21 shows the average importance rating of each of the 10 factors on which GAO was rated the lowest by the technical staff. The median average importance rating for all 28 employment-related factors was 3.51.

Figure VI.21: Importance to Staff of 10 Lowest Rated GAO Work Factors



The results cited above seem to indicate that, in general, although in the view of members of the technical staff GAO has considerable need for improvement, the areas in which the greatest improvement is needed are not among those that are considered the most important, while the areas considered the most important, are among those in which GAO rates the highest.

General Views and Specific Problems of Technical Staffmembers

In the final section of the questionnaire, our questions concerned the overall opinions of the technical staff on various aspects of their experiences at GAO and their general views of GAO. Among the topics covered were the staffmembers' general level of satisfaction with their GAO employment, the degree to which they felt they had been given challenging work, the visibility afforded their work, whether they would recommend GAO to others, and whether they thought they would remain at GAO. At the end of the questionnaire, we invited the staffmembers to make additional comments if they wished to do so. In total, 157 members of the technical staff took advantage of that opportunity.

Staff Comments

Some staffmembers seemed hesitant to recommend GAO to others, and some appeared ambivalent about whether they would remain at GAO. A majority, however, responded favorably when asked about their satisfaction with their current employment at GAO. In their narrative comments, however, staffmembers raised a number of concerns about the agency.

Concerns most frequently expressed in narrative comments by both assistance staff and those performing evaluator functions related to a shortage of resources, such as personal computers, support staff, and training resources, and to the physical accommodations in the GAO building. On the subject of personal computers, comments were made about how difficult it is to complete work with insufficient computer resources. Typical of the comments staffmembers made was that the lack of computer equipment was "absurd" and "pathetic." Similarly, in their narrative comments relating to the physical accommodations in the headquarters building, respondents remarked that uncomfortable conditions made it difficult to be productive. One respondent, whose office is in the GAO building, wrote:

"Inadequate ventilation, excessively hot and cold temperatures, mediocre air quality and lack of natural light, in combination, significantly reduce productivity by some staff. Conditions in the building are particularly discouraging to any attempts to complete tasks outside of normal working hours ...."

Respondents indicated that the resource for which the agency has the greatest need is an adequate supply of high-quality support staff. Eighteen individuals expressed this concern and seven of those suggested that GAO develop research-assistant or junior-specialist positions to assist with technical work.

The second most frequently voiced concern in the narrative comments related to how others in the agency view technical staff. Twelve of the respondents who provide technical assistance and 17 of those performing evaluator functions indicated in their narrative comments that they felt their technical skills were not appreciated by the agency. Included in these responses was the perception on the part of some technical staff that their technical advice and suggestions about innovations in design and methodology were not accepted by evaluators or management. Three assistance staffmembers commented that they felt unnecessary stress in trying to persuade evaluators of the merits of their approach, while two regional computer specialists tied stress to the challenge of

working on several complex jobs simultaneously, and under unrealistic time constraints.

Closely related to the perception that their work was not sufficiently appreciated was a concern about possibilities for promotion. Among the 157 respondents who provided narrative comments, concerns about promotion opportunities were raised 63 times—28 times among technical staff in evaluator roles and 35 times among staff providing assistance. Twelve staffmembers in evaluator roles and 14 of those with assistance roles wrote that they felt traditional evaluators were more highly valued in the agency and more likely to be promoted. Seven technical staff with evaluator roles and 15 assistance staff suggested that GAO establish a promotion track specifically for technical staff. In total, 15 respondents (9 with evaluator roles and 6 with assistance roles) felt that GAO did not provide sufficient pay to retain technical staff.

A subject of considerable comment was pay-for-performance (PFP). Ten individuals commented on PFP and all comments were negative. All 10 indicated that it is difficult, if not impossible, to directly compare the work of evaluators with that of technical staff. One respondent suggested that GAO develop a

> "subset of BARS that recognizes the uniqueness of the professional specialist. Development of this subset requires major input from the specialists themselves. They are the only ones that are knowledgeable enough to develop a BARS that fits their unique role in GAO."

A total of 19 staffmembers indicated in their narrative comments a concern that GAO stressed the quantity of products and the speed at which those products are completed to the detriment of the quality of the products. Four staffmembers indicated that the analysis on some jobs was simplistic given the complex nature of the issue being examined.

Level of Job Satisfaction

Although the narrative comments of survey respondents indicate some concerns with GAO's resources for technical staff and opportunities for recognition and promotion, in their responses to the structured portion of the questionnaire, technical staffmembers were not so dissatisfied that they wished to change their role in GAO. We asked respondents about the conditions under which they might consider such a role change. Specifically, we asked the assistance staffmembers if they had ever applied for, and if they would now be interested in, a lateral transfer to an evaluator position, and we asked the staff in evaluator roles

the same questions regarding a position in a group that provides assistance. Neither group expressed great interest in changing from one technical role to the other.

Among technical staff with assistance functions, 85 percent reported that they have never requested a lateral transfer to an evaluator position, and slightly more than three-fourths said they are not interested in such a move at the present time. Likewise, technical staff with evaluator roles preferred to continue in that role rather than moving to the assistance area. Only 8 percent have ever applied for a lateral transfer to a technical assistance position, and about two-thirds are not interested in such a transfer now.

Next, we asked members of both the assistance and evaluator function groups if they would want to make the switch if a promotion were involved. About 39 percent of the assistance staff and 43 percent of those in evaluator roles said they would make such a switch, while 45 percent of assistance staff and 37 percent of technical staff in evaluator roles indicated that they would not. Assistance staff alone were then asked a question with longer term implications. We asked if they would want to be promoted to an SES position that required them to manage work of the evaluator staff that, at least in part, might be less technical or less methodologically rigorous than their current work. About 56 percent responded yes, about 29 percent responded no, and 15 percent were undecided.

Apart from their opinions regarding movement within the technical staff, we were interested in the behavior staffmembers had exhibited in the past regarding promotion to positions in the other functional group. About 70 percent of assistance staff reported that they had never requested to be assessed as evaluators for promotion. Among technical staff performing evaluator functions, the picture was slightly different. Eighty-six percent of headquarters staff reported that they had not applied for promotion to a technical assistance role, and no regional staff performing evaluator functions reported applying for such a position.

We also asked the staffmembers their assessment of the likelihood that they would be selected for a promotion to a position in the other functional group. Only 9 percent of the assistance staffmembers believed it likely that they would be selected for promotion to an evaluator position, and 16 percent of the technical staff performing evaluator functions believed that if the GS system were to continue (i.e., no banding) it

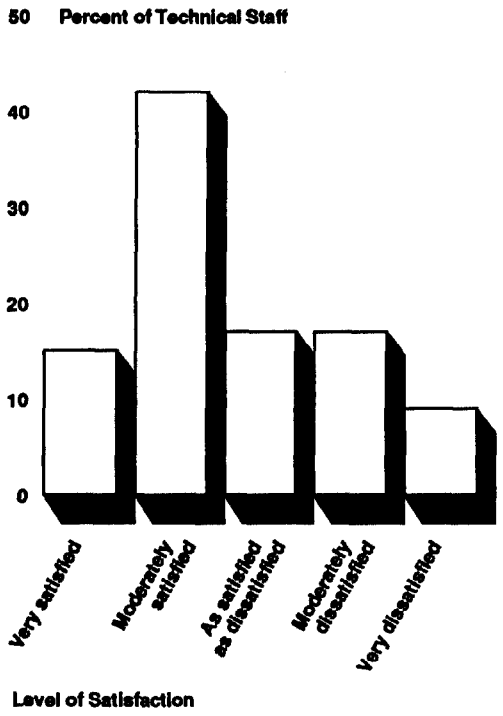
would be likely that they would be promoted to a technical assistance position if they were to apply.

Thus, the majority of technical staff in both assistance and evaluator roles reported a desire to remain in their present roles. While in the narrative comments some technical staff expressed dissatisfaction with their present jobs or with GAO, others reported positive aspects of life at GAO. One respondent wrote:

"I love GAO's mission and its employees are outstanding in their level of competence and dedication."

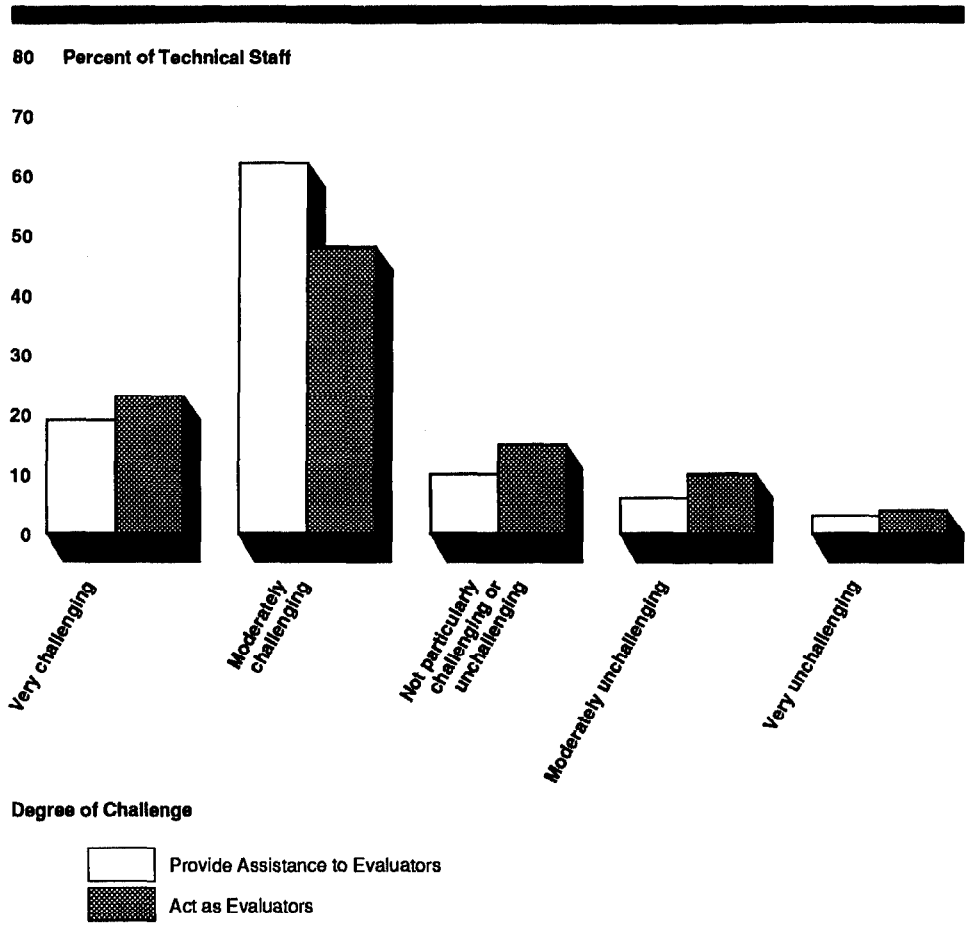
In order to summarize their general views and opinions about the agency, we asked members of the technical staff about their overall satisfaction with their current employment at GAO. As figure VI.22 shows, there was a high degree of satisfaction expressed. There were no substantial differences among any subgroups in response to this question, except within the technical assistance community. Whereas nearly two-thirds of those staffmembers providing computer related assistance or economic analysis assistance said that they were moderately or very satisfied, only about half of those providing other kinds of assistance felt that way.

Figure VI.22: Level of Satisfaction With GAO Employment



Apparently, GAO's technical staff feel adequately challenged by their work. Fifty-three percent said that their GAO work has been moderately challenging, and an additional 22 percent said that it has been very challenging. Assistance staff were somewhat more likely to report being challenged than were those performing evaluator functions, and a greater proportion of regional office staff than headquarters staff reported being challenged by their work. The full range of responses to this question is shown in figure VI.23.

Figure VI.23: Degree of Challenge Offered by GAO Work

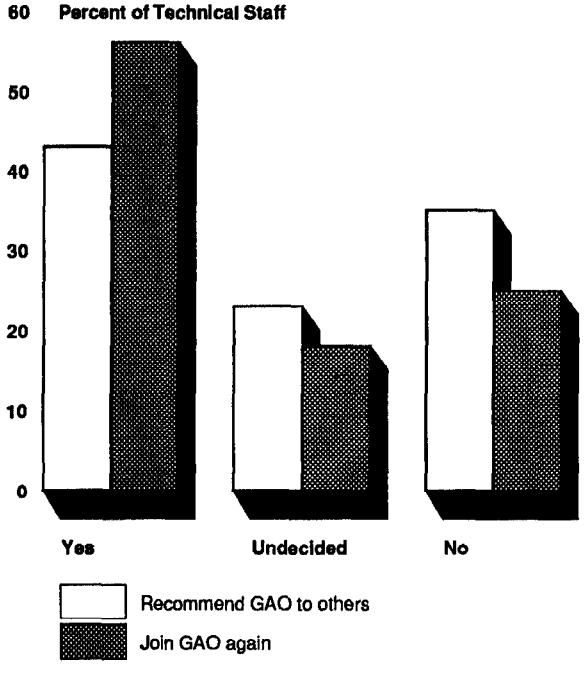


On the subject of the visibility afforded their work in GAO, 61 percent of the technical staff responded favorably, indicating that their work has received at least as much visibility as it deserved. As might have been expected, assistance staff were less positive on this point than were those serving in evaluator roles. Fifty percent of the assistance staff said that their work had been given less visibility than it deserved, while 31 percent of those performing evaluator functions felt that way.

Near the end of the survey questionnaire we confronted the members of the technical staff with two "bottom line" questions. First, we asked whether they would recommend GAO as an employer to others with skills and backgrounds similar to their own. Then we asked them whether, knowing what they know now, they would again seek employment with GAO. The staffmembers were somewhat more disposed to again join GAO

themselves than to recommend it to others. Overall, 56 percent said that they would "do it again," while 43 percent would recommend that someone else do it. There were no appreciable differences in the responses to these questions between assistance staff and those performing evaluator functions. The response patterns on these two questions are shown in figure VI.24.

Figure VI.24: Staff Opinion on Recommending GAO to Others and Rejoining GAO



As a final indicator of the extent to which technical staff feel comfortable in the GAO environment, we asked for their assessment of the likelihood they would actively seek employment elsewhere within the next 2 years. About 39 percent thought it likely or very likely that they would do so, while about 35 percent thought it unlikely or very unlikely. The remaining 26 percent thought that there was about a 50-percent chance that they would do so. By a margin of 43 percent to 32 percent, technical staffmembers performing evaluator functions were more inclined than were assistance staff to think it likely that they will look elsewhere. A much larger proportion of assistance people in headquarters, 41 percent, than in the field, 21 percent, said that they would be likely to seek other employment. Part of this difference in reported likelihood of looking elsewhere might be attributable to differences in age and stage in career

between the majority of assistance staff and the majority of those performing evaluator functions.

Survey of Mid-Level Managers and Focus Groups of Senior Managers

I. Survey of Mid-Level Managers

A subgroup of the task force was formed to examine the attitudes and experiences of GAO managers concerning technical staff. Two approaches were used with two different groups of managers. In the first approach, GAO managers responded to mail questionnaires. (The second approach is described in section II of this appendix.) In particular, GAO managers' opinions were sought on the issues of recruitment, training, integration, communication, and retention of technical staff.

Methodology

In order to look at GAO management attitudes toward technical staff, a survey was conducted of the group of GAO managers most involved in work on GAO jobs. This group was defined to include directors of issue areas, associate directors, assistant directors, assistant regional managers, and managers of regional technical assistance groups (TAGS). These managers were designated by their units as supervisors of staff who work on GAO jobs in the seven program divisions, the 15 regions, and the Office of the Chief Economist. Only the assistant director-in-charge was included for technical assistance units at GAO headquarters. In this report, we refer to this group as GAO managers or, simply, managers.

To obtain the views of these GAO managers, a survey was developed and mailed to 375 managers who met the definition above. The survey instrument was designed to obtain the opinions of four types of managers: (1) those who supervise only technical staff (according to the task force definition of technical staff), (2) those who supervise both technical and nontechnical professional staff, 3) those who do not supervise technical staff but do work regularly with technical assistance staff, and 4) those who do not work regularly with or supervise technical staff. The GAO manager survey was conducted between May 26 and July 10, 1989. Out of the 375 questionnaires mailed, 335 were used in the analysis for a response rate of 89 percent.

Recruiting and First-Year Experiences

We asked GAO managers to indicate which practices are most important to follow when hiring technical staff. Over 80 percent of the managers indicate that explaining how GAO works to the candidate is very important. A majority of managers also agree that it is very important to base hiring decisions on the likelihood of adjusting to a team oriented environment (63 percent), as well as considering the candidate's oral (55 percent) and written communications skills (54 percent).

Having the immediate supervisor interview the prospective employee may be critical when hiring so that technical employees will not be disappointed with the subject area or skills required to perform the job. A majority (62 percent) of those who manage only technical staff agree that this is a very important hiring practice. Only 44 percent of all managers hold this opinion, however.

Those managers who have had experience in actually trying to replace technical staff report mixed success. A third of these managers indicate that they are only partially or not very successful in locating and hiring qualified staff to replace those who left. Another 31 percent state they are only moderately successful, and the remaining 36 percent feel they are very or extremely successful.

GAO managers specify three areas in which technical staff in their first year at GAO have more difficulty than nontechnical staff in adjusting to GAO. These areas are: adapting to the GAO way of doing work (71 percent), adjusting to the degree to which GAO work is reviewed (69 percent), and disappointment with the degree of recognition accorded to their work products (64 percent). Managers feel that technical and nontechnical staff are similar in their need for supervision, their need for orientation training, and their disappointment with the amount of routine tasks assigned.

Three-quarters of the managers of technical staff report that their staff are generally or very satisfied with the degree to which their work assignments match the expectations they had when hired. In addition, about half of these managers believe their staff are generally or very satisfied with the degree to which they can display their technical proficiency in their first year at GAO. Another third say that, overall, their staff are both satisfied and dissatisfied. Those who manage only technical staff are somewhat more likely to see their staff as generally or very satisfied in this area (61 percent), with another 25 percent feeling their staff are both satisfied and dissatisfied. Just under half the managers of both technical and nontechnical staff report that their staff are generally or very satisfied (47 percent), with another third reporting they are both satisfied and dissatisfied.

Training

We asked all GAO managers about the need for external training to advance the skills of technical staff and the need for expanding external training. Those who manage technical staff were also asked about the

need for more GAO courses for their staff and whether GAO should provide funding to attend conferences.

Three-fourths of all GAO managers believe that technical staff need more external training than nontechnical staff to advance their skills. Ninety-two percent of those who manage only technical staff believe that more external training is required for their technical staff. Both types of GAO managers with technical staff believe that training funds should be provided for technical staff to attend conferences (94 percent). Of those who have an opinion on how frequent this type of training should be, 84 percent state that such training should be provided at least once a year.

It is easy to say that more money should be spent on external training if the issue of limited resources is not raised. Therefore, we asked managers to consider expanding training opportunities for (1) technical line and (2) technical assistance staff even if equal resources could not be provided to the nontechnical staff as well. These two questions were asked of the managers who either manage or work with technical staff on a regular basis. Overall, these managers feel that training opportunities should be expanded for technical staff even if fewer resources are provided for the nontechnical staff. The managers favor devoting scarce resources to the technical assistance staff (59 percent) over the technical line staff (49 percent). But this differs depending on the type of manager. Most of those who manage only technical staff believe that more resources should be devoted to expanding training for technical assistance staff (89 percent). Comparable numbers are 56 percent for those who manage both technical and nontechnical staff and 51 percent for those who work regularly with technical assistance staff.

GAO managers strongly believe that orientation training is necessary for technical staff. Further, most managers also believe that both technical staff and nontechnical staff need such training.

GAO managers as a whole do not see a need for additional GAO courses for technical staff when asked about five technical areas. Those who manage only technical staff, however, do show a strong preference for additional courses in statistics (83 percent) and research design (74 percent).

Integration and Communication

One section of the survey examined the integration of GAO technical staff into the agency and the quality of the communication between technical and nontechnical staff. All managers were asked about ways

to promote communications between these two groups. They were also asked about the ways that technical and nontechnical staff might differ. Those who work regularly with technical staff were asked about the types of technical issues that must be resolved.

GAO managers believe that the technical staff have made contributions to the work of GAO as a whole. Fifty-seven percent of the managers believe this has been a great or very great contribution to GAO's work. Those who manage technical staff are more likely to rate the contributions of technical staff highly. Three quarters of the managers of technical staff see great or very great contributions compared to less than half (46 percent) of the managers who have no technical staff.

Among those managers who have used technical assistance staff on their jobs, 58 percent rate their contributions as great or very great. Managers of both technical and nontechnical staff are the most positive about the contributions of technical staff to jobs under their supervision (71 percent rate the contributions as great or very great).

Managers who use technical assistance were asked about the types of assistance that are used on their jobs. The most frequently used types of assistance are for sample design (86 percent) and for questionnaire design (86 percent). Other types of assistance used by three quarters or more of the managers include research design and methodology, statistics, and analysis of survey data. Two-thirds of the managers had used economics assistance. Assistance for engineering and actuarial techniques have been used by less than a third of the managers.

Among managers who supervise both technical and nontechnical staff, three-quarters rate the contributions of their technical line staff as great or very great.

GAO managers were asked how frequently they personally become involved in resolving disputes over technical issues. Depending upon the type of technical issue, only 15 to 23 percent of the managers report that they often or very often spend time resolving such differences of opinion. The three most frequently cited issues are adequacy of evidence to support a proposed finding (23 percent), placement of technical work in the report (22 percent), and presentation of technical work in the report (21 percent). Just under one third of the managers who have used technical assistance on a regular basis report that they have consulted with experts outside of GAO on issues raised by the technical

assistance staff. Managers of technical staff report that they are generally satisfied or very satisfied (75 percent) with the way in which their staff's work is used in the final product.

GAO managers were asked about ways in which communications between the technical and nontechnical staff could be enhanced. From a list of five ways to promote communications, three methods are favored by a large majority of managers. Three-quarters of the managers would like to see courses specifically for technical staff on GAO policies and practices. About two-thirds favor technical courses for nontechnical staff and short-term rotations of technical staff to nontechnical positions. (It should be noted that the rotation of technical staff is not favored by a majority of those who manage only technical staff. Instead, they favor short-term rotations of the evaluators through specialist groups.)

With regard to written communications, most managers believe that technical staff are less capable than nontechnical staff. However, about two-thirds of GAO managers feel that technical staff do not differ from nontechnical staff in their ability to work well with other people and to communicate well orally.

Managing Technical Staff

We asked GAO managers about three specific aspects of managing technical staff. These included staffing, use of BARS for technical staff, and differences in supervising technical and nontechnical line staff.

GAO managers were asked about the skill mix of their current staff and the number of staff they supervise. Just over half of those who manage technical staff (54 percent) are satisfied with the skill mix in their unit. A larger number, however, say they do not have enough technical staff for the group's current needs (64 percent).

When asked about the appropriateness of the BARS rating system, more than half (56 percent) of the managers who have had experience with preparing or reviewing performance appraisals for technical staff believe that the system is not very appropriate for technical assistance staff. Among those who manage both technical and nontechnical staff, 53 percent feel that BARS is "moderately" or "very" appropriate for technical staff and 47 percent feel that it is "somewhat" or "not very" appropriate.

Managers who supervise both technical and nontechnical line staff must attend to the needs of two types of staff. One strategy for this is to treat

technical staff the same as nontechnical staff in terms of task assignments. Therefore, we asked these managers how much difference, if any, they saw between the technical and nontechnical staff under their supervision in assigning staff to tasks. The largest number (44 percent) see great or very great differences between their technical and nontechnical staff. A third (35 percent) see moderate differences, and a fifth (21 percent) see little or no difference.

Retention

This section of the survey addressed the reasons why technical staff have left GAO and the priorities that managers feel should be given to various strategies for trying to retain such staff.

When asked why technical staff under their supervision actually left, GAO managers most often cite (major or minor reason) higher salaries (81 percent) and a desire for a better match of assignments to skills or subject areas of interest (71 percent). The next most frequently cited reasons are: better acceptance of the technical role by management (66 percent), career rewards for technical tasks as opposed to managerial tasks (64 percent), more computers and equipment (64 percent), more recognition for a job well done (62 percent), and more influence over assignments (59 percent).

All of the GAO managers were asked about the priorities that should be placed on various factors that might influence technical staff in their decision to leave (see table VII.1). The three items given the highest priority (high or very high) by managers are: giving more recognition for a job well done (62 percent), career rewards for technical tasks as opposed to managerial tasks (65 percent), and more computers and equipment (66 percent). In addition, 50 percent of the managers say a high or very high priority should be placed on better matching of skills or subject areas of interest to staff and on better acceptance of a technical role by management. There are some differences between those managers who have lost technical staff and other managers. Managers who have actually lost technical staff are more likely than other managers to feel that salary should be a high priority (56 percent) and are slightly less concerned about skills match (46 percent).

Table VII.1: Reasons for Staff Leaving and Retention Strategy Priorities

Reasons	Major/minor reason (%)	Priority (% high or very high)	
		All managers	Managers who had staff leave[a]
Higher salary	81	43	56
Better skills match	71	50	46
Acceptance of technical role	66	50	57
Career rewards	64	65	73
Computers/equipment	64	66	72
More job recognition	62	62	56
More assignment influence	59	18	36

[a]This includes both managers of technical staff only and those who manage both technical and nontechnical staff.

GAO managers favor improving technical resources such as textbooks, journals, and special computer software for GAO's technical staff. They support these additional resources even if fewer resources are added for nontechnical staff. Percentages range from 71 to 92 percent for technical assistance staff and 61 to 77 percent for technical line staff.

GAO managers were asked for their opinions on three methods of enhancing the careers of technical staff. Only 24 percent of the managers think that technical staff should receive faster promotions in order to retain talented staff. Fifty-seven percent of all managers say that the top of the career ladder for technical staff should be the Band II level or higher. Finally, when asked about nonmanagerial Band III positions for technical staff, 66 percent of all managers support the concept.

One option for aiding the retention of technical staff is to give them promotions to managerial line positions. When asked about the suitability of technical line staff to be promoted to managerial line positions, GAO managers are divided in their sentiments. About 40 percent feel that technical and nontechnical line staff are equally suited to be promoted to such positions. However, a similar number feel that nontechnical staff are somewhat more or much more suitable for these promotions.

However, attitudes toward the promotion of technical assistance staff to managerial line positions are very negative. Almost three-quarters of all managers feel that nontechnical staff are more suitable than technical assistance staff for such promotions.

II. Focus Groups of Senior Managers

The second component of this study again examines the recruitment, management, training, and utilization of the technical staff at GAO, but this time from the perspective of the agency's senior management and based on a focus group technique rather than a mail survey.

Methodology

To study this issue, five groups of senior managers were interviewed using the focus group technique. The managers included in this study are Resource Managers, Directors of Planning and Reporting, Directors of Operations, Regional Managers and Assistant Comptrollers General (unit heads only). Six focus groups (two for the Regional Managers) were conducted between April 7th and April 28th, 1989. Overall, 38 managers took part in these six groups.

The focus group technique was selected as the method for this segment of the study because of a desire to ascertain the managers' perspectives and attitudes in qualitative rather than in quantitative terms. While this technique has some methodological limitations—for example, findings for each group cannot be generalized beyond that group—we chose it because it encourages discussion and candor among managers in the individual groups, and because it provides rich, in-depth detail which we could use to illuminate the quantitative survey results. The information below discusses the results of all six focus groups.

Differences Among Divisions

Throughout many of the group discussions, the difference between the technical and operating divisions was brought up as a point of discussion. Some participants believed that PEMD and IMTEC have had very different experiences from the rest of the divisions, especially with regard to technical staff. As one manager said:

"I think you've got two groups here. You've got the technical divisions and the non-technical divisions. And our issues are quite different. There's probably more differences between our unit and PEMD than there is between specialists and generalists in our division."

Definition of Technical Staff

Most of the 38 senior managers felt that those who are currently doing technical work, generally in an assistance capacity, are the only staff who can be readily identified as technical staff. Those staff operating as evaluators "on the line" should not be considered technical staff, they said, even if they have had technical training or if they have come from a technical position or division. In other words, these senior managers

seemed most comfortable with a very narrow definition of technical staff relying on "how the staff are used" (i.e., the type of work the staff do or are willing to do, rather than on training or past work experience). In the words of one senior manager:

"If they are on line as an evaluator, that's what they are, and background may or may not be that important in terms of the assignment they're going to be on. I was very comfortable with [technical staff including] people in the TAGs and the DMTAGs—[those] that are actually off line performing off line functions in terms of how we assign their work."

Many senior managers noted that GAO as a whole is becoming a more technically oriented organization and that technical distinctions among the evaluators are sometimes difficult to make. They felt that the current cadre of evaluators is becoming more technically proficient and that new evaluator staff arrive with more technical credentials than they have had in the past. In some cases, they said, evaluators are getting technical experience and training because of rotations into the TAGs and DMTAGs. Many senior managers perceived that when the technical staff move into line positions they quickly become integrated, lose their specialized skills and "aura," become just like any other evaluator, and do not retain a unique "way of looking at things" that sets them apart from other staff:

"With people coming from so many different backgrounds and disciplines and experiences, just the fact that [a person has] been in a DMTAG [isn't] the most significant factor [in having a unique, technical perspective]."

Senior managers from PEMD and IMTEC saw the definition of technical staff differently, however, considering virtually all of their non-administrative line staff as technical, based on their background, training, and experience.[1]

Managing Technical Staff

Many senior managers felt that technical staff are more likely than non-technical staff to have some difficulty adjusting to "the GAO way of doing things." They said the technical staff perceive that a review of their work indicates a "competency problem" and they feel "disempowered," rather than just accepting that GAO reviews all of its documents with a particular level of detail. Some senior managers also noted

[1]The Assistant Comptroller General for Program Evaluation and Methodology, while present at one of the focus groups, was requested by the moderator not to join in the discussion because of her position as chair of the Interdisciplinary Task Force. Her views, therefore, are not incorporated or represented in this discussion of the focus group findings.

differences in attitudes about work between technical and nontechnical staff which one of them characterized as follows:

"[Technical staff say] I'm not going to do a J-1. I just want to do my work. I don't want to do vouchers. I don't want to do any of that kind of stuff. Whereas the generalist has done all those things recognizing it's not the greatest thing to do but you've got to follow the procedures."

Technical staff were also perceived by many senior managers as having trouble with the elaborate GAO review and referencing procedures and to reject a "detailed facts and figures, word-for-word kind of referencing" in favor of peer review. As one senior manager expressed it:

"GAO is so concerned about accuracy, credibility, support and evidence that we go through a very, very elaborate report review and processing situation. People who have done writing on the outside, who pretty much expect to have what they say accepted and published and everybody agree with it, can be in for a rude awakening when it comes to putting the product through the GAO review process."

Technical staff were viewed by many senior managers as being most comfortable operating within an academic model in which they are "in control," have "hands-on experience," and are the managers. In contrast, at GAO they are required to assist, be managed, give advice, and "analyze what someone else is doing." In addition, they were viewed by some senior managers as having difficulty adjusting to writing for a lay audience rather than for an academic or professional audience. They were also perceived by some to "get wrapped up in the technique probably more so than with the objective of the assignment."

Many senior managers believed that certain aspects of the screening and recruitment of technical staff should be slightly different than for nontechnical staff, and that it is important to screen not only for technical skills but for adaptability to the GAO culture, flexibility, communication skills, and interpersonal skills. Interpersonal and communication skills were perceived to be particularly important because the technical staff interact with so many evaluators and have an impact on so many different jobs. Furthermore, to minimize some of the problems discussed above some senior managers felt that they should go out of their way "to be very up-front" about the special role that a GAO technical staff person plays and the need for him or her to adapt to GAO's procedures. In the words of one senior manager:

"When folks go into [a technical assistance unit] the frequency [of dealing with other people] probably heightens the need for interpersonal skills along with the technical

skills, and they don't get to use those technical skills if they aren't very keen in terms of [interpersonal skills]."

Finally, many senior managers believed that technical staff want to work only in their area of specialization. However, because of the varied demands of GAO jobs, they pointed out that it is not always possible to provide a satisfactory match between the staff person's skills and the content area of the job. As discussed earlier, the senior managers felt that to avoid serious dissatisfaction among the staff it is very important to alert prospective technical staff to these requirements. In addition, one senior manager commented that a management issue is created by the fact that managers try, to the extent possible, to honor technical staffs' requests for working in a particular specialty area:

"We can't always give those people exactly the neat kinds of experience exactly in the areas in which they're interested [and] which they thought they were going to get when they came in. Some of their work is very satisfying to them and other times they are not as happy and it's always that battle to use them the best you can but to fight fires at the same time."

Training

Many senior managers noted that the training needs of technical staff are different from those of nontechnical staff. That is, they thought that the majority of training needed by technical staff is available only outside of GAO at conferences, in college courses, and at professional meetings. Technical staff were generally perceived to need the basic procedural training available from the GAO orientation courses, and some senior managers believed that technical staff can benefit from managerial courses as well, but felt that these courses do not need to be as extensive or as detailed as they would be for nontechnical staff. As one senior manager noted:

"There are some commonalities. Training about the way GAO does its work in terms of procedures and so forth, everyone needs that sort of thing. But I think most technical people feel that in terms of the in-house courses, there isn't much there for them. They have to go outside to improve the level of their skills."

Many senior managers perceived that technical fields are changing more rapidly than nontechnical fields and require that technical staff get frequent skill training to keep them "on the cutting edge" and to maintain their "state of the art" skills. Some senior managers found this important as they think of their technical staff as an "investment" that would have to be replaced if the staff person were to leave or if their skills were to become "dated."

Some senior managers pointed out that training for technical staff is considerably more expensive than that required for nontechnical staff. Because their training is often at a fairly high level, that makes it a "big ticket item," and managers indicated that technical staff may have to "trade off" in terms of who gets training in any given year. In addition, the senior managers felt pressed to provide the needed training for technical staff without neglecting the needs of the nontechnical staff, who make up the majority of GAO's professional employees. As one of them put it:

"If you're going to support somebody to take a semester course at college, that's a large hunk of your training money."

The technical staff were perceived by most senior managers to be very attentive to their own professional development needs. They saw this interest manifesting itself in an adeptness at identifying training opportunities, a "tendency to fight their way through the system to get a bigger share of the budget," a willingness to contribute funds for their own training, an eagerness to be active in their professional communities, and a concern about keeping "current" in their technical field so as not to embarrass themselves among their peers. As one senior manager said:

"When microtechnology became available, they went at that with a zeal and enthusiasm that you don't find as some new operational auditing technique becomes available for evaluators."

There was some disagreement among the senior managers regarding whether GAO is meeting the training needs of the technical staff. Some managers believed that GAO is doing a good job of accommodating to the technical staffs' external training needs. Others, however, believed that even though the technical staff may get more training than the nontechnical staff, "it is still probably not adequate for people of their caliber and their background." One manager noted that "there is a general feeling of deprivation among all our staff in terms of getting issue area or subject matter training." Many managers lamented their "little training budgets" that prevent them from providing training to all the staff who request it. As one senior manager stated:

"I don't think that we're funding enough. I think about our DMTAGers and I know I have heard many of them say that they would like to take courses on this or that or some new technique, but we can't afford to send them all and many times we can't afford to send one."

Integration and Communication

Senior managers believed generally that there are currently no major communication or integration problems between the technical staff and other groups within the GAO organization. Furthermore, senior managers emphasized that issues of communication or integration most often arise because of individual problems that do not exist for the technical staff any differently or more frequently than for the nontechnical staff. There was some discussion of difficulties in the past, but there was general agreement that respect for the technical groups has developed over time and that "the working relationships" between technical and nontechnical staff currently "are very, very good." In the words of one senior manager:

> "[The technical staff] understand that their responsibility is to work with the issue area directors and associate directors and the staffs and try to work in a cooperative way to make the staffs understand what they are there for and how they work. I feel like the team part has come together very well."

Many senior managers indicated that when communication problems did occur they were just as likely to be between functional and service staff or between technical staff who have adapted to the GAO way and those who have not, as between technical and nontechnical staff. The senior managers have not generally been directly involved in these communication issues. They have had some contact when methodological or job issues were raised to their level for discussion, in which case these managers saw their role as "facilitating a lot of discussion" until "both sides understand each other's position fully."

Many senior managers did comment that in the early days of introducing the DMTAGS and using more technical staff, there were two areas of communication that required some sensitive and diligent work. First, there "was some rough going for a few years" in promoting the services of the technical assistance units. Second, there were disputes about how to do a job between the technical "purists" and those who were pressured to meet the timing demands of the job. There was a perception that some jobs were "over-designed," in which the technical staff designed a "Cadillac" when all they needed was a "Chevy." Alternatively, there were cases where the "audit staff could not appreciate the methodological need to proceed in [a particular] fashion when there appears to be a much straighter line to get from here to there [that is] much less resource intensive." Three senior managers spoke to these issues as follows:

"The technician gets caught up in the process, in wanting to do more for the sake of purity of the science, whereas the evaluator has recognized that the job has got to get out the door in 12 months or so and somewhere we've got to cut corners in terms of methodology."

"You wind up with over-designed jobs. The statistician didn't realize that he could cut corners on this one and the generalist didn't know enough to tell the statistician to cut it off. So, that's been an integration problem due to inexperience on both sides."

"What became readily apparent was that the specialist needed training in relating to people and communicating and interacting skills. What the evaluator needed was a basic appreciation for technical areas—being able to relate on technical issues at least an inch deep with these folks. And then trusting them to go the mile deep in an inch wide area."

The senior managers discussed many approaches and activities that they believe have contributed to the technical staff being "well respected and appreciated." When the DMTAGs were first organized, some divisions made a decision to indirectly promote the use of the DMTAGs because they believed that a smooth, working relationship is "something that you can't force." They carefully structured a few early jobs in which the DMTAGs were used and the results were highly successful. Then they made sure that the success was well-known to everyone in the division. Other divisions have taken a more direct approach to ensuring the use of the DMTAGs by focusing on the need for sound methodologies and "framing the issues right at the outset of the job." They then insist that all jobs go through the DMTAGs by routing all job-start paperwork through the DMTAG and including a DMTAG representative in the one-third and report conferences.

To foster communication between technical and nontechnical staff, some technical staff have been rotated to line positions. Some senior managers felt that this experience gives technical assistance staff exposure to the audit cycle and to the individual evaluators they will be working with. Others encouraged "marketing" of the technical staffs' skills. Here the staff engage in outreach activities in which they visit the audit sites to explain the services of the technical staff or they are assigned as advisors to several evaluator staff with whom they are supposed to periodically check. Finally, some regions and divisions have eliminated the technical assistance units altogether to encourage a better "synthesis" of the complementary technical and evaluator skills. One manager explained:

"We have required [them] to get some on-the-job audit experience or an evaluator experience so that they can understand what the whole audit process is and understand the frustrations that the evaluators live through."

Senior managers in the regions mentioned a few other activities that they perceived to be useful in forging and solidifying relationships between technical and nontechnical staff. They were the technical conferences, the TAG annual report, user group meetings, and using technical staff to train auditors in technical issue areas.

Recruiting

The senior managers generally believed that recruiting technical staff is not a problem. They felt that the only exceptions were in the computer field, where GAO salaries are too low, and in some regions where salary is a problem for technical and nontechnical staff alike.

A few senior managers indicated that while they have plenty of applicants for their technical positions, they must carefully screen for staff who have an appropriate mix of technical and interpersonal skills. They noted that without good interpersonal skills there will be little opportunity for a technical staffmember to accomplish anything, even with superior technical skills. Furthermore, some senior managers indicated that they must also carefully screen applicants for a willingness to advise or assist rather than having "hands-on experience."

Retention

Senior managers were of the opinion that retention of technical staff presented the same issues as for nontechnical staff. Some even said they thought retention rates for technical staff were higher than for nontechnical staff.[2] As one manager expressed it:

"I think what you are hearing us say is that there's not much distinction in terms of people leaving in terms of technical or generalists."

When technical staff do leave, GAO's senior managers believed that it was generally for a higher salary, especially in the computer field, or because their specialized skills were not being used as they had anticipated.

[2]Attrition rates for technical assistance staff are now running at about 15 percent annually, while those for nontechnical staff (i.e., line evaluators) are around 6 percent (GAO 1988 Annual Report of Key Performance Indicators, November 1988).

The general perception among senior managers was that "there are plenty of promotions" for technical people. Some felt that technical staff may be promoted faster than nontechnical staff because there is less competition for the positions and the divisions must operate on a "rank-in-person" principle. One senior manager said this situation has led to some "acrimonious" comments from the evaluators, noting that:

"We're promoting [the specialists] like crazy. As a matter of fact, I think we're promoting them too quickly."

Many senior managers stated that the uppermost levels of the career ladder should be reserved for staff who are managers. However, "by exception" or "on a case by case" basis, there are opportunities for highly qualified technical staff to advance to the GS-15 (Band III) level and even to the SES pool without supervisory responsibilities. As one senior manager commented, "there is nothing on the books that keeps you from [promoting them]." In some of these cases, though, the senior managers felt compelled to justify the promotion by including management responsibilities even when they were not real. Two senior managers commented:

"A viable alternative that I see is a willingness to promote people to the Band III level as specialists, as opposed to having to be assistant directors running audit sites."

"I think you will always see the exception. There will always be some cases, but I think generally speaking, we're going to expect people in the SES to have broader skills, managerial skills."

Some senior managers stated that, within GAO, it is difficult to reward exceptional technical staff with higher level promotions. Technical staff were perceived to "peak out" and either be forced to move to the evaluator ranks or to leave GAO to advance. The majority of the senior managers, however, believed that this situation is as it should be. In one manager's words:

"You've got to decide what you want to do in life. If you want to be responsible for the kinds of things that [a group director] would be responsible for, manage people, put the report together, deal with the Hill, if you want to do that then you should move over and that is the route to the top in this organization. But if you want to spend your whole time [doing technical work] and thinking of yourself as somebody who is sort of here at GAO but he could be in an academic institution, then you are only going to go so far in this organization because we don't pay off for that sort of thing at higher levels."

Comparison of Technical Staff and GAO Manager Surveys

Interdisciplinary management at GAO is strongly influenced by the extent to which managers and technical staff have similar perceptions of their relationship with each other and of the role technical staff can and should play at the agency. The two surveys of technical staff and GAO mid-level managers[1] carried out by the task force provide a basis for making that comparison (see appendixes VI and VII). Information gained through related activities of the task force, most notably the interviews with former staff and the focus groups with GAO's upper management, has not been incorporated into this appendix because those activities used very different methods to collect their data and analyze them. Chapter 4 juxtaposes their findings with those obtained from the two surveys examined here.

Since even the two surveys generally ask related but not identical questions, some care and caution is needed in drawing inferences from these comparisons. However, an analysis across a broad range of questions reveals fairly clear patterns of agreement in some areas, and divergence in others between GAO's technical staff and its managers. The main topics addressed in this analysis are (1) the selection and orientation of staff new to GAO; (2) quality control with respect to both GAO's policies/procedures and technical accuracy/completeness; and (3) factors influencing technical staff to leave or stay at GAO.

Starting Out

A basic question is how much technical staff and managers differ in their background and experience. As expected, technical staff tend to have more graduate education, with 41 percent having been trained at the doctorate level when hired, compared to 10 percent of managers. Half the managers hold the bachelor's as their highest degree compared to 25 percent of technical staff. Managers also have worked, on average, more than twice as long at GAO, with a median of 20 years at the agency compared to 8 years for the technical staff.

Experience Relative to Expectations

One issue of particular concern to the task force was the extent to which technical staff coming into the agency had an inaccurate understanding of what their jobs would entail. Staff who started in 1980 or later were asked about this. Of these, 24 percent found that their experience during their first year either very greatly or greatly matched their expectations, 48 percent reported they matched moderately, while 28 percent

[1]Directors of issue areas, associate directors, assistant directors, assistant regional managers, and managers of regional Technical Assistance Groups (TAGs).

found a slight to nonexistent match. The fact that 76 percent indicated no better than a moderate match of experience to expectations suggests a fairly widespread view among technical staff that the accuracy of understandings conveyed to incoming staff could be improved. At the same time, 76 percent of the managers—when asked about "perceived satisfaction" among technical staff—reported that, on average, their technical staff were satisfied with the match of their experience to their expectations (14 percent thought they were very satisfied and 62 percent generally satisfied).

Of the 76 percent of technical staff whose experience matched, at best, moderately their initial understanding of what they would be doing at GAO, 62 percent found the work less technical than expected and 75 percent used their specialized skills less often than expected. But those managers supervising technical staff generally did not see a problem in this area. Just about half (51 percent) felt that their staff, during their first year, were either very or generally satisfied with their ability to use their technical proficiency on their assignments. Only 17 percent of them believed their technical staff were dissatisfied on this dimension. Yet 46 percent of the managers who lost technical staff rated the need for "a better match of assignments to skills or subject areas" as a "major reason" for their staff leaving GAO. This was the second highest rating accorded to any of the 17 factors listed, after salary, which 48 percent rated as "major."

Thus, the two surveys have surfaced some disparity between what technical staff and managers believe about the match between technical staff expectations and experience at GAO. However, managers do recognize the need to convey to incoming technical staff a clear understanding of what their work at GAO will involve. For technical staff currently being hired, 82 percent of managers believe it is "very important" to explain to the applicants "how GAO works," and 65 percent feel it very important that candidates receive an oral description of what their job duties would be. The main question, therefore, is not whether this should be done but how well and how consistently it is carried out in practice.

Orientation and Training

GAO managers overwhelmingly perceive technical staff as having greater difficulty than nontechnical staff in adapting to GAO work procedures (71 percent to 2 percent) and review processes (69 percent to 7 percent). Consistent with this view, 75 percent of the managers favor establishing courses specifically for technical staff on GAO policies and practices to

more effectively convey this information, even though most managers—71 percent—also believe that all professional staff need some form of GAO orientation training.

From the perspective of technical staff, any problems they have with GAO procedures lie in the limited availability of training of this sort. Technical staff generally do not quarrel with the need for or appropriateness of GAO procedures (see below). However, only 43 percent of the technical staff hired since 1980 recall receiving as much as 24 hours of formal training in GAO methods and procedures within 6 months of starting work. Forty-eight percent say that they definitely did not receive such training. Between 47 and 73 percent of technical staff hired since 1980 do not feel that they received adequate instruction when they started to work at the agency (either through courses or on-the-job training) in workpaper preparation, indexing, referencing, or GAO's reporting style.

Opportunities for Improvement

Technical staff and managers agree on the desirability of more and better training for technical staff, early in their career, in GAO policies and practices. They also agree on the importance of clear and accurate expectations among technical staff accepting employment at GAO. Both of these areas are thus clear candidates for task force attention.

Doing the Job

One factor that can cause tensions in the relationship between managers and technical staff is the potential for differing emphases on particular aspects of quality assurance (see chapter 3). On the one hand, there are GAO's own policies and practices which have evolved over a long period of time and apply to the full range of GAO products (some of which are technically complex and some of which are not). On the other hand, each technical discipline is partially regulated by a set of methodological norms which define good—and acceptable—quality work within that field. Indeed, technical staff are often hired precisely because of their knowledge of those norms. On a simplistic level, one could view nontechnical managers as primarily the defenders of quality as defined by GAO policies, and technical staff as primarily the defenders of technical quality as defined by professional norms. In practice, of course, distinctions are blurred and the real question is how effectively these two groups work together to maximize adherence to both aspects of quality and how smoothly they resolve any apparent conflicts that arise between these norms.

Managers do have doubts about the knowledge of technical staff with respect to GAO policies and practices. Among managers other than those who supervise technical staff exclusively, 84 percent believe that technical staff are less likely to be aware of GAO policies and practices than nontechnical staff. Even among those who manage only technical staff, 44 percent agree with this view, while 54 percent believe technical and nontechnical staff are about the same.

This deficiency, if accurately perceived by managers, does not reflect a systematic rejection by technical staff of the value of GAO policies. On the contrary, 56 percent of technical staff indicated in their survey that they believed that GAO's documentation requirements, including indexing and referencing, were reasonable, and only 17 percent felt that they were unreasonable. However, as noted above, most technical staffmembers thought they had not received adequate training in these areas.

At the same time, some technical assistance staff have concerns relating to the technical quality of GAO's products. This emerged in questions about the use of their own work and the resolution of technical disputes. While 84 percent expressed predominantly favorable views—30 percent reporting that their work had been presented accurately in "all or almost all" the GAO reports they had worked on and 54 percent saying "most" reports—16 percent indicated that their work was accurately portrayed no better than half the time. A somewhat larger proportion—24 percent—said that disagreements they had with the evaluators working on jobs frequently had not been resolved in a technically adequate way (17 percent reporting adequate resolutions "as often as not" and 7 percent rarely or never). By contrast, 60 percent indicated that technically adequate resolutions were obtained—either "always or almost always" (23 percent) or "usually" (37 percent)—while 16 percent said they had not experienced such disagreements.

The subset of managers who supervise both technical assistance and line staff were asked a related question: how satisfied were they with the way their technical staff's work was used in final products, including accuracy and depth of coverage? Their responses broadly paralleled those of the technical assistance staff cited above. About three-quarters were favorable (74 percent): 22 percent reported they were "very satisfied" with the use made of their staff's work and 52 percent "generally satisfied." Of the remainder, 21 percent were "both satisfied and dissatisfied," and 5 percent very or generally dissatisfied. As with the technical assistance staff, managers approved of the process used to negotiate

disputes over technical issues, but with somewhat lower levels of satisfaction than for the overall use of their technical staff's work. Fifty-seven percent were either "very satisfied" (14 percent) or "generally satisfied" (43 percent) with this process, while 43 percent were either ambivalent (29 percent) or generally dissatisfied (14 percent).

These responses show that large majorities of technical assistance staff and managers of technical staff are broadly supportive of GAO's use of technical work. However, they also suggest that at least some in both groups find room for improvement. Thus, for each of the four questions, there was a clear preponderance within the favorably disposed group toward the more reserved response—"most" or "usually" rather than "all or almost all the time" and "generally" rather than "very" satisfied. Moreover, a minority of technical assistance staff described situations which, if true, would indicate serious problems for an organization that places as much emphasis as GAO does on the accuracy and objectivity of its work—for example, the 16 percent finding their technical analyses presented accurately in reports no more than half the time. (We cannot, of course, make any judgment here about the accuracy of these statements; other persons involved could perhaps persuasively justify the decisions to which these respondents objected.) Nonetheless, their responses—even with some discounting for individual partiality—may well reflect genuine problems with respect to aspects of technical quality, and/or a certain frustration on the part of these technical staffmembers with GAO's approach to quality control.

Communication Between Technical and Nontechnical Staff

In order to develop the kind of trust and confidence that is needed for true interdisciplinary teamwork, managers, nontechnical, and technical staff need to be able to communicate effectively and work together with each other. Most mid-level managers believe technical and nontechnical staff are about the same in their ability to work well with other people (67 percent) and communicate orally (64 percent); however, those managers who do see a difference (33 percent to 36 percent) overwhelmingly rate the nontechnical staff higher on these dimensions. Managers express stronger reservations about the written communication skills of technical staff, which play a role in the internal exchange of views as well as in the ultimate impact of reports on non-GAO audiences. Here, 59 percent of mid-level managers rate the nontechnical staff more highly than technical staff.

Effective communication requires not only a clear message but also a reasonably receptive audience. Technical staff, for their part, perceive a

certain amount of indifference (or resistance) from nontechnical staff to the information that the technical staff are trying to convey. While twice as many technical staff credit the evaluators with whom they work as being "receptive" to new or different ways of doing their work (44 percent to 20 percent), another fairly large group of technical staff (36 percent) express mixed feelings, rating evaluators "as receptive as unreceptive." Thus, more than half the technical staff find the evaluators at best ambivalent to at least one major type of input that the technical staff have tried to introduce into discussions over the planning and implementation of GAO assignments.

Contributions of Technical Staff

Despite some areas of divergence and possible friction noted above, managers and technical staff agree that technical staff have a substantial and positive impact on GAO's work. Overall, 57 percent of GAO managers believe that both technical assistance and technical line staff make a "great" or "very great" contribution to the agency as a whole. A total of 58 percent of managers rate the technical assistance received for their own jobs as making a great or very great contribution, while 77 percent rate the contribution of technical line staff working for them as great or very great. Interestingly, managers rate some types of technical assistance more highly than others, ranging from 70-71 percent "great" or "very great" contribution for sample design and questionnaire design, to 26 percent for engineering assistance.

Technical staff appear to have a similar perception. For example, 83 percent of technical assistance staff feel that their advice is generally given serious consideration—46 percent reporting that this "always or almost always" occurs and 37 percent "usually." Moreover, 49 percent feel that their group's advice is accorded great or very great authority by the people they assist. (No comparable questions were asked of technical line staff.) Only 1 percent of technical staff say that their advice is rarely or never given serious consideration, but 16 percent perceive their group's authority to be less than "moderate" (12 percent "some" and 4 percent "little or no authority").

Opportunities for Improvement

The two surveys asked about several types of changes that could influence the quality of GAO working relationships and products. These included recruitment of additional technical staff, expansion of internal and external training opportunities, possible mechanisms for adjudicating disputes over technical issues, and changes in staffing policies designed to enhance contact between technical and nontechnical staff.

Over half of the mid-level managers (55 percent) believe that they have the right mix of technical skills represented on their own staffs; 40 percent do not. There is greater consensus on the need to hire more technical staff, with 64 percent favoring a larger number compared to 32 percent who feel the current number of technical staff working for them is adequate.

Both managers and staff support increased technical training for technical staff. (Training on GAO procedures was discussed in the section on "orientation and training" under "Starting Out".) A majority of managers believe that GAO should expand its own course offerings in several technical areas—statistics and research design, but not in others—computers, economics, and questionnaires. Fifty-seven percent of the technical staff feel that GAO's current selection of courses "slightly matches" or "matches little, if at all" their need for technical training. Both technical assistance and technical line staff would most like additional training in "analytical techniques."

Technical staff prefer to receive their technical training through professional seminars (59 percent) or professional meetings (47 percent) rather than in-house GAO training (favored by 21 percent). Within limits, GAO managers appear willing to go along with this preference. A majority (59 percent) would support a disproportionate expansion of training (including conferences) for technical assistance staff, but not technical line staff, relative to nontechnical staff. At the same time, 72 percent of managers favor offering technical courses to nontechnical staff as well.

Technical assistance staff split evenly (35 percent to 35 percent) in favor or opposed to a formal mechanism to resolve technical disputes beyond what currently exists. Those favoring this mechanism would prefer a "GAO authority" by 58 percent, as opposed to several alternatives involving external experts. This is consistent with the current practice of GAO managers, about a third (32 percent) of whom reported they had consulted one or more technical experts outside GAO to help resolve a technical issue in the last 3 years.

Another strategy for enhancing GAO's use of technical staff is to establish staffing patterns that would bring more technical and nontechnical staff into the same working unit, which over time should promote better communication and interaction between them. Along these lines, 65 percent of managers would promote technical quality and communication by encouraging technical staff to take short-term rotations in nontechnical positions or groups. However, just 41 percent favor—and 38 percent

oppose—short-term rotations of nontechnical staff into specialist groups such as DMTAGS. Only managers who supervise technical staff exclusively, presumably including the heads of DMTAGS, EAGS, and TAGS, give greater support to rotations of nontechnical staff into those units.

Greater contact between technical assistance staff and generalist evaluators could also occur through more permanent transfers within the organization. However, technical assistance staff expressed minimal interest in making career shifts of this sort. Only 8 percent indicated they would want a lateral transfer to an evaluator slot; however, 39 percent said they would want to be promoted as an evaluator.

Staying at GAO

Both surveys examined in some detail the extent to which technical staff are satisfied with their work at GAO, the likelihood that they will seek employment elsewhere, and, particularly, the factors that drive a decision to leave or stay. In comparing the technical staff and manager responses, the main questions are whether they view the situation in comparable terms and the degree to which they share similar preferences of how the organization can and should evolve over time.

Overall Satisfaction

A majority (57 percent) of technical staff are satisfied overall with their employment at GAO, either "moderately" (42 percent) or "very" (15 percent) satisfied. Twenty-six percent are dissatisfied—17 percent "moderately" and 9 percent "very"—while 17 percent are "as satisfied as dissatisfied." Thus, the overall pattern indicates that a majority of technical staff are reasonably to extremely happy at GAO. However, the 43 percent of neutral or dissatisfied staff signifies that more could probably be done to enhance the job satisfaction of technical staff at GAO.

Staff satisfaction is likely to affect the probability of current staff staying at GAO as well as their effectiveness in aiding the recruitment of new technical staff. In responding to the survey, 38 percent of technical staff stated that they are "very likely" (22 percent) or "likely" (16 percent) to make a serious search for employment outside GAO within the next 2 years. Another 27 percent felt that there was about a 50 percent chance that they would do so. Less than half (43 percent) of the technical staff would recommend GAO as a place to work for others with similar skills and backgrounds, compared to 35 percent who would not recommend it and 23 percent undecided. This suggests two things: that GAO may have to exert some effort to maintain its cadre of technically-trained staff,

and that monitoring of technical staff attrition is important to do (see the footnote, page 127).

Mid-level managers perceive that technical staff at GAO are, at least in some respects (assessed in the survey), relatively dissatisfied compared to nontechnical staff, and more likely to seek employment elsewhere. For example, managers believe that newly hired technical staff are more often disappointed than nontechnical staff with the number of routine tasks they are assigned (40 percent to 12 percent) and with the recognition accorded their work (64 percent to 2 percent). Moreover, managers expect that technical staff are more likely than nontechnical staff to leave GAO by a very substantial margin (61 percent to 5 percent).

Reasons for Staying With OR Leaving GAO

The two surveys provide relatively extensive data on factors that could influence the decisions of technical staff to remain at GAO. Although the list of factors that technical staff and managers were asked to consider were not identical, there was substantial overlap in the content of what they covered. Overall, the results show a broad consensus between technical staff and management on what the critical factors are that affect staff attrition.

Technical staff were asked to rate 28 factors that might contribute to the attractiveness of an organization as an employer. The most highly rated were "professionally challenging work" (93 percent "great or very great importance"), "work in area of interest" (89 percent), "access to personal computers" (79 percent), "professional reputation of organization" (75 percent), "salary" (73 percent), and "autonomy in how the work is done" (72 percent). For the mid-level manager survey, the managers who had actually lost technical staff in the last 3 years indicated which of a similar list of 17 factors had been "major reasons" why those staff chose to accept employment elsewhere. Here, four factors clearly predominated: "salary" (48 percent), "match with staff interests" (46 percent), "acceptance of technical role by management" (45 percent), and "rewards for technical rather than managerial tasks" (43 percent).

Of the other factors (besides salary and match with interests) that staff rated highly, two also appeared (in somewhat altered form) on the list rated by managers. Among the managers, 29 percent felt access to computers was a major reason for leaving GAO (tied for 5th out of 17 factors) and 25 percent "influence over assignments" (7th of 17). On the other hand, the technical staff did not rank "ability to advance in career without going into management" nearly as highly as the managers did

"career rewards for technical tasks as opposed to managerial tasks." While 55 percent of technical staff accorded this factor great or very great importance, it only tied for 13th out of the 28 factors rated by technical staff. By contrast, managers ranked it fourth (out of 17). Moreover, 43 percent of managers losing technical staff cited a desire for such rewards as a "major reason" for their leaving GAO, only 5 percentage points behind the first-place factor, "salary."

Opportunities for Improvement

From the perspective of retaining technical staff, it makes sense to focus attention on the factors they think are important in terms of how well or poorly they feel GAO does on those factors (see table VIII.1). It is especially in the areas of weakness that opportunities for improvement can be found. There are 9 factors out of the 28 surveyed to which more than half the technical staff ascribe great or very great importance and fewer than half rate GAO as good or very good. These are (in order of staff-assessed importance): "access to personal computers," "amount of salary," "autonomy in how the work is done," "interaction with peers within GAO," "influence over public policy," "financial support for outside training," "career advancement without managing," "adequacy of personal work accommodations," and "interaction with peers outside GAO."

Table VIII.1: GAO Performance on Employment Factors in Relation to Their Importance to Technical Staff

Employment factors	Importance rating[a]	GAO rating[b]
Factors which the technical staff consider important where they rate GAO relatively highly		
Professionally challenging work	93 (1)	58 (5)
Work in skill or subject area of interest	89 (2)	69 (4)
Professional reputation of organization	75 (4)	71 (3)
Stability of employment	69 (7)	95 (1)
Work in variety of subject areas	69 (7)	88 (2)
Importance of work outside organization	59 (11)	55 (7)
Retirement benefits	54 (15)	58 (5)
Factors which the technical staff consider important where they rate GAO relatively poorly		
Access to personal computers	79 (3)	37 (15)
Amount of salary	73 (5)	39 (14)
Autonomy in how the work is done	72 (6)	31 (16)
Interaction with peers within GAO	68 (9)	49 (10)
Influence on public policy	60 (10)	46 (11)
Financial support for outside training	56 (12)	16 (24)
Career advancement without managing	55 (13)	9 (28)
Adequacy of personal work accommodations	55 (13)	21 (22)
Interaction with peers outside GAO	52 (16)	24 (19)
Factors which the technical staff consider relatively less important		
Amount of health benefits	49 (17)	45 (13)
Interaction with upper management	47 (18)	30 (17)
Access to mainframe computers	40 (19)	52 (8)
Level of administrative support	40 (19)	16 (24)
Opportunity for outside professional recognition	38 (21)	23 (20)
Level of research assistance support	34 (22)	12 (27)
In-house library services	29 (23)	52 (8)
In-house technical training	28 (24)	19 (23)
Ability to publish about work outside organization	25 (25)	29 (18)
Individual authorship of products	24 (26)	13 (26)
Opportunity to teach within organization	18 (27)	46 (11)
Opportunity for outside professional employment	16 (28)	23 (20)

[a]Percent of technical staff rating the factor of "great" or "very great" importance (rank order of factor in parentheses).

[b]Percent of technical staff rating GAO "good" or "very good" on that factor (rank order of factor in parentheses).

Managers were asked what priority should be given to 17 factors that could affect the attractiveness of GAO as a place for technical staff to work. The top 10 factors, ranked in order of the percentage of managers who rated them as high or very high priority, were: "more computers" (66 percent), "career rewards for technical as opposed to managerial tasks" (65 percent), "more recognition for a job well done" (62 percent), "better match of assignments to staff interests" (50 percent), "better acceptance of the technical role by management" (50 percent), "opportunities to attend professional meetings and seminars" (49 percent), "better technical training" (46 percent), "higher salary" (43 percent), "better office space" (27 percent), and "more opportunities to work with other technical staff" (27 percent).

In comparing the factors identified from the staff and manager surveys, one finds considerable congruence, particularly on the importance of improving access to PC's and the somewhat less urgent desire for better working conditions, technical training, and contact with professional peers. On the other hand, there is disagreement about matching assignments with staff interests. Managers believe this is a problem, but technical staff—who rank this second in importance—feel that GAO does well in this area (69 percent rated GAO good or very good). In the same way, managers and technical staff accord different priorities to "nonmanagerial career rewards." However, while technical staff did not assign a high priority to this factor, they rated GAO lowest (28th) on this dimension—with only 9 percent saying the agency was good or very good.

The biggest difference between staff and managers may be over "autonomy in how the work is done/more influence over assignments." Only 18 percent of managers accorded it high or very high priority (tied for 15th out of 17)—compared to 72 percent of technical staff rating it of great or very great importance (6th out of 28). It is interesting to compare this with the rather higher rating, noted above, of "more influence over assignments" as a "major reason" for leaving (7th out of 17). It is true that managers may feel there is relatively little they can do, in the context of GAO's operations, to expand staff autonomy. However, the importance placed by technical staff on this dimension suggests that it may be useful to exploit whatever latitude exists in this area. Notably, those managers who supervise only technical staff, and therefore have probably the most experience in working with them, are much more likely to give high or very high priority to this factor (51 percent).

One issue long considered critical to the morale and retention of technical staff at GAO is their perceived promotion potential relative to nontechnical staff. In this vein, managers were asked a series of questions on the desirability of specific changes in the career path of technical staff. Generally, they seemed to favor expanded promotion opportunities targeted to technical staff. Thus, 57 percent felt the top of the noncompetitive career ladder for technical staff should be raised above the current level (equivalent to GS-12). Moreover, 66 percent supported the concept of nonmanagerial Band III positions for senior technical staff.

Technical assistance staff would appear to welcome these types of opportunities (technical line staff were not asked a similar question). For example, they prefer research to managerial work—assuming equivalent salaries—by 56 percent to 33 percent. But by a very sizable margin (62 percent to 17 percent), they would aspire to managerial positions if that is what is required for promotion to the Band III level. In other words, the technical assistance staff would be pleased to advance without changing the nature of the work they do, but most would also be willing to move into a managerial role if that is how GAO chooses to structure its advancement opportunities.

However, managers express great skepticism that technical staff would perform such managerial functions as well as people recruited from GAO's nontechnical staff. Technical assistance staff in particular are rated as less suitable than nontechnical staff for assistant director, director, and regional manager posts, by a margin of 73 percent to 8 percent. Moreover, even technical line staff, many of whom have experience leading assignments similar to that of nontechnical candidates for such positions, are considered less suitable by 44 percent to 14 percent. (Forty-one percent judge technical and nontechnical line staff equally suitable.)

In short, GAO's technical staff may have a greater desire to be promoted into managerial positions than many in the current cadre of managers believe is desirable.

Implications for Improving Interdisciplinary Management at GAO

These patterns of agreement and disagreement in the survey responses of technical staff and GAO managers lend support to a number of specific measures designed to facilitate interdisciplinary work at GAO. They include:

- instituting procedures to make sure that all newly hired staff are given clear and accurate descriptions of the type of work they will do at GAO;
- increasing training for technical staff in GAO policies and procedures, along with systematic efforts to insure that all technical staff receive this training soon after their arrival at GAO;
- continuing training for nontechnical staff in technical areas;
- expanding training in technical subjects for technical staff, including increased resources for external training in relevant areas that cannot be covered adequately through GAO's own courses;
- monitoring of technical training for all staff;
- increasing managerial attention and resources, insofar as is feasible, to ameliorate those aspects of the GAO workplace that technical staff and managers indicated are most likely to have a negative effect on technical staff morale and retention, including inadequate access to personal computers, noncompetitive salaries, restricted contact with professional peers, and limited input in how they will do their work;
- monitoring technical staff attrition;
- seeking nonmanagerial Band III positions more routinely for those strong technical staff whom GAO wishes to retain and who do not desire to perform managerial functions;
- structuring incentives to encourage technical staff to obtain qualifying experience (e.g., as project managers), and then to apply, for managerial positions. If the performance of these new technical managers should be of high quality, it seems reasonable to expect that GAO's current managers could well change their attitudes on the managerial aptitudes of technical staff over time.

Review of Available Orientation and Training Programs

Introduction

Orientation and training programs play important roles in educating staff about their work context and providing opportunities for them to maintain and enhance specific skills. GAO historically has had a strong commitment to training, providing both an active central training program and some resources for external training opportunities. The agency is currently in the midst of a major curriculum revision for its evaluator and evaluator-related staff, with curriculum proposals under review that would place much greater emphasis on technical skills. The present workforce is a heterogeneous mix of disciplines and technical skill levels, necessitating a training curriculum with sufficient flexibility to allow nontechnical staff to expand their technical skills, and technical staff the opportunities they need to further enhance their statistical and methods skills. Thus, any review of available training activities at the present time must consider both existing and proposed training programs.

In conducting this review, we concentrated on examining training activities for GAO's existing technical staff, the group studied by the Interdisciplinary Task Force. In the context of improved understanding between technical and nontechnical staff, we also discuss briefly current agency efforts to provide opportunities for nontechnical staff to expand their technical skills and the challenges posed by the wide range of technical skills among recent hires.

Training Needs of Technical Staff

This task force's efforts identified four basic areas of training relevant to GAO's technical staff—orientation to the agency's policies and procedures, analytical techniques and methods, supervision/management, and issue area training. The subgroups of the task force showed a high degree of consistency in their results regarding the need for training in several of these areas and in the preferred methods of delivery.

Orientation

GAO's managers believe strongly that all technical staff should be included in orientation training so that they will understand the agency's policies and procedures. This was the case whether staff were to work in line or in technical assistance roles. The importance of the acculturation process was also heavily emphasized, especially the need to educate staff that GAO's products are institutional rather than individual products. A key issue in any such orientation is "language." GAO now has a multidisciplinary workforce; however, much of the vocabulary of its policies and the underpinnings of its work procedures stem from the accounting profession. In order for technical staff to be successfully

acculturated, orientation activities need to adequately explain the "reasons behind" GAO's quality assurance/quality control procedures. For example, for such staff to implement procedures such as workpapers, they need to understand GAO's documentation requirements and to be aware of the subsequent uses of their analysis products. They also need to translate correctly the vocabularies of various disciplines and to learn about the origins and nature of the audit tradition. These issues emerge frequently—e.g., from the task force's interviews with staff who have left the agency, as well as from discussions during training classes.

Despite the importance managers place on "orientation" training, slightly less than half of the technical staff surveyed by the task force reported having received training in GAO's work procedures during their first 6 months on the job. For some, this lack of training may have been a function of the budgetary cuts made in training in the early 1980's when GAO was under tight fiscal constraints; however, those entering the agency in the 1986-88 timeframe reported receiving only slightly more orientation training.

Analytic Techniques and Methods

There is general agreement among both managers and technical staff that GAO's technical staff have special training needs, and that many of these needs are best met through external rather than internal resources. Current in-house courses do not meet the technical training needs of these staff. Technical staff themselves expressed interest in two training areas—analytic techniques and design methods. Those who manage technical groups expressed a strong preference for additional courses in statistics (83 percent) and research design (74 percent). In addition, technical staff are perceived as having a stronger disciplinary affiliation than other GAO staff, an affiliation that they often seek to maintain through attendance at one or more yearly professional conferences.

Supervision/Management

The third area of training need concerns supervisory/management training. Here, the task force results are mixed. GAO managers have varying views of the degree to which technical staff have special supervisory/management training needs. Some believe that staff need special assistance in interpersonal communication skills; others believe that there is little difference between the skills of technical and nontechnical staff in this area. Others think that the biggest challenge lies in first persuading technical staff to take on managerial responsibilities, and then teaching

them the necessary skills. However, this is somewhat belied by the finding of the technical staff survey that 70 percent of technical staff would welcome the opportunity to assume managerial duties at higher levels.

To some degree, it seems likely that this issue of special supervision/management courses for technical staff will become moot as GAO's overall workforce becomes increasingly technical. The recently initiated effort to develop a revised supervision/management curriculum for GAO must of necessity assume a technical management environment.

Issue Area Training

The task force's survey of technical staff joining GAO since 1980 found that individuals functioning in line positions cited needs for training on issue area specific topics. In general, this is not surprising; GAO staff moving to new issue areas presumably often have such training needs.

In addition to these four areas, the regional office Technical Assistance Groups have identified needs for advanced automated data processing training in systems operations, programming, and other applications. Their assistance work often requires them to provide heavy computer support to regional assignments, and the needed training has not generally been available centrally. Access to technical training for TAG members, whether basic or advanced, is further hampered by their geographic dispersion. Each office has relatively small groups of staff requiring such training, even though in the aggregate they make up a significant number.

Current and Proposed Training Activities

As already noted, training activities for technical staff are currently in transition, with some activities initiated and others only in the proposal or planning stages. This section summarizes the status of training activities for each of the four areas of need identified by the task force.

Orientation

As the task force's survey documents, many technical staff now with the agency did not receive a formal orientation to GAO. Currently, all entry-level GAO hires are scheduled to complete an 8-day Introductory Evaluator Training course within their first 2 months with the agency. This course was revised in January 1989 to better reflect the changing nature of agency recruitment and, based on a re-evaluation in late 1989, was further revised in the spring of 1990. The first 3 days of the course are devoted to explaining the history of GAO, its mission, and an overview of its assignment planning and execution policies and procedures;

they also include opportunities for participants to meet with some of the agency's top managers, including the Comptroller General, and a tour of the Hill. The remaining days are devoted to skill training, with emphasis on writing and interviewing. In past years, entry-level technical staff have either participated for the first 3 days or the entire program, with mixed reviews.

Given the need for technical staff, especially social scientists, to understand GAO's audit tradition, it would also be useful for new technical staff to complete a course in basic auditing. The new evaluation curriculum starts with an overview course—Approach and Methodology Selection—that illustrates the similarities and differences between audit and evaluation approaches. As a follow-on, there are two proposed audit courses which may meet the orientation training need for technical staff: Compliance Auditing, and Economy and Efficiency Reviews. Either of these courses may help orient technical staff to GAO.

GAO, in the past, had no orientation program for mid- to upper-level hires, whether of technical background or otherwise. Divisions sought to create individualized programs for Band III hires through on-the-job training opportunities and sometimes arranged priority enrollments in such courses as GAO, Congress, and the Environment and Managing Personal and Organizational Change. The need for an upper-level orientation program was identified as critical. GAO has greatly increased its upper-level hiring, with projections as high as 60 persons for fiscal year 1990. The Training Institute led an agency-wide effort in this area to develop a classroom orientation program and to specify other supplementary activities, on-the-job or classroom training, which could assist new staff in becoming familiar with the agency's values, procedures, policies, and structure. GAO's first orientation course for upper-level hires was conducted in March 1990.

Beyond introductory training, the task force considered which courses might be useful to technical assistance staff to enable them to better understand the work context of the nontechnical evaluator-in-charge. It was agreed that the following list of currently available evaluator courses might be helpful:

- Introductory Evaluator Training (8 days);
- Promotion Programs for Bands II and III (2 days);
- Computer Security (1-2 days);
- Approach and Methodology Workshop (2-1/2 days);
- Report Writing and Message Development (3 days).

Assistance staff could enroll in additional courses as electives when such courses appear relevant to their assignments or career needs. Those desiring to eventually move on-line may want to complete as many of the core courses as possible, including the new Assignment Management course.

Analytic Techniques and Methods

Until last fall, in-house opportunities for learning about new analytic techniques and methods had been infrequent. In the mid-1980's a few contracted courses were purchased and made available on a limited basis to members of DMTAGS, TAGS, and PEMD; however, this effort was short-lived. In the interim, technical assistance staff desiring to learn log-linear methods once even pooled their own funds to bring in a local university professor to provide a workshop. The only other regular opportunities were sessions at GAO's Technical Conference and professional conference attendance funded by each unit's external training budget. When the Human Resource Management Task Force interviewed technical assistance staff in 1988, they found a general consensus that such staff had special training needs that needed to be met outside GAO and that their share of the unit's external training budgets was not adequate to meet those needs.

Two steps have already been taken to meet training needs in this area—a new speakers series, and a change in priorities for allocation of GAO's external training funds.

In fall 1988, the Training Institute initiated a Speakers Series in Technical Methods which brings a recognized technical authority to GAO on a monthly basis to provide a 2-hour presentation on analytic or methodological issues. Past topics have included: interrupted time series analysis, complex sampling plans, standards for statistical reporting, and computer-assisted telephone interview methods.

At least twice, these presentations have been expanded into a longer workshop format. The advisory group for the Speakers Series is drawn from the technical staff representing all divisions and regional offices, thus providing a mechanism for staff to obtain access to presentations on new methods and techniques. Although this effort has drawn good attendance from headquarters, it has been less accessible to regional office staff.

Instructions for external budget justifications were this year revised to place additional emphasis on the needs of technical staff. Given the lack

of appropriate internal courses, it is recognized that per person allocations to technical staff may need to be increased to enable them to obtain the requisite training from professional conferences, workshops, or university graduate programs. This issue is particularly critical for meeting the advanced ADP training needs of the regional office Technical Assistance Groups. The centrally funded Managerial and Executive Development Programs have also been expanded to include financial support of nominees for intensive technical and issue area training.

GAO's Technical Conference will continue to be a major resource for staff, especially the first day of external speakers. However, this conference can, at most, provide "exposure" to new techniques and methods, not training. More intensive in-house opportunities are planned and the possibility of 1- or 2-day pre-conference workshops is currently under discussion. The revised evaluator curriculum proposal for GAO advocates that all nontechnical evaluators attain knowledge of basic applied statistics comparable to that of 1 year of graduate work. Several elective advanced statistics courses are also proposed to meet the needs of both existing technical staff and recent recruits entering GAO with substantial prior statistical training: Multivariate Analysis, Categorical Data Analysis, Time Series Analysis, and Causal Modeling. While planned as in-house courses, it is expected that these courses will be delivered through ties with various universities (or their equivalents).

Supervision/Management

GAO's supervision/management course sequence is now under revision, trailing curriculum development in other areas. It is expected that new proposals in this area will recognize the increasingly technical nature of GAO's workforce and will thus be applicable to any technical staff already on board. A draft proposal is expected to be ready for agency comment in the spring of 1990. In the meantime, the Training Institute is proceeding with the development of a generic Introduction to Supervision course to meet continuing training needs in this area. Most of the existing on-line courses are for Band II or III staff, are very general in nature, and are purchased from commercial vendors. These courses include: Managerial Decisionmaking, Managerial Leadership, Managerial Competencies, and Managing for Productivity.

Issue Area Training

The great majority of GAO's issue area training needs are handled through external training funded by individual units. Two exceptions

exist: training to support AFMD's financial management areas and training to support IMTEC's information systems areas. Only the IMTEC activities are relevant to this review.

As noted previously, IMTEC has continually sought to identify specific training needs in support of its mission and to support both internal and external training opportunities. The Training Institute has worked with the division to both procure specific training courses and to develop a collaborative program with a local university. The most recent initiative is a graduate-level 6-course Certificate in Information Systems program available from the George Washington University (GWU). Faculty from the university teach courses at the end of the work day in GAO's Training Center, enabling staff to have convenient access to graduate education opportunities at substantial tuition discounts. Most GAO staff seek tuition assistance from their unit's external training fund.

Summary

In sum, several efforts have been either recently initiated or are planned to better address the training needs of GAO's technical staff. New orientation activities exist for entry-level staff, and their appropriateness for new technical staff is being evaluated. Planning efforts are underway to design and implement new orientation activities for mid- to upper-level hires, activities which should be applicable to mid- and upper-level technical staff as well.

The Speakers Series on Technical Methods provides a new forum for headquarters technical staff to create their own training opportunities on analytic and design methods, and several new in-house advanced statistics courses are planned for the next year. In the information management and technology area, GAO's computer science staff have access both to external speakers and to extensive contract and university-based training opportunities. Additionally, the guidance provided for the allocation of units' external training funds has been changed to reflect the special needs of technical staff for external training. This is in recognition of the fact that technical staff will need a higher per person allocation in order to obtain continuing education outside the agency.

The supervision/management area is as yet undeveloped. Until new curriculum proposals are forthcoming, it will not be possible to determine whether technical staff's needs are met in this area. Issue area training is not expected to differ for technical and nontechnical staff, except perhaps for the information technology area.

Review of Systems for Identifying and Tracking the Recruitment, Retention, and Rewarding of Technical Staff

Introduction

Management Information Systems (MISes) play a key role in GAO's ability to monitor progress in increasing the technical skills of its workforce. Such systems allow the agency periodically to inventory workforce composition and to track progress in recruitment, training, retention, and rewards for specific types of staff. This report reviews the adequacy of existing management information systems and suggests needed modifications.

In conducting this review, we broadened the scope to include reviewing the adequacy of systems for tracking any skill group within the organization (e.g., economics, secretarial/ administrative, writer/editor). In our review, however, special attention was placed on the adequacy of systems for identifying and tracking technical staff.

Defining the term technical posed as great a problem for this effort as it did for the work of the entire task force. There is little agreement within the organization. The designation technical is used by some parties to refer to "non-line" assistance work, to refer to specialized training, or to refer to the nature of the person's predominant assignments. Information on level of degree (i.e., bachelors, masters, doctorate) is insufficient without information on area of degree; information on area of degree may be insufficient without information on content of the school's curriculum; and curriculum information may be insufficient without information on degree of subject mastery. To avoid constraining our definition of "technical" prematurely, we looked to determine the nature of any available information related to technical skills and education.

Methodology

Our review of MISes considered their utility for tracking any generic group.

The following MISes were identified for review:

- Personnel/Payroll Database, National Finance Center, Personnel;
- Education Microcomputer Dbase System, Personnel;
- Awards Microcomputer Dbase System, Personnel;
- SMIS/Profile, Office of Information Resource Management (OIRM);
- SMIS/Training Registration System, Office of Information Resource Management and Training Institute (OIRM and TI);
- Applicant Tracking System, Office of Recruitment (OR);
- Database for Entry-level Tracking and Analysis (DELTA), Office of Recruitment (OR).

Each system was briefly reviewed to determine:

- the major purpose of the system;
- the availability of information on technical training and skills;
- the quality of the information and nature of update procedures; and
- the potential of the system for enabling tracking of progress in recruiting, training, retaining, and rewarding staff.

Individual MIS summaries are provided in appendix XI.

Findings

GAO's needs for human resource information are currently being met through a variety of MISes. The Personnel/Payroll Database provides the core information, with other MISes custom designed to meet specific needs of individual staff offices or divisions and regional offices. While most of the information necessary to identify and track the progress of subgroups of staff is generally available through these systems, this decentralized approach to MIS development and planning needs to be thoroughly reviewed. Some redundant efforts are already evident and the process may not be yielding the most useful human resource data in an efficient manner.

Current State of Decentralized Information Systems

The Personnel/Payroll Database at the National Finance Center contains over 1,400 data elements, including: name, title, position series, grade, step, pay plan, salary, date last promoted, service computation date, date hired at GAO, and organization code. Data from this system can be retrieved using a variety of methods—downloads to PCs, tapes to the House Information System Computer Center, or direct access to the National Finance Center. Several of the other MISes covered in this report use information from this database and supplement it with additional data items. Data are extracted biweekly from this system to create historical files maintained on the House Information System.

Personnel has constructed other special purpose databases maintained on PCs, one of which is the Personnel Awards/Education System (PAES) Database. The Education Microcomputer Dbase portion is intended to capture education and professional certification information for current GAO employees, information not available from the Personnel/Payroll Database. The education record contains up to three majors and three professional certificates for each staff member. Historical education information is available for the past 5 years. It should be noted, however, that education data must be given to Personnel by the employee,

and the database will only be accurate if the employee keeps the information current. The Awards Microcomputer Dbase portion of PAES is intended to capture historical awards data not readily available from the Personnel/Payroll Database. Historical awards information is available for the past 5 years, with a slight data entry backlog for 1989. The data are provided by the Employee Benefits Office after each award is finalized.

The SMIS/Profile system is maintained by OIRM, but is an option for individual GAO units. Its purpose is to provide information on the characteristics of staff members and to flag key dates for personnel actions. It allows space for entering up to three academic degrees (degree, school, year, major) as well as one professional certification. Education information is again provided and updated by the employee and thus may not be current.

The SMIS/Training Registration System (TRS), involving another subset of the SMIS, is designed to provide information on staff members' training and other continuing professional education activities. Prior to January 1989, use of the training subsystem of the SMIS was optional, and it was not used by all units. With the initiation of the 80-hour continuing education requirement for all evaluators and evaluator-related staff, the Training Institute designed an MIS for recording continuing education activities which links the training subsystem of SMIS and the Institute's central Training Registration System. Information on attendance at central courses is handled through TRS. Information on other activities is entered into the SMIS subsystem by each GAO unit and is ultimately merged with TRS. Central course information is very accurate; the accuracy of information on other activities will likely depend on whether individuals have already satisfied the 80-hour requirement. The linked system began in January 1989, and it is still too early to determine its overall accuracy. The system will permit the agency to determine how much of its training/educational activities involve technical, supervisory/management, or issue-area related training. As the core technical curriculum for evaluators is finalized, the system will also enable monitoring the agency's progress in increasing the technical skills of its staff.

The remaining two MISes serve special needs of the Office of Recruitment (OR). The Applicant Tracking System, maintained on a microcomputer, contains information on the education backgrounds of all applicants through the National Recruitment Program. Items include disciplines, grade point averages, and level of degree. The database is limited to persons applying through the entry recruiting program, thus it omits upper-

level hires, attorneys, etc. Database for Entry-level Tracking (DELTA) is another OR microcomputer database. It contains the same education information; however, it provides longitudinal information on the employment and promotion patterns of staff accepting employment offers at GAO. The data base is new, starting with the universe of hires resulting from 1986 employment offers. Promotion information is obtained manually from the Personnel/Payroll Database. Due to its infancy, DELTA currently reflects promotions only through the GS-12 level (Band I). This database, however, comes closest to the tracking system approach believed necessary to monitor the agency's progress with workforce subgroups.

None of these previously described systems contain individual appraisal data, and the organization, both historically and currently, has sought to keep appraisal information separate from all other personnel data. This year a new data base is being constructed in ACG/Operations that combines characteristics information from the NFC system, performance and bonus data from the recent appraisal cycle, and merit selection promotion information in order to assess the implementation of GAO's new pay-for-performance system for evaluators.

In sum, each staff office, and sometimes individual GAO divisions or regional offices, has independently developed its own human resource MISes to meet its needs. The result is that there is no single data system that can presently meet the agency-wide need to identify and track progress in recruiting, training, retaining, and rewarding specific subgroups of staff. Instead, there are multiple systems (mainframe and microcomputer) that, with some modification and merging, could be adapted to meet this need. Before proposing any modifications, however, we believe that it is necessary to better delineate the purposes of such an effort.

Need to Determine Information Purposes

The major purpose of an integrated human resource MIS approach is to efficiently provide information necessary for managing the human resources of the agency. We start with the assumption that there is an ongoing need to assess how well GAO is doing with respect to recruiting, training, retention, and rewarding of staff. Such information is desirable for the entire workforce, and for specific subgroups, in order to assess

both absolute and relative progress. Examples of relevant subgroups and information items are:

Subgroups

- technical staff (in line and assistance roles);
- evaluators by discipline (e.g., business administration, social sciences, accounting, public policy, public administration);
- lawyers;
- secretarial/administrative staff;
- upper-level hires in Band III;
- recent hires according to geographic areas;

Information Items

- GAO-wide and unit EEO profiles;
- distributions of job series;
- distributions of academic specialties;
- distributions of colleges and universities;
- distributions of academic degrees;
- entrance salaries of subgroups;
- salary progressions of subgroups;
- distributions of bonuses among subgroups.

With regard to the tracking of technical staff progress, especially important items would be:

- attrition rates,
- employment durations,
- amount of training,
- patterns of continuing professional education activities.

In combination, these kinds of information could be contrasted and compared within and across time to answer a variety of policy-relevant questions. For example:

- Are we succeeding in increasing the proportion of entry hires with masters degrees?
- Are we succeeding in broadening entry hiring to include more disciplines relevant to GAO's work, e.g., social scientists? Is this as true in the regions as at headquarters?
- Are we making progress in rewarding and retaining secretarial staff, thus reducing the attrition rate of this subgroup?
- Are there any dramatic differences in distributions of bonuses, rates of pay progression, and rates of promotion across organizational units?

- Are there any differences in attrition rates across organizational units which are not explainable by the job series?
- Are we able to retain our most promising staff?
- Is there appropriate access to external training funds?

The existence of an integrated system could also make it easier to evaluate the effects of future human resource initiatives at either the unit or agency-wide level. The development of systematic data on trends over time could enable monitoring of changes in workforce patterns in a variety of areas. Indeed, recent government studies of the turnover of computer scientists and secretarial staff have proven to be enlightening and sometimes surprising in their results. For example, the turnover rate for computer scientists was found to be much lower than had been assumed.

Next Steps

Defining a new human resource MIS is outside the scope of this task force. MISes are not without costs, and it is necessary to determine the details of the required information, the most crucial policy questions, and the attendant costs and benefits, before advocating any large efforts in this area. At the present time, it is possible to obtain considerable information from the various independent systems; however, substantial effort is needed to coordinate and merge such information requests. The most pronounced information gap is the lack of regular reports on the progress through the agency of specific skill groups. This is information which is extremely policy relevant, but relatively expensive to produce and maintain on an ongoing basis.

MIS Summaries

Name of System and Contact	Personnel/Payroll System National Finance Center Personnel Terry Condon, Personnel Stevie Young, Personnel
Major Purpose	To provide personnel/payroll data on GAO employees. Currently, nearly all reports which are generated (excluding CAPS) use the personnel/payroll data from the National Finance Center (NFC). The data can be retrieved to run reports using a variety of methods — downloads to PCs, tapes to the House Information System (HIS) Computer Center, or accessing the NFC directly. The data are extracted biweekly to update the historical information maintained at the HIS.
Information Available on Technical Training and Skills	None.
Assessment of Information Quality and Description of Update Procedures	The information entered into the system is based on personnel actions provided by management to document the hires, promotions, reassignment, and separations of GAO employees. The personnel office relies on units to provide the information on a timely basis to ensure accurate salary payment and personnel reporting of the employee. Historical information on employees resides at the HIS facility and will be up in Fall 1989. Data entry is performed daily directly into the NFC system, based on the personnel and payroll documents received.
Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff	The system contains 1,400 data elements, including: name, title, series, grade, step, pay plan, salary, date last promoted, date of last within grade, service computation date, date hired at GAO, veterans preference, last personnel action processed (HIS must be accessed for prior actions), annual/sick leave data, date of birth, handicap code, minority code, organization assigned to, duty station, work schedule, and probationary date. These are the most commonly requested data items. Reports can be produced which will provide 5 years of historical data.

Name of System and Contact	Education Microcomputer Dbase System Personnel Don L. Phillips, Personnel Becky Taylor, Personnel
Major Purpose	To capture additional education and professional certification information for GAO employees (supplemental to information available at NFC). This detailed information is not available from the personnel/payroll system at NFC.
Information Available on Technical Training and Skills	The education record contains data elements for school, type of degree (maximum of three degrees), major, date of degree, and professional certificates (maximum of four) for each employee.
Assessment of Information Quality and Description of Update Procedures	Education data exist for employees who have been employed with GAO during the past 5 years. Some education data from October 1988 through the present for new employees have not been obtained yet. In addition, the data maintained in the system may not reflect the most recent, up-to-date information since education information is normally not provided by employees after their initial appointment with GAO. Data entry is performed using a Dbase program to update the system. In the future, the education data for new and existing employees will be obtained from a new form, GAO 202, soon to be placed in distribution. This system is not yet fully functional.
Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff	Reports can be produced which will provide education data on current GAO employees and for employees who have separated from GAO within the past 5 years.
Name of System and Contact	Awards Microcomputer Dbase System Personnel Don L. Phillips, Personnel Becky Taylor, Personnel

Major Purpose	To capture historical awards data which are not readily available from the personnel/payroll system at NFC.
Information Available on Technical Training and Skills	None.
Assessment of Information Quality and Description of Update Procedures	The system currently maintains awards data for staff employed with GAO during the past 5 years. It captures information on all awards, regardless of the number. Historical awards data prior to October 1988 are currently on the system. Awards data are provided by the Employee Benefits Office after finalizing individual awards. A form has been developed, GAO 203, to be distributed in the near future to request from GAO employees an update of their awards history.
Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff	The awards data elements maintained in the system are: name, series, grade, pay plan, date of award, type of award, amount, and office originating the award. Reports can be produced which provide 5-years worth of awards information on current GAO employees and separated employees.

Name of System and Contact	Staff Management Information System/Profile (SMIS/Profile), OIRM Rhonda Thompson, OIRM
Major Purpose	To provide information on the characteristics of staff members and to flag key dates for personnel actions.
Information Available on Technical Training and Skills	The database permits entering information for up to three academic degrees (degree, school, year, major) as well as one professional certificate. Use of these information items is optional.

Assessment of Information Quality and Description of Update Procedures	Education information is provided by the individual employee. Update procedures are likely to vary across GAO units. It is unclear whether education degree information is kept current.
Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff	The SMIS/Profile system is currently not used by all GAO units. Voluntary nature of use and likely inaccuracies in the education information limit its usefulness for tracking purposes.
Name of System and Contact	SMIS/TRS Office of Information Resource Management, Training Institute Pat Logan, TI Rhonda Thompson, OIRM
Major Purpose	To provide information on staff members' training and other continuing professional education activities. To determine compliance with GAO's 80-hour continuing professional education requirement for evaluator and evaluator-related staff.
Information Available on Technical Training and Skills	The database contains information on attendance and completion of internal training courses, attendance at external courses and conferences, speaking engagements, and published writings. Detailed information is available on Training Institute course participation; more limited information is available on other educational activities. No information is available on degrees granted for completion of college courses or on certifications.
Assessment of Information Quality and Description of Update Procedures	Information on attendance at TI courses is handled centrally through the Training Registration System (TRS) at NIH. Information on other activities must be entered into the SMIS training subsystem by each GAO unit and is then merged with TRS data. Courses are categorized as being one of three types: technical, issue area, or supervision/management. Information on central courses is accurate and complete. The completeness of other information is likely to vary, depending on whether the individual

employee has already satisfied the 80-hour continuing professional education requirement.

Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff

The linked SMIS/TRS system began in January 1989 with reporting formats still under development; therefore, it is too early to determine the overall quality of the database. The system is used by all GAO units, with small offices providing data manually to the Training Institute. As the curriculum for evaluator staff is finalized and course development completed, the system will enable tracking of skill enhancement in various technical skill areas.

Name of System and Contact

Applicant Tracking System
Office of Recruitment
Steve Kenealy, OR

Major Purpose

To provide information on GAO applicants through the National Recruitment Program.

Information Available on Technical Training and Skills

The database contains information on the education backgrounds of all applicants through the National Recruitment Program. There are six major discipline categories (less reliable information available on subcategories of disciplines), GPA data, and level of degree information. Individual codes exist for each school.

Disciplines: public administration, business administration, computer science, social science, economics, accounting, other.

GPA: currently gives only GPA ranges, will switch to exact GPA in Fall 1990.

Degrees: B.A., Masters, Ph.D., Law.

The database is constantly evolving as new needs are identified to support the initiatives underway in OR. As recently as last year, the database included only three disciplines. The discipline categories have recently been expanded, reflecting GAO's changing recruiting practices.

	The database is limited to persons applying through GAO's National Recruitment Program (Band I), thus it omits upper-level hires, attorneys, administrative secretarial staff, etc. A separate system exists for administrative/secretarial applicants, but it is currently receiving very little support.
Assessment of Information Quality and Description of Update Procedures	Information is entered manually by OR and is based on self-report by the job applicant. No verification checks are made for GPA, etc. Update procedures are not relevant.
Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff	As of Fall 1990, the system will offer some capability for assessing GAO's progress in expanding its entry recruitment activities through the National Recruitment Program. Over time, this should result in greater disciplinary diversity in the applicant pool and a larger proportion of technical degrees.
Name of System and Contact	Database for Entry-level Tracking and Analysis (DELTA) Office of Recruitment Steve Kenealy, OR
Major Purpose	To provide information on the characteristics and employment patterns of applicants selected from the National Recruitment Program applicant pool.
Information Available on Technical Training and Skills	In general, information available for DELTA is the same as for the Applicant Tracking System — school codes, degrees, GPAs, and major disciplines. In addition, this database contains information on whether GAO's offer was accepted, whether the individual showed up for work, and whether the individual continues to work for GAO (including dates of separation). Information on dates of promotion is available through the top of Band I only due to the newness of the database. Attrition information is obtained from personnel's ongoing personnel system. Promotion information is available from a special personnel report and is matched and entered manually.

Assessment of Information Quality and Description of Update Procedures

Education information is self-reported by the applicant. Information on attrition and promotions resides in GAO's MISes for personnel. The DELTA system is updated several times a year to incorporate new attrition and promotion data. It is not updated for changes in education-related information. The database was initiated for Fall 1986 selectees, employees who started work in early January 1987.

Assessment of Potential for Enabling Tracking of Progress in Recruiting, Training, Retaining, and Rewarding Staff

The database has strong future potential for tracking GAO's progress in these areas for the universe of staff hired through the National Recruitment Program starting in 1986. It is the only longitudinal database. Like the other OR database, however, it omits several major groups of employees.

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whom move to program divisions every year. Second, all program divisions and most regional offices benefit from technical assistance on their work by expert groups housed within their own units. Finally, technical people are increasingly assigned to program division jobs which they staff or run, co-located there with GAO's auditors from the beginning of the project. GAO's approach thus includes efforts to achieve a critical mass (like BOB), to provide auditors with technical assistance (like the HHS/IG), and to integrate its workplace (like Arthur Andersen), albeit gradually and over time.

However, just as this three-pronged strategy has sometimes been difficult to implement, so the approaches tried in the organizations whose managers we interviewed have not proceeded without problems. We asked our seven experts to discuss these problems of interdisciplinary management and the resolutions they had sought to apply.

Problems Identified and Strategies Adopted or Suggested

Given the different nature of the integration efforts discussed above, we were surprised to find that many of the same problems emerged in the various organizations. The strategies adopted, however, tended to vary. Generally speaking, the integration problems our interviewees raised fell into three categories:

- Problems of "fitting-in" (i.e., difficulties for technical staff in perceiving themselves, and being perceived, as integral members of the organization);
- Problems in assuring work quality across disciplines; and
- Problems of rewards and recognition for technical staff.

Fitting-In

The problem here, in a nutshell, is that it is easier to work with the kinds of people you know and understand than it is to work with people who have been trained differently, make different assumptions, use different words (i.e., either words that are actually unfamiliar, or words that are well known but used in a special way), and possess different criteria for measuring product quality. Speaking of his experience at BOB, Carey said that technical people and generalists "just don't seem to mix very well naturally, so the temptation is to separate them. But if you separate them, you manufacture morale problems because mainstream missions and operations tend to receive preference over those of specialists." Carey's solution is to maintain separate technical centers, nonetheless, to ensure high quality and critical mass, but at the same time to have technical people work directly—not as advisors—with

Technical people across IBM came to use the CTC and the Fellows as informal channels to top management. By the same token, Branscomb said, the Committee and the Fellows also became "de facto ombudsmen" for the technical professionals at IBM. That is, the two groups served as an informal network for communicating ideas and judgments between top management and technical staff at the working level, operating independent of (but not in competition with) the formal corporate hierarchy.

The "fitting-in" problem at the Inspector General's office at HHS was so intractable that it was at the origin of Kusserow's conclusion, noted earlier, that the integration of technical people with generalists simply doesn't work. The Inspector General told us that technical staff in an audit office automatically become "the odd men out: they're immediately surrounded by white corpuscles." The problem, then, was how to get the technical contribution Kusserow felt was needed applied directly to the work of the IG's office. Kusserow's solution was to keep the functions separate organizationally, but instead, to integrate the jobs themselves. This boils down, in practice, to technical assistance. For example, economists from outside a unit will work together with auditors to help "frame an audit" by identifying key assumptions. Sampling approaches are approved in advance by a sampling statistician, again from an outside unit. But such work involves only discrete parts of jobs. Auditors and technical people do not work together on projects from beginning to end on a coequal basis. Thus the solution to the "fitting-in" problem at the IG's office was either to avoid it entirely by total separation—as in the case of auditors and social science evaluators—or to implement only temporary, segmented relationships—as in the case of specialized technical assistance to audits.

At IBM, the problem of integration was a different one, that of bringing in advanced scientists and engineers to work with already highly trained technical people in the product or technology divisions. This was not the technical-nontechnical fitting-in process just described, but one of getting top-flight people to work in places which needed their contributions and where they would not ordinarily want to work. IBM's strategy was again dual. First, they established a sabbatical program that assigns technical staff to work in various divisions within the company, for a year. Second, they created ad hoc "laboratories," staffed in part by advanced researchers, in part by people from the divisions, to work together on implementing the operating division's plan for future products. These programs were ingenious in that they allowed some of the company's top technical people to learn about divisional perspectives,

without forcing them to give up their identity as members of IBM's prestigious research community; in addition, and perhaps most importantly from the company's perspective, the divisions received help of a quality they couldn't have otherwise procured.

These kinds of "fitting-in" difficulties have not occurred at Arthur Andersen and RAND. In the former case, this is because of the way staff with different undergraduate degrees are given the same training and become somewhat homogeneous after a year. That is, there is no mainstream staff group with whom new recruits need to fit. In the RAND case, it is because of the existence of the matrix organization, which optimizes the fit of a variety of technical disciplines working on the same jobs within the same workplace.

At RFF, it was not the technical people who had a problem fitting in—so long as this group remained uniquely composed of economists—but rather, some of the nontechnical staff. Ahearne told us there were problems in getting RFF technical staff to accept even the need to focus on the use of their work, much less the need to turn technical language into lay terms, or the judgments of editors about how to do that. One solution brought to this problem was to recruit an associate professor of history from a prestigious university to take charge of preparing RFF publications. The idea was that perhaps the possession of a doctorate would help to permit a peer relationship with the staff economists. That, however, only led to more vehement arguments and stronger, not weaker, antagonisms. Even bringing in prominent potential user groups to talk about policy needs didn't work: many RFF staff felt these meetings were a waste of their time and said so. RFF's management has reorganized the nontechnical staff four times in recent years, but so far nothing has worked well. The technical staff view is that RFF should cut back on what they see as "overhead."

In recent years, RFF has also moved to bring in a few technical people who are not economists. This has typically involved, first, a 6-month debate on whether "still another" non-economist is really needed at RFF, followed by a search for good candidates who have had experience in working with economists. This strategy has helped a great deal in ensuring that non-economists will fit in at RFF; however, the benefit is not without cost, namely, that of severely limiting the pool of potential recruits in non-economic fields.

In discussing RFF's fitting-in problems, it is interesting to note their similarity with those of other mainstream, but nontechnical, organizations.

Given these similarities, it seems reasonable to argue that some of the concerns we have thought of as opposing technical to nontechnical people may in reality be problems of mainstream versus non-mainstream groups. This will be important to distinguish as we apply these lessons to GAO.

Still, another area of "fitting-in" problems is the expectation in most workplaces that both technical and nontechnical (or mainstream and non-mainstream) staff will understand and be responsive to the overall goals of the organization (see above, the stress put on mutual commitment and organizational accountability at the individual level by RAND and Arthur Andersen). The difficulty here is that, as our literature review showed, the academic training of many technical staff does not prepare them well for the goals or the routines and rituals of organizational life: that is, for dedication to organizational rather than scholarly or disciplinary goals.

At RAND, for example, a number of the original contingent of researchers who conducted the organization's pioneering work on national security issues were unenthusiastic about the proposed expansion into domestic policy issues in the late 1960's and "did not choose to participate" in it. Shubert told us further that RAND has always had a problem in detaching researchers from research and moving them into management positions. Relatively few RAND researchers have wanted to go any higher in the organization than project leader or perhaps program director. For those who have wanted to do so, RAND has relied on the individual researcher's initiative to achieve success as a manager. As a result, Shubert said, only limited progress has been made at RAND in the art of developing research management skills. (They are, however, currently developing a course in management for new project leaders.)

Branscomb joined Shubert in pointing out the failure of many technical organizations to recognize the importance of educating their researchers in the techniques of management, to develop tools for doing so, or to reward those people who succeed in mastering the art.

Woolsey mentioned specific organizational cultures that need to be understood by researchers moving into a nontechnical environment. She told us, for example, that she had been accustomed to having "brownbag" lunches once a week at her former workplace "where people would just grab a conference room and colleagues could come and talk." But that did not work well at Coopers and Lybrand where there

was no such informal custom and the auditors misunderstood her intention. Woolsey believes that technical staff should be told about an organization's mores at the time they join the organization. Learning about the workplace culture in dribs and drabs comes too late to be useful and allows some serious mistakes to be made. Indeed, it is under these types of circumstances that the perception is often acquired (and given credence) that technical staff are "arrogant," or "uncaring" about the goals of an organization (in comparison to their own individual agenda). In our interviews, technical staff were variously referred to as "condescending," "elitist," or as "folks coming on like a band of Jesuits trying to Christianize the heathen."

Branscomb articulated the tension explicitly. Everybody in an organization, he said, must understand and respect the importance of an organization's goals, and the necessity for it to keep discipline in support of those goals and in the management of its business. But at the same time, there needs to be freedom of communication and openness in an organization if technical people are to make their best contributions to that organization.

However, communication is precisely one of those areas in a multidisciplinary workplace where "fitting-in" problems are most common because of different kinds of jargon across technical disciplines or between technical and nontechnical groups, as well as across the different cultures and work goals just described. It is true that some communication problems reflect fairly simple misunderstandings that derive from ignorance about the usage and terminology that characterize different educational backgrounds. Coopers and Lybrand has addressed this problem by recognizing these differences in orientation and explaining them routinely to the members of interdisciplinary groups. Woolsey thinks that a great deal of acrimony and confusion can be prevented when it is realized how differently accountants and economists define a simple term like "cost." Similarly, "materiality" means little to a statistician, and "statistical significance" is not understood by the typical run of "general practice" people. Woolsey suggests that interdisciplinary organizations should routinely record and systematically share among their staff members such discoveries involving differing assumptions and definitions. An organizational glossary of terms, for example, could be useful. Ahearne reinforced this point by noting that when RFF hires non-economists (even those accustomed to working with economists), it takes as much as a year for them to become familiar with RFF economists' terminology.

Although RAND's matrix organization appears to have dealt more or less successfully with the other fitting-in problems described above, communications problems do exist there. However, they take on a somewhat different character: the normal difficulties of multidisciplinary discourse are increased by the matrix organization, which not only separates disciplines but reinforces that separation by turning the discipline into an organizational unit (i.e., the department). In the same way, divisional boundaries separate those who analyze one kind of program (in health, say) from those who work in other areas. This is not so much a question of multidisciplinary misunderstanding as it is of the kind of compartmentalization that so frequently arises in organizations for other reasons ("turf" protection, for example, or the demands of multisponsored activities). But since this can be dangerous for an organization like RAND, which must often bring complex mixes of skills to bear on cross-cutting policy problems, the corporation has addressed the issue by making its boundaries as transparent as possible and by maintaining "an open shop." The recruitment of staff across divisions and departments is not only encouraged but happens all the time. For example, one senior staffer spends half his time working on jury selection and the other half on army logistics.

Shubert told us that RAND makes great efforts to ensure that everyone who needs to know something related to his or her work is told about it. All staff, for example, are asked to agree that their correspondence can be opened unless it is marked "personal." RAND also counts on the openness of its communications to determine whether a new manager is functioning well. That is, if staff working for a certain project leader have problems with that leader's management, they are expected to talk about it, first, with the leader and then at higher levels of management. So if people do not work out as project leaders, they can be returned to research, retrained, or eased out.

A different communication problem that RAND also has is that, although many staff are inveterate communicators, there is often no one there to hear them because people have become so busy. Jobs currently tend to be spread very thinly, Shubert said, and "it's hard to find time to write, to arrange or attend seminars, or even to have informal encounters."

Looking at these "fitting-in" problems in the GAO context, many of the same issues have been raised in the past, both by GAO's managers and technical staff. For example, GAO's Reports Task Force review (1982-1983) noted that there was too much separation between the Institute for Program Evaluation (a technical division of GAO, now the Program

Evaluation and Methodology Division) and GAO's program divisions. This is the same problem that BOB confronted. However, instead of abolishing the division as BOB did, the Comptroller General decided to maintain it and also to facilitate the creation of technical assistance groups within each of the program divisions and regional offices. (These are known as DMTAGS, or Design and Methodology Technical Assistance Groups, and EAGS, or Economic Analysis Groups, in the headquarters divisions, and TAGS or Technical Assistance Groups, in the regions). In addition, after a period of time in the technical assistance groups, division and regional managements have been encouraged to gradually move technical staff out of the assistance groups to work on projects with GAO's "generalist" auditors in the field. What this means is that technical staff at GAO have three different opportunities: to work in a technical division or office where most people have advanced degrees; to work with program division personnel on particular aspects of jobs; or to work side by side with generalists on a coequal basis from the beginning to the end of a project.

GAO technical staff appear to be linked reasonably well with divisional and regional management, and also to top GAO management through the three technical division heads and through an Interdivisional Design Group which has brought together the technical assistance managers in monthly meetings since 1984. Thus, access to top management appears to be less relevant an issue for GAO than does communications, where the kinds of problems encountered at Coopers and Lybrand are quite common. For example, social scientists coming in to GAO are often ignorant of auditing, are not familiar with quality control procedures like the preparation of workpapers or indexing and referencing, do not understand or accept concepts like "criteria, condition, cause and effect" (by which auditors at GAO use their professional judgment to determine causes of observed changes), and are confused by auditors' use of the terms "reliability" and "validity" to mean "accuracy." GAO's managers, both mainstream and technical, have also noted the lack of preparation of many technical staff for management. Thus, the points made by Branscomb, Shubert, and Woolsey about the need to train technical staff in management and in the pathways of the institutional culture they are entering are highly relevant to GAO.

All of this pinpoints the critical role of effective and open communication in mitigating the discomforts for technical people of fitting into nontechnical or multidisciplinary organizations. But that role does not end there. Communication is also important in resolving the clashes of assumptions, work procedures, and study methodologies that seem to

follow inevitably from the juxtaposition of different disciplines in the same workplace.

Assuring Work Quality

The central purpose for developing an interdisciplinary organization is typically to respond better to changing demand, usually involving both the quality and the use of the work product. Yet it is in that very area of the work product that disputes between technical and nontechnical staff, or among technical staff of various disciplines, are most acute, and that the importance of "fitting-in" and especially, of open communications, can be most clearly understood. In effect, it makes sense, as our experts pointed out, to eliminate those communications problems that derive from ignorance of the differing assumptions and ways of conceptualizing questions that divide various disciplines from each other, and technical staff, as a whole, from nontechnical staff. On the other hand, recognition of these differences will only carry us so far. Differing assumptions and values lead to real conflicts as well as perceptual ones. The experience of our seven experts in a range of organizations is eloquent in this regard in that every one of them raised problems in this area, whatever the organizational context or strategy adopted.

When we asked the Comptroller General where Arthur Andersen had had its biggest problems of integration, he told us it was in planning the work, that is, in determining how the organization would set about trying to address the kinds of questions or problems posed by its client. Sometimes there were as many as four staff approaches to a problem—for example, on one job there was an auditing approach, an operations research approach, a computer-oriented approach, and a tax specialist approach—and there had to be a mechanism for conciliating these positions, since they were often mutually exclusive and people tended to dig in their heels.

At first, if the team could not agree, it was always an "engagement" partner who had the final say. But when the consulting side of Arthur Andersen had some serious problems of job quality in the late 1960's and early 1970's, the decision was taken "to get better organized" for these important jobs. They did not go to a matrix organization, like RAND, but instead, set up the institution of the "practice director." The Comptroller General told us this was a difficult decision to take because, until then, the "engagement" partner had been king, and "to say to the king, 'you'd better get some advice along the way' was not always easy."

In any event, the "practice director" was an innovation of the early 70's at Arthur Andersen that was at first voluntary. A practice director was a very experienced senior advisor who "would fly in from anywhere and go over the whole job with the team." He was not responsible for that job, but he had a great deal of authority. As the Comptroller General put it, "if you were the engagement partner and you didn't agree with the practice director's advice, you'd better be successful." Practice directors were assigned to one of three areas: tax, audit, or consulting. So each office could call on three practice directors, depending on the type of work.

When it was used, the innovation worked so well as a way of bringing people together and improving work quality, that Arthur Andersen eventually made recourse to the practice director mandatory in either of two cases: if an audit was one of a public corporation, or if a consulting job went above a certain dollar level. That is, at some point during the execution of such a job, the practice director would have to be called in to review it.

At RAND, the issue of how interdisciplinary work disagreements should be resolved was central to the selection and use of the matrix approach. Shubert told us that everyone shares responsibility for RAND products. There is also a recognized responsibility to help colleagues, ranging from discussions in the halls to participating in formal review processes. Every RAND report is reviewed in writing by at least two peers who are selected by the department head, in consultation with the division head. These reviewers (who may come from inside or outside RAND) are chosen to combine objectivity with knowledge of the area concerned, and the performance appraisals of the reviewers take specific account of the quality of the reviews they've written each year.

The main questions addressed by the reviewers is "Is this publishable? Are the assumptions clear and reasonable? Are the methods strong? Are the conclusions appropriate?" The review is addressed to the author of the report, with a copy going to the department head. The author then talks to each reviewer and addresses each comment, though he or she may not necessarily accept every point. About 95 percent agreement is reached through discussion between the author and the reviewer. When they cannot agree, the department head (whose discipline is normally the same as that of the senior author) arbitrates. If the department head cannot solve it, it goes to the division head. Even when the reviewer comes from a different discipline and the dispute basically reflects an

interdisciplinary disagreement (such as the importance of theory versus data, for example), the approach is still the same.

Basically, Shubert says, RAND tries to promote a rational, informal process, and depends on that to ensure a reasonable sharing of viewpoints. If issues are raised that cannot be resolved, they go to a higher level, where people try to decide on a substantive basis. Shubert noted that staff sometimes confront each other "on points that they eventually recognize are not really germane to the review. The program people are in there arguing too. Also, it's not unusual for some difficult or controversial reports to have a very large number of different reviewers (the RAND alcoholism study, for example, had about 120, most of them from outside RAND)."

At the HHS Inspector General's office, Kusserow told us that a major work problem he and others had had with the evaluation unit was that the staff, "if left to their own devices, could never seem to come to a conclusion." He attributed this to their academic training and background and said there were also conceptual problems in that they always wanted to do "the definitive study," were not satisfied merely to contribute to a specific piece of knowledge, and basically "had trouble in narrowing the scope of their work to a manageable level." As a result, some reports came in late, were too long, and occasionally appeared unintelligible.

Kusserow's solution was to stop the whole process and to ask the division's management to deal with the problem as an analytical task. As a result, new standards on the study design and job process were developed and incorporated into the division's operating manual. Since then, Kusserow believes there has been a marked improvement in the quality, timeliness, and impact of the division's reports.

Ahearne joined Woolsey in pointing out that, at RFF, understanding the assumptions made by different disciplines in structuring work has been key to productive interdisciplinary work. For example, he noted that economists tend to think in terms of a rational behavior model: "their basic perspective is that people will make decisions intended to maximize their net economic benefit. Whereas other social science disciplines have a model in which emotions, moral judgments, and error (based on inadequate information, insufficient time, and lack of interest) are major factors in determining decisions, so they tend to disagree." Ahearne feels that once people understand their differing assumptions, they can then structure a way of working together usefully.

RFF's review process consists of sending drafts to, say, four to six outside reviewers, plus one or two inside RFF. Based on that review process, many manuscripts have been rejected and others sent back for additional work.

Many of the problems raised by our experts in this area are echoed at GAO. For example, our technical staff also complain on occasion about managerial decisions that they feel distort the results of their analyses. The review process at GAO is extensive, but it is mainly internal, except in one technical division where external review is conducted on a regular basis for every report. Disagreements between managers and technical staff at GAO have raised questions about the effectiveness of an almost exclusively internal review process in resolving technical issues.

On the other hand, some of the points made by Kusserow about the academic quality of technical staff reports have also been expressed at GAO, and both managers and staff in technical divisions have been grappling with the same problems of achieving brevity and clarity in their reports.

Strategies that may be of interest to GAO, with regard to the resolution of technical issues, are the RAND and RFF external review processes. Branscomb said he feels that the great challenge, in an interdisciplinary workplace where technical and nontechnical staff are mingled, is to stimulate the mainstream culture to generate a work product of high quality, while also attaining real responsiveness from technical staff working in the non-research environment. Knowing what motivates technical staff is important. So are recognition and rewards.

Rewards and Recognition for Technical Staff

All the experts we spoke to agreed on the importance of both rewards (including salary) and other forms of recognition for maintaining the morale of technical staff. As Ahearne put it, "Two things are extremely important to technical people: being able to say and write what they believe, and being recognized for what they do." Unfortunately, there are few failsafe appraisal and recognition systems. On the other hand, salary is something that people can often agree about. Several of our organizations (i.e., RAND, RFF, and IBM) did not appear to have problems in this area. This reflected concerted efforts by these organizations to keep their salaries competitive with the alternatives available to their staffs.

In addition to salary, many experts noted the importance of "psychic rewards." These include bonuses and other types of rewards within the

organization. However, several also emphasized that it is normal for technical staff to seek recognition among peers in their discipline, as well as in the organization. Branscomb noted that, since peer recognition is so very important to technical people, it behooves an organization to encourage them to publish, to present their results at professional meetings, and so forth. This is as beneficial to the organization as it is to the staff, since it keeps staff current about developments in their field and hones their presentation skills. Further, he said, the knowledge base for IBM, RAND, RFF, or GAO is not what the organization knows, but what the world knows. All seven of our experts noted the importance for technical staff of being able to publish and present their research results. To this end, the Inspector General's office at HHS encourages and recognizes such activity by giving awards to staffmembers who publish articles in professional journals.

Several experts, however, noted restricted opportunities for the promotion of technical staff in some organizations. Carey discussed the serious problems at BOB (see above), and this situation recurs in the HHS Inspector General's office where technical assistance staff, or "specialists," with the exception of a very few, cannot expect to rise above the GS-12 or 13 level. Among the organizations we examined, only those that are themselves dominated by technical staff—RAND and RFF—appear to have avoided promotion problems altogether. Indeed, one interesting point about the RAND/RFF experience is that it suggests that if technical staff salaries are competitive enough, there may be relatively little demand by technical staff for assuming broader management responsibilities.

At Coopers and Lybrand and Arthur Andersen, technical staff can become partners by working their way up the consulting side of the business. However, both Woolsey and the Comptroller General indicated that in the past, consulting partners tended to remain "second class citizens" within the accounting firms, even though their work is much more profitable than the traditional auditing business. Thus, technical staff can be denied psychic rewards that are taken very seriously by those within the organization, even though they earn handsome salaries. Both Woolsey and the Comptroller General indicated that the consulting and auditing arms of Arthur Andersen and Coopers and Lybrand have not yet resolved these issues.

IBM, on the other hand, seems to have done a remarkable job of providing nonsalary rewards within the company (e.g., through the IBM Fellows program and generous cash bonuses). It does have a problem, though,

with proprietary information. Publishing by technical staff is discouraged in some areas by the heavy emphasis on protecting corporate intellectual property. During his years at IBM, Branscomb struggled, with only limited success, to open the product divisions to intellectual exchanges with academic research centers and other sources of technical peer group interaction.

With regard to the relationship of these issues to GAO, salary has been a real problem for us because government agencies do not control their own salary structure. Now, although ceiling salaries remain capped, GAO is instituting a new pay-for-performance system whose bonuses and pay increases may provide a way to help at least some technical staff earn more money.

Promotion, at GAO, appears to be a problem for technical staff essentially at the GS-15 level (now called Band III) and beyond if they have not had experience as managers. Entrance to the SES corps at GAO has generally required strong management skills because of the need to be able to shift SES-ers from one GAO area to another. However, as GAO moves forward in its interdisciplinary approach, it seems likely that candidates for the SES will also need to have acquired and successfully demonstrated technical skills, along with their management capabilities.

Summary and Conclusions

The interdisciplinary contexts discussed by our seven experts were of three types: mainstream (whether technical or nontechnical) versus nonmainstream, technical pluralism, and state-of-the-art versus current practice. All three contexts are probably relevant for GAO in that although our organizational situation used to be of the first type, we are likely to be—indeed, we already are—moving toward the second and third types over the coming years, as our staff and management become more interdisciplinary.

The organizational approaches outlined by our experts moved from "separate but equal," side-by-side strategies, through various types of intermediary relationships (from technical assistance to multidisciplinary teams), to deliberate integration via training and other methods.

The problems experienced fell into three categories: fitting-in; assuring work quality across disciplines; and rewards and recognition.

Problems

"Fitting-in" problems included feelings by technical staff of organizational inferiority (i.e., their sense of being "second-class citizens" in a

mainstream organization) and of having limited access to top management. They also included hostility by mainstream groups which felt threatened by unfamiliar technical approaches, irritated by technical staff behavior, or unpersuaded by managers' approaches to integration. In some places, it was hard to get the best technical talent to go where it was most needed; in others, technical staff would not accept differently trained people as peers.

Another area of fitting-in problems had to do with the responsiveness of technical people to the overall goals and values of the organization. For example, technical staff have not always been especially interested in learning how to manage, but have felt obliged to aspire to management positions because technical salaries and other rewards were not competitive. Further, in a mainstream organization, newly introduced technical staff have not always internalized institutional values unaided, especially when those values differed markedly from their own. In addition, when little or no effort was made in organizations to bridge the gaps between a mainstream and a technical culture, technical staff have been perceived (or have perceived themselves) as not being responsive to the organization's overall goals.

Communication, the ability to understand and be understood effectively, was a fitting-in problem in every organization whose managers we interviewed, because of differences in assumptions, culture, values, and language, both across disciplines and across technical and nontechnical groups. This seemed often to be a problem of simple misunderstanding. In other cases, the normal difficulties of discourse were exacerbated by organizational boundaries, and these developed on occasion into thick walls between units which required carefully developed efforts to break down.

Work quality problems in the interdisciplinary context emerged in three areas: problems of settling disagreements about work; problems of getting technical staff to write well-scoped, readable, user-oriented reports; and problems of stimulating cross-cutting interests and leading-edge research among groups from varied technical disciplines.

Finally, with respect to rewards and recognition, everyone agreed on their importance for technical staff morale, and on the importance to technical staff of the ability to publish their work. Perhaps the most acute problem we encountered was that of promotion in some organizations. At HHS/IG, the problem occurred at the GS-12 or -13 level; at BOB and GAO, it was at the GS-14 or -15 level; at Coopers and Lybrand and

Arthur Andersen it was at the very top. RAND, RFF, and IBM had no such problem.

It is important to note that in the three organizations where technical staff salaries were competitive (at RAND, for example, researchers often earn more than department heads), there was little or no demand on the part of technical staff to be promoted to a higher level of managerial responsibilities.

Strategies

Different strategies were adopted by the various organizations to address the particular interdisciplinary problems posed by their individual contexts. Training and procedure standardization were important at Arthur Andersen. RAND adopted a matrix organization to deal with a workforce that was interdisciplinary right from the start. BOB, the HHS/IG, and Coopers and Lybrand set up separate technical organizations and then brought various modifications to that strategy: integration of two technical centers at BOB, centralized technical assistance at HHS/IG, and the dual career track at Coopers and Lybrand. IBM integrated scientists and engineers into all phases of its operations from the very beginning (there are now between 25,000 and 30,000 technical people at IBM in an organization of around 175,000 U.S. employees, according to Branscomb). RFF moved to an interdisciplinary workforce after many years of domination by economists in a mainstream role.

IBM was concerned with ensuring (1) that the best technical thinking in the company would be widely available within the divisions, and (2) that technical people everywhere in the company would have access to top management. To meet these objectives, they implemented four initiatives: a Corporate Technical Committee; a Fellows program; a sabbatical program (sending top technical staff to work in various divisions within the company for a year); and ad hoc laboratories.

The need for RFF was to bring non-economists successfully into the workplace to join economists in working on projects. The strategy adopted was to seek out those qualified social scientists and others who had had prior experience in working with economists.

At RAND, the goal of interesting researchers in management positions led to the recognition that a course in research management (now being developed) was needed at the project leader level. Coopers and Lybrand is addressing "fitting-in" problems by orienting new technical staff in the methods and values of the mainstream (auditing) culture. Differing

assumptions and definitions are explained and a glossary of terms has been suggested.

RAND confronts both work disagreements and barriers across divisions and departments by creating incentives for better communication. Arthur Andersen has dealt with work conflicts explicitly by instituting the special position of "practice director." RAND relies on a peer review system, run by the corporation but often involving outside professionals, for judging reports; disagreements are arbitrated at higher levels and expanded review occurs for controversial reports. RFF goes to 4-6 external reviewers and 1-2 internal reviewers for every product.

With regard to rewards and recognition, the HHS/IG encourages staff to make presentations before outside professional groups and has established an award system for outside publication by technical staff; and both RAND and RFF see the publication of research results in journals as an important part of their staffs' regular jobs. IBM, RAND, and RFF go to great lengths to ensure that their salaries are competitive. Salaries of technical people in all three places may be higher than those of managers. IBM also gives special bonuses and conveys different types of psychic rewards to top technical staff.

Some of these strategies may have relevance for GAO. A course orienting new technical people at GAO could focus on two things: first, the culture, language, assumptions, and traditional methods of the organization that are especially pertinent for them to know; and second, a general introduction to management (for mid-level staff without managerial experience) that would emphasize methods for developing and motivating staff, working in teams, fostering peer group relations, responding to supervisors, furthering institutional goals, and the like. This would combine IBM, RAND, and Coopers and Lybrand strategies.

More external peer review (such as that current at RAND and RFF) could be helpful in resolving technical arguments at GAO.

Finally, GAO may want to give some thought to rewarding technical staff more visibly for successful efforts to publish their work and present it at professional conferences. These efforts are important in that they increase the organization's reputation and prestige, accustom staff to present and defend their work, and bring them current information on new ideas and methods in their field.

Interviews With Outside Managers

GAO's task force on interdisciplinary management, in examining the management, training and utilization of its technical staff, established a subgroup to discuss with managers in other agencies and private firms the challenges of supervising technical personnel in a nontechnical environment. Because the problems surrounding interdisciplinary staff management are ones that many private-sector and government organizations have dealt with for many years, it is valuable to learn what experiences managers—and especially nontechnical managers—in other organizations have had in supervising technical staff that can suggest improvements in our own practices. In short, from their viewpoint, what are the pitfalls and paths to success in interdisciplinary staff management?

This paper summarizes the results of the interviews we conducted with a number of organizations, presents some suggestions by respondents with regard to issues raised by GAO, and describes a set of separate interviews we undertook as a result of the first set, to examine in more detail the experiences of various organizations with the dual career ladder (see also appendix I, Effectiveness of the Dual Ladder System).

We first conducted structured interviews in nine government and private-sector organizations. These were: the Bureau of Labor Statistics; the Department of Defense; the Food and Nutrition Service; the General Services Administration; the Department of Labor; Peat Marwick Main and Company; the National Air and Space Administration; the National Institute of Standards and Technology (formerly the Bureau of Standards); and Touche Ross International. They were selected judgmentally on the basis of their similarity to GAO with regard to the challenges they face in managing an interdisciplinary staff. The organizations included two private audit organizations, three federal offices of Inspectors General, and four other federal organizations.

After discussing the interviewees' organizations and job descriptions, we asked them if they had encountered difficulties in integrating technical and nontechnical employees, and if they had, to identify and discuss any difficult management problems that they attributed to the introduction and/or presence of both technical and nontechnical staff in the organization. This was followed by a discussion of some key management issues that GAO identified. Finally, the respondents were asked to provide information about programs and/or practices within the agency that they felt facilitated successful interdisciplinary staff management.

The issues most often discussed fell into four categories: problems in hiring and retaining technical staff; interpersonal relations and communications; conflicting goals and work styles; and the need for training.

Problems in Hiring and Retaining Technical Staff

More than half of the respondents (five) indicated they had serious problems in this area. Of these, four felt that their problems were due (at least in part) to the inflexibility of the Office of Personnel Management's (OPM) regulations regarding ceilings for technical staff positions, the disparities between salaries in government and private industry, and the public accountant certification (CPA) requirement for executive branch audit staff. Two respondents attributed high turnover among technical staff to these problems. In the four organizations in which no problems in hiring or retaining technical staff were noted, their success was attributed to either an ability to promote technical staff to GS-14 positions or the existence of a separate, nonmanagement career path for technical staff (see below, the section on dual career ladders). Turnover of technical staff was believed to be higher than that of nontechnical staff in four of the organizations, even though this was not necessarily viewed as a problem.

Suggested Solutions

When asked about the steps that had been taken in their organizations to deal with technical staffing problems, the respondents mentioned the following actions as promising solutions:

- Focus on staff concerns that can be addressed, such as the availability of technical training and professional tools, flexibility in job assignments, awards, bonuses, and pleasant physical environments.
- Clearly state advancement limitations to potential staff during screening interviews.
- Encourage OPM to provide more flexible job classifications (such as positions comparable to GAO's evaluator series).
- Demonstrate to both the technical staff and the organization the importance of the role that technical staff can play. Several of the organizations have highlighted the skills and accomplishments of their technical staff to line management and fostered the early involvement of technical staff in job planning.
- Provide technical staff with varied and challenging job assignments.

Problems in Interpersonal Relations and Communications

Two thirds (six) of the respondents felt that their organizations had at some time had a communication/cooperation problem either between technical and nontechnical staff, technical staff and nontechnical clients, or technical staff in different disciplines. Factors that were viewed as contributing to problems in communication and cooperation were:

- lack of communication skills among technical professionals;
- differing approaches to problem solving between different professional groups and between technical and nontechnical audit staff;
- lack of understanding among nontechnical managers regarding the potential roles and contributions of technical staff;
- overlapping areas of expertise as well as professional and occupational rivalry; and
- preference of technical staff for working independently rather than as part of a team.

Suggested Solutions

Three respondents felt that their problems in this area were minimized by their use of a formal or informal matrix organizational structure. Some of the other suggestions for alleviating these problems were that management should

- look for good communication skills when screening technical staff;
- stress the importance of the actual job content (e.g., computer audit rather than software development) during hiring;
- stress the importance to the organization of an interdisciplinary approach to jobs; and
- emphasize to all staff the importance of diversification, possibly even cross-training, as a condition for advancement within the organization.

Conflicting Goals and Work Styles

In all but one organization, problems were perceived in getting the technical staff to adapt to the organizational environment. In four of the organizations it was the impression of the respondent that this was due, at least in part, to a "researchy" work style or personality type. Some of the differences cited between the technical staff and their organizations were:

- the insistence of scientific professionals on the sufficiency of "professional judgment" as opposed to a detailed demonstration of evidence,
- a "perfectionistic" personality type that does not fit well in organizational cultures requiring great flexibility,

- the inability of technical staff to ignore "irrelevant" details and focus on primary issues,
- the "natural" reclusiveness of technical staff,
- technical staff intolerance of "bureaucratic requirements" (such as documentation and other paperwork) and other aspects of organizational work environments, and
- conflicts among research goals, program goals, and management goals.

Suggested Solutions

The only organization that did not appear to be experiencing difficulty integrating its technical staff was a federal scientific agency that boasts a very flexible organizational environment. Some of the steps taken in the other eight organizations to alleviate the above problems included the following:

- Promote the skills and accomplishments of technical staff to the rest of the organization.
- Enforce accountability to ensure that everyone feels fairly treated. In one organization this is accomplished by requiring written contracts between technical assistance staff and their clients to eliminate misunderstandings.
- Provide audit and accounting training for technical staff as well as technical training for nontechnical staff and management. Several respondents have encouraged their technical staff to seek CPA qualification.
- Make sure that job requirements (such as documentation) are reasonable. In one case, management has provided technical staff with a small staff of paperwork facilitators.
- Require nontechnical managers to maintain at least a good layperson's understanding of technical issues.
- Make it clear at the outset to all staff (technical and otherwise) that they will need to add to and diversify their skills in order to advance.

Role of Training in Interdisciplinary Staff Management

Only one of the private-sector audit organizations recognized a technical staff need for management training; however, the respondent emphasized his perception that this training was needed equally by technical and nontechnical staff.

Two of the respondents saw an organizational need for audit and/or accounting training for technical staff. Three expressed a management position that technical staff training was principally for the maintenance of technical skills. Two viewed technical staff training as a benefit that could be used to compensate staff for inadequate salaries.

Several agencies identified informal training activities that they felt were particularly effective. These were:

- teaming new technical staff with successful, experienced technical staff to improve communication and consulting skills;
- using rotational staff appointments in the program office as management internships that junior staff can either request or be assigned to;
- pairing technical staff with same-graded evaluators on jobs; and
- using commercial "freebies" such as videos, expositions, and vendor seminars when training dollars are restricted.

The Dual Career Ladder

As a result of the interviews summarized above and because of the uncertain conclusions of the literature review (see appendix I), the task force decided to examine more carefully the operations and effectiveness of the dual career ladder and its advantages or disadvantages for technical staff. As a result, we reviewed six organizations (five private and one federal): Monsanto, Texas Instruments, Honeywell, Xerox, 3M, and the National Institute for Standards and Technology (NIST). We chose these organizations because they currently use a dual ladder which meets three criteria: (1) advancement is based on technical rather than managerial expertise, (2) positions require few administrative responsibilities, and (3) rewards and status are viewed as equivalent to those attainable on the management ladder. Other reasons for choosing these organizations were that they were able to furnish documentary evidence of their career ladder's design and implementation, they allowed us to interview their employees, and they are cited in the literature on dual career ladders. Names of candidate organizations were obtained both from the literature and, as already noted, from interviews conducted in earlier task force studies.

This study was conducted in two phases. In Phase I, discussions were held with upper-level management—usually a corporate officer with a personnel or human resources perspective—to obtain a description of the dual career ladder, how it operates, and how well it is documented. In Phase II, computer-assisted telephone interviews were conducted with 37 technical staff at various levels to obtain their perspectives on the dual career ladder. Since the federal technical organization, NIST, diverges so substantially from the private organizations, we discuss it separately.

In the corporations we studied, dual career ladders occurred only within the technical divisions of the business. In general, the organizations used

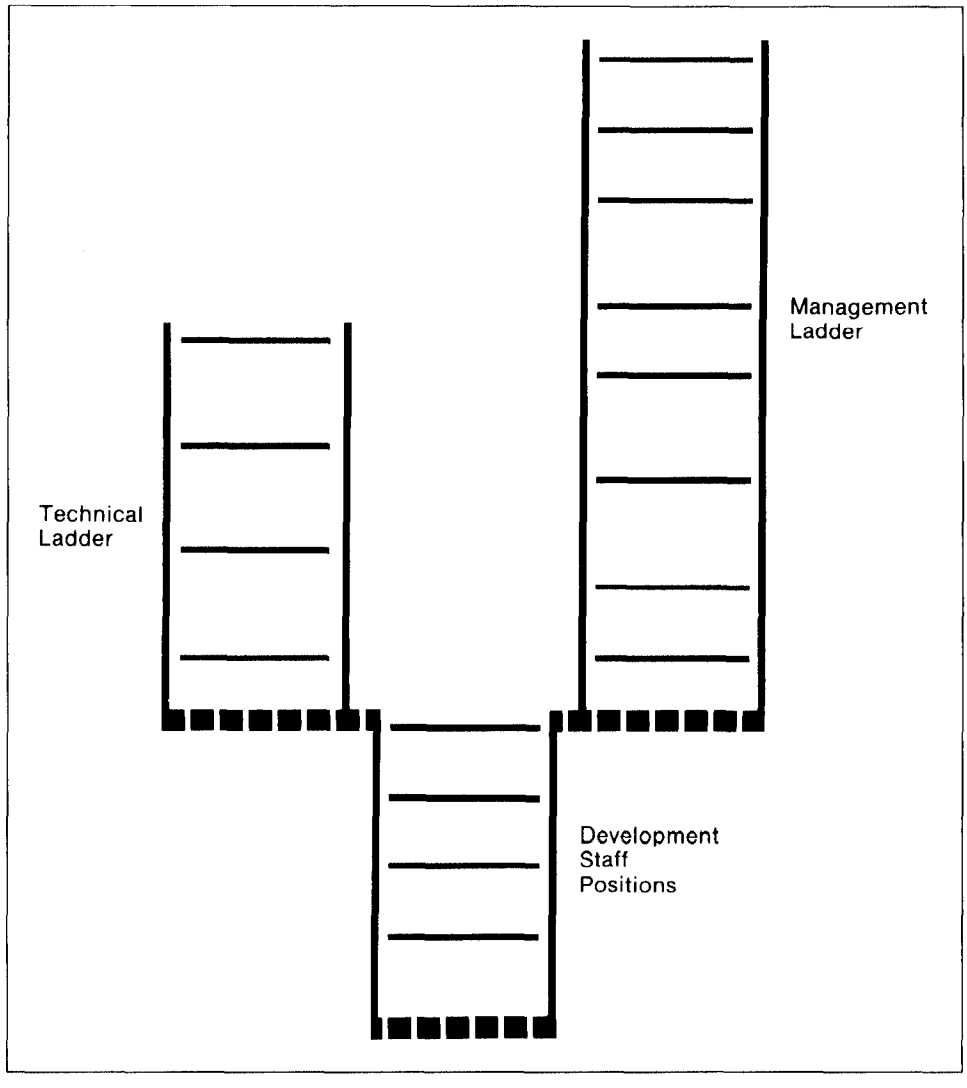
the ladder to retain valuable expertise, combat turnover, and promote technical staff without requiring them to assume management responsibilities they might not welcome.

The design of the dual career ladder and the way in which it is used varied among organizations. In each case, the organization's goals and corporate culture determined the structure of the ladder, as well as the manner in which it was put into practice.

Background

Dual ladders are found mainly in the research, engineering, and product development departments of organizations in technical industries such as pharmaceuticals, chemicals, computers, and electronics. Figure III.1 shows a typical dual career ladder, with one or more developmental positions below the branch point at which technical staff must decide whether to pursue a management or a technical career. In general, this ladder usually does not reach as high as the parallel management ladder, and it has fewer positions on its top rungs. People at its highest levels constitute a technical elite, often nationally recognized in their professions and treated as corporate resources whose value goes beyond the department or field in which they do their work.

Figure III.1: Dual Career Ladder



The corporations we studied have used dual ladders for at least 10 years and, in one case, for over 40 years. Eligible staff came principally from research and engineering positions but, in at least one organization, all technical staff were eligible for the advanced technical positions.

While election to and promotion on the technical ladder required both managerial and peer review, the relative importance of this review varied among organizations. The organizations were unanimous, however, in their position that the technical ladder should not be used as a "dumping ground for failed managers." In other words, their concern

focused on the need to ensure that those placed on the technical ladder were selected for their high standard of technical performance rather than their lack of interest or ability in managing staff.

The opportunities for advancement offered by both sides of the dual career ladder were roughly comparable at the lower and mid-levels, but were more limited on the technical side at the higher levels. In addition, the technical side generally offered few, if any, opportunities to reach a position equivalent to corporate officer. Yet, as noted, one of our three criteria had been that rewards and status on the technical ladder should be seen as equivalent to those attainable on the management ladder. This does not necessarily seem to be the case.

Promotion Criteria

The organizations differed considerably in the way technical ladder positions were created and filled. At one end of the spectrum, positions were developed to address an identified organizational need, position descriptions were quite detailed, and candidates were rated on specific aspects of performance. Performance ratings then determined an individual's suitability for the position in competition with other candidates. At the other end of the spectrum were organizations that focused more on the development of individual staff and thus had a less structured promotion process with little or no competition for positions. In all but one organization, the technical ladder was used principally for the development of "home-grown" staff, with few, if any, positions awarded directly to individuals hired from outside.

Although organizations varied in the degree of tenure afforded the advanced technical staff, in all cases individuals could be demoted or removed from the technical ladder for "performance below the standards for the positions."

Use of Technical Staff

There was considerable variability, both within and among organizations, in the way the advanced technical staff were used. While some people worked largely on their own projects, the majority worked on project teams.

How technical staff advice was used depended on both the organization's management style and the individual's temperament. Although in all organizations the advanced technical staff were expected to provide some form of technical leadership, most were used as consultants to

management. Only one company regarded its senior technical staff as equal members of the management team.

The Special Case of NIST

The National Institute of Standards and Technology (NIST) is different from the five private organizations in several respects. Most of NIST's advanced technical staff function as individual contributors; in this respect, the organization identifies more with academia than with private industry. Instead of having a technical ladder that is smaller than its managerial ladder, the ratio of advanced technical staff to managers is almost 20 to 1. According to NIST management, technical professionals do not want to be managers; many have to be "persuaded" to take management positions and will escape those positions at the earliest opportunity. Career ladder crossovers are believed to be fairly common. Even though federal law (rather than corporate culture) governs hiring, promotions, and career path ceilings, NIST has achieved slightly greater flexibility through its Pay Banding Demonstration Project and OPM's technical expert program.[1]

Management Training and Career Assistance

There was little formalized organizational effort in management training or career assistance in five of the six organizations. At Xerox, however, managers were expected to discuss career ladder preferences with developmental staff and to provide them with both management and technical experiences. In addition, all Xerox employees are required to take management seminars. The company has extensive in-house management training and also takes advantage of the technical management courses offered at MIT.

Interview Results

Of the 37 technical staff we interviewed, eleven were developmental staff, 12 were middle managers, and 14 were advanced technical staff who hold positions on the technical side of the dual ladder. By and large, the respondents believed the ladder was a viable and important part of their organizations. Some respondents suggested minor adjustments; none suggested a major overhaul.

During the course of the structured interview, we asked the respondents to evaluate what benefits this ladder had provided to their organization. In their estimation, the top five benefits of the dual career ladder for

[1] Paragraph 3104 of Title 5 allows OPM to grant a number of positions, similar in administration to SES positions, for the purpose of attracting top drawer technical talent to government where needed.

their organization were: (1) the retention of staff with uniquely valuable technical skills, (2) opportunities for non-management advancement, (3) sufficient opportunities for advancement, (4) opportunities for technical staff to interact with upper management, and (5) autonomy in deciding how to do their jobs.

These factors do not necessarily mean that individual personal preferences and needs were largely met through the technical ladder. For example, the factor ranked first (the retention of staff with uniquely valuable technical skills) is purely a management goal.

Concerning the relative importance of factors that contribute to or hinder the job satisfaction of technical staff, these staffmembers ranked challenging work, its match with their skills and interests, the provision of tools (such as personal computers), and the degree of autonomy granted them as the four most important. Thus, the only one of these factors that the dual ladder was seen to affect was the last one (i.e., autonomy in deciding how to do their work).

Many of the staff mentioned that a crucial requirement for advancement on the technical ladder is an understanding of the business of the organization. They emphasized that while it is important to recognize key technical opportunities, it is at least as important to be able to sell the idea to a sponsor, develop the idea as a viable product, and see it through to delivery.

When we asked the respondents to rate a number of factors on which technical ladder promotions ought to be based, the top three mentioned were (1) creativity and innovation, (2) state-of-the-art knowledge, and (3) peer recognition as an expert. Interestingly enough, in terms of differences among technical and nontechnical values, strong interpersonal skills were near the bottom of the list.

We also asked the respondents about the comparability of rewards on the two ladders, and the consensus was that those on the managerial ladder tended to fare somewhat better. Managers were believed to have somewhat better remuneration and perquisites, and most respondents believed that upper management had a better understanding of the managerial ladder's contributions to the organization. The advanced technical staff, on the other hand, were viewed as slightly more likely to have the esteem of their peers or to receive awards. When asked about suggestions for improving the technical career ladder, the majority of the respondents indicated that they were pleased with the program. The

most frequent suggestion was that the advanced technical staff should have more input to strategic planning.

When the respondents were asked whether they would prefer a promotion on the technical ladder or on the management ladder, the majority of managers' and advanced technical staff's responses were, as expected, to obtain promotion on their respective ladders.

Finally, it is interesting to note that staff eligible for the technical career ladder in the six organizations are (1) relatively homogeneous within their organizations and (2) educationally and functionally distinct from other staff in their organizations. This presents a different picture from that of GAO, with its extremely heterogenous technical staff, many of whom perform the same functions as nontechnical staff.

Summary and Conclusions

With respect to the first set of interviews, all of our respondents spoke to issues that had already been raised within GAO regarding the management of interdisciplinary staff: the difficulty of hiring and retaining technical staff, particularly in specialties that are in high demand; the problems in interpersonal relations associated with a highly varied staff; and the difficulties of merging that highly varied staff into a cohesive unit that honors everyone's professional ethics without compromising organizational goals. Most of those interviewed suggested solutions to one or more of these problems, discussed above.

One of these solutions was the dual career ladder which functioned in some of the organizations we studied and which formed the object of a second set of interviews. We found that the dual ladder concept allowed organizations to retain valuable expertise and promote technical staff without requiring them to assume unwelcome management responsibilities. Although top management and staff differed on whether technical staff had enough power and influence in strategic planning, and although the consensus among respondents was that the two ladders were not equal (managers being seen as having better remuneration and perquisites) both groups agreed that the dual career ladder has been successful.

A Census of GAO's Technical Staff

GAO's task force on interdisciplinary management, which seeks to improve the management, training and utilization of technical staff at GAO, established a subgroup to define, identify, and count GAO staffmembers who should be considered technical staff.

The criteria adopted by the task force to identify the universe of GAO technical staff are given in chapter 2 (figure 2.1) in volume 1 of this study (GAO/PEMD-90-18).

Developing the Census

We requested the divisions, regions, and offices to review the backgrounds and assignments of their staff, and for staffmembers who met our criteria, to provide his or her name, current location, grade, job series, and technical field or discipline.

We pretested this method of capturing technical staff for the census by applying it in GAO's General Government Division (GGD). In GGD, the listing of technical staff was prepared by the Division's Human Resource Unit. GGD's Director of Operations, who is familiar with the technical staff in the division, reviewed the results of the pretest (i.e., appropriateness of who was included and excluded). On the basis of the pretest, which successfully captured all GGD staff with known technical background, the task force concluded that the criteria and approach, while not perfect, would (1) be a fair representation of GAO staffmembers who have specialized or research skills not normally possessed by members of the evaluator staff and (2) provide an adequate universe for the survey.

After the pretest, we proceeded with the task of identifying technical staffmembers GAO-wide who should be included in the census for questionnaire purposes. The listings of technical staff provided by the divisions, regions, and offices were reviewed by two task force members, who evaluated the lists in terms of the stated criteria and added or deleted staff as appropriate. Based on task force deliberations and agreements, staffmembers in some staff offices, job series, or occupational specialties were excluded from the lists (such as writer-editors, personnel psychologists, computer systems analysts in staff offices, etc.).

Characteristics of Technical Staff

Technical staff, as might be expected, are concentrated primarily in three divisions or in the DMTAG, TAG, or EAG technical assistance groups within divisions and regions. (See tables IV.1 and IV.2.)

101, Social Science Analyst/Program Specialist, each has about 13 percent of the population. All other staff are spread among the remaining 17 job series.

Table IV.4 shows distribution of people by organization, and tables IV.5 and IV.6 provide additional detail about characteristics of the technical staff.

Table IV.4: Technical Staff by Organization[a]

Organization	Number	Percent of total population
AFMD	14	3
GGD	52	11
HRD	56	12
IMTEC	90	19
NSIAD	44	9
PEMD	78	16
RCED	39	8
Other	16	3
Regions	92	19
Total	**481**	**100**

Series	AFMD	GGD	HRD	IMTEC	NSIAD	PEMD	RCED	Other	Regions	Total
GS-1301 Physical Scientist	0	0	0	0	0	1	1	0	0	**2**
GS-1350 Natural Resources Manager	0	0	0	0	0	0	1	0	0	**1**
GS-1510 Actuary	0	1	0	0	0	3	0	0	0	**4**
GS-1515 Operations Research Analyst	0	3	1	1	5	9	6	0	5	**30**
GS-1529 Mathematical Statistician	0	0	1	0	2	0	0	0	0	**3**
GS-1530 Statistician	0	0	0	0	0	1	0	0	0	**1**
GS-1550 Computer Scientist	0	0	0	15	0	0	0	0	0	**15**
Total	**14**	**52**	**56**	**90**	**44**	**78**	**39**	**16**	**92**	**481**
DMTAG/TAG/ADP Staff	13	15	21	17	17	0	12	2	75	**172**

Once we had our two universes—technical and nontechnical staff whom unit managers would like to have retained—we drew a random sample from each list. We randomly selected one technical and one nontechnical person from each unit to be interviewed. In all, we conducted 18 interviews with technical and 21 with nontechnical staff, plus 4 interviews with technical people who had returned to GAO. (Some of the units had no technical staff leave during this time period; some had no staff at all leave; and some had no staff leave that they wished to retain—therefore, we could not interview one person from each of the units included.) Our results cannot be generalized beyond our samples.

Staff Who Left GAO

Over 1,200 people attrited from GAO during fiscal years 1986-88. Excluding those who died or retired, administrative staff, and GS-7s and below, about 550 professional staff left GAO. Of these, about 20 percent were designated technical by their unit managers, and about 80 percent were designated nontechnical. Managers would have preferred to retain about 70 percent of the technical staff, and about 50 percent of the nontechnical staff.

In the next sections, we present what we learned from these interviews in terms of entry to GAO, integration of staff into the GAO work process, interpersonal relationships, and the decision to leave GAO.

Entry to GAO

Technical and nontechnical staff responded similarly to questions about their first year at GAO. A majority of both groups said that their actual experiences at GAO matched their initial expectations. Some, however, said that later in their careers, their actual experiences deviated from their expectations. Both groups cited negative and positive experiences with supervisors and assignments.

Most persons in both groups received training in their first year and said that it was beneficial. However, most also said there was other training they would like to have had and did not get during their first year.

Experience Versus Expectation

Work assignments and GAO's approach to work were the areas cited by some of both groups as not always meeting expectations. For example, one technical person wanted to work full time in her unit's TAG and was told that she would have to work as an auditor through the grade 12 level. Another technical person was assigned to a TAG although he was hired as an evaluator and would rather have stayed an evaluator.

would be doing programming but instead was treated strictly as an evaluator and assigned accordingly. A nontechnical staffmember said that she was assigned to jobs she was not interested in. Another nontechnical person told us she had taken a job with GAO and relocated to Washington in order to develop her computer skills. But she said she was told to forget everything she had learned in school and concentrate on becoming an evaluator. She eventually left GAO with the feeling that she had disrupted her life for no purpose.

On the positive side, two technical staff said awards received on first-year assignments boosted their perceptions of GAO.

First-Year Training

Most respondents, both technical and nontechnical staff, received some form of training during their first year with GAO. A majority of each group said the training was beneficial. However, many of each group said that in retrospect they would like to have taken other courses during their first year. The courses most often mentioned by both groups were courses in basic auditing, workpaper preparation, and evidence.

Integration of Staff Into the GAO Work Process

Integrating staff into the work of GAO is another area we explored with both technical and nontechnical staff who left GAO. When asked what technical requirements for good quality work were difficult to maintain in GAO, both groups cited problems with job design and methodology, and time constraints.

A majority (11 of 18, or 61 percent) of technical staff interviewed said there are problems with our methodology and the way we design various jobs. Five commented on design issues: sampling, modeling, and questionnaire design. One technical respondent said that GAO work methods conflicted with professional standards, especially with social science research methods. Four technical respondents believed GAO could improve its application of computer technology.

A minority (8 of 21, or 38 percent) of nontechnical staff interviewed also had critical comments about GAO's methodology, but the criticisms were different, focusing on problems other than design. For example, one nontechnical staffmember said technical requirements are difficult to maintain because of GAO's reluctance to allow staff to specialize in specific issue areas. Another said GAO is not doing vulnerability and reliability assessments when they should be done, and that GAO relies too much on testimonial evidence. Four nontechnical respondents joined

Suggested Changes in GAO's Work Procedures

When asked directly if GAO should make changes in its work procedures to facilitate good quality work, a majority of both the technical and nontechnical staff said yes. Specific suggestions varied. Individual technical staffmembers suggested the use of more outside consultants in our work; the allowance of more time to do quality work; the development of procedures for documenting computer work; a change in GAO's organization structure to bring more technically trained staff into upper management; and the development of technical skills in the regions. Nontechnical staffmembers said that GAO should have a policy requiring headquarters staff to be more involved in audit work; that GAO should change its method of collecting data, with the objective of reducing the time spent and the level of detail; that GAO should eliminate some layers of report review; and that GAO should allow people to specialize.

Suggested Changes in GAO's Training

A majority of both technical and nontechnical staff had suggestions for GAO's formal and on-the-job training. Both groups believed that they needed basic audit training. One technical person said that GAO should increase its computer skills. One nontechnical person said that managers should show new staff what they are expected to do: for example, how workpapers are to be prepared and later referenced. Another nontechnical staffmember said that new people should be placed with "quality" or "seasoned" supervisors, and have at most three or four assignments during their initial years. "Don't rotate them for the sake of rotation," he advised.

Interpersonal Relationships

A majority of both technical and nontechnical respondents characterized their interpersonal relationships at GAO as generally harmonious. A majority of both groups also said their performance appraisals were generally accurate and well justified.

Communications

A majority of both sets of respondents said that they had little or no difficulty communicating their professional judgment to supervisors and peers and that their peers and supervisors attempted to understand their concerns to a moderate or great extent. Most also said that they had the opportunity to go higher up the chain of command with a problem.

The nontechnical respondent who said his morale was negatively affected said he had received some awards but no positive reinforcement from his supervisors, who were far removed from his jobs. He also stated that he received hardly any verbal recognition.

Decision to Leave GAO

Both technical and nontechnical respondents cited limited promotional opportunities as their reason for leaving GAO. More nontechnical than technical staff said they would definitely recommend GAO to someone with comparable experience. The two groups generally agreed on the attractive features of GAO—varied work experience; professional image, reputation and prestige; good working relations; improved marketability.

Reasons for Leaving GAO

The majority (10 of 18, or 56 percent) of the technical staff interviewed cited lack of promotional opportunities among the reasons they left GAO. Six of the 10 said they believed their chances for promotion would have been better if they were generalist evaluators. In addition, three of the four technical staff who left and subsequently returned to GAO also cited lack of promotional opportunities as their reason for leaving.

Responses among the nontechnical staff interviewed also turned up lack of promotional opportunities among the reasons for leaving GAO, but this reason was cited by a minority (7 of 21, or 33 percent) of nontechnical staff.

Many other reasons were given for leaving GAO by both technical and nontechnical staff. These included the desire for different types of work experiences; travel; personal situations; and problems with management.

Specific Changes Needed to Persuade Staff to Stay

Most technical and nontechnical staff cited improvements that would have encouraged them to stay. In the same way that many cited lack of promotional opportunities as the reason they left, so more promotional opportunities would have encouraged them to stay. Eight people (4 technical and 4 nontechnical)—that is, about 20 percent of the sample—said that nothing would have persuaded them to stay.

One technical respondent said that managers must demonstrate that they seriously want to increase technical sophistication in GAO. Several technical people thought their technical skills were underutilized or that

- Professionalism, image, reputation, prestige (10 of 39 people).
- Good working relationships (11 of 39 people).

Reasons for Returning to GAO

Of the four technical respondents who subsequently returned to GAO, three were rehired at higher salaries than when they left (two at a higher grade, one at a higher step). One of the staff who returned did so because she was offered a higher grade and management promised to let her work in the group of her choosing. Another came back primarily because of personal conflicts he experienced on his new job. The third returned to GAO because he felt that GAO's assignments were more challenging. The fourth person who returned took a significant cut in salary to return to GAO, but did so for personal reasons.

report, therefore, we examine the survey responses of distinct, but often overlapping, subgroups within that population.

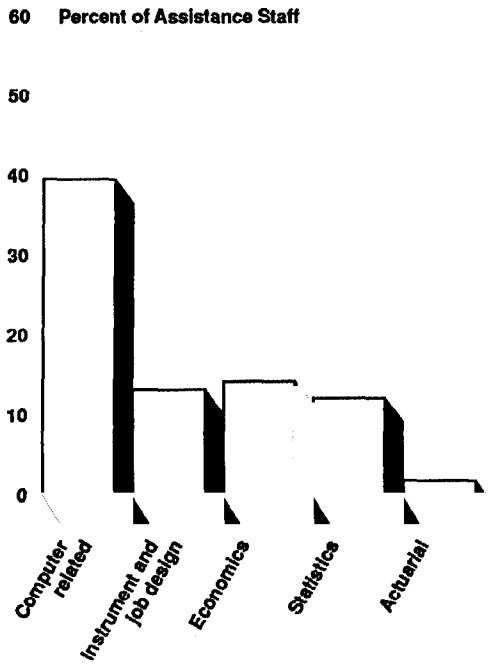
Probably the most fundamental distinction among the members of the technical staff is that between staff located in a Washington division or office and staff located in regional offices.[1] Eighty percent of the technical staff are in headquarters, and 20 percent are in the regions. A second important distinction among members of the technical staff concerns the role that they perform. About 45 percent of the survey respondents report that they serve in an assistance or advisory role, in most instances as part of a DMTAG, a TAG, or the OCE. Fifty-five percent are managing or working on jobs for which overall responsibility rests with their own work group within a technical division, a program division, or a regional office. Thus, the members of this latter group are performing functions that are in essence those of the typical GAO evaluator.

The split between assistance and evaluator functions differs dramatically between headquarters and regional staff. In headquarters, 36 percent of the technical staffmembers provide advice or assistance, while in regional offices 81 percent do so (see figure VI.1). Thus, when reporting responses of regional office staff, we are to a very large degree reporting the responses of staff whose function is to provide assistance. This is less the case when we report the responses of headquarters staff.

[1]Included in regional office responses are two from staff of the European office.

categorization of importance among the assistance staff is that of the kind of assistance provided. Figure VI.2 displays the primary areas in which technical staffmembers provide assistance.

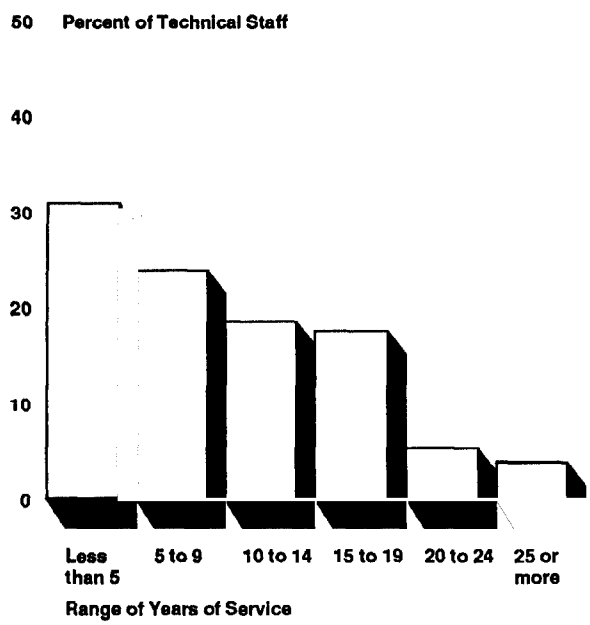
Figure VI.2: Types of Technical Assistance Provided



We believed that, among the staff performing evaluator functions, a distinction of considerable importance would be that between staff in the two technical divisions, IMTEC and PEMD, and those in the program divisions and regions. Presumably, the 53 percent who are in the technical divisions are in an environment populated by staff who are similar to themselves in level of training and in area of specialization. This is not the case for the 47 percent who serve in program divisions and regions. Thus, professional isolation would seem less likely to be a problem for those in the technical divisions.

Another distinction that we believed to be important within the technical staff concerns educational level. As shown in figure VI.3, the technical staff is divided almost equally among those holding bachelor's,

Figure VI.4: Years of Service

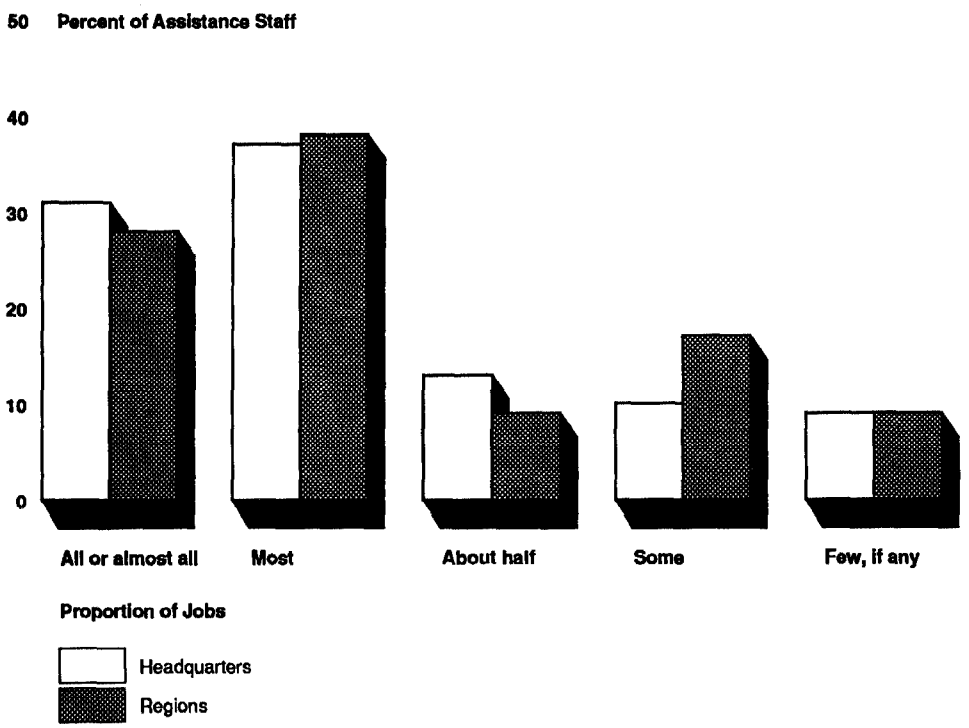


Among the more recent hires, that is, those hired in 1981 or later, technical staff are primarily located at headquarters, with a large number being in PEMD (in existence only since 1980) and IMTEC (formed in 1983). Linked to the difference in location is a difference in function within the agency. By a considerable margin, the more recent hires are performing evaluator functions rather than serving in assistance or advisory roles.

There is a considerable difference between the more recent hires and earlier hires in educational level. Overall, 43 percent of the recent hires hold doctorates, while only 15 percent of the earlier hires do so (see figure VI.5). Even when PEMD staffmembers are excluded, the difference is striking, with 37 percent of the recent hires holding that degree.

staff. Although the assistance staffmembers do not often prepare written material to be included in the final report, the results of their work are, in most cases, discussed or presented in the final report (see figure VI.6).

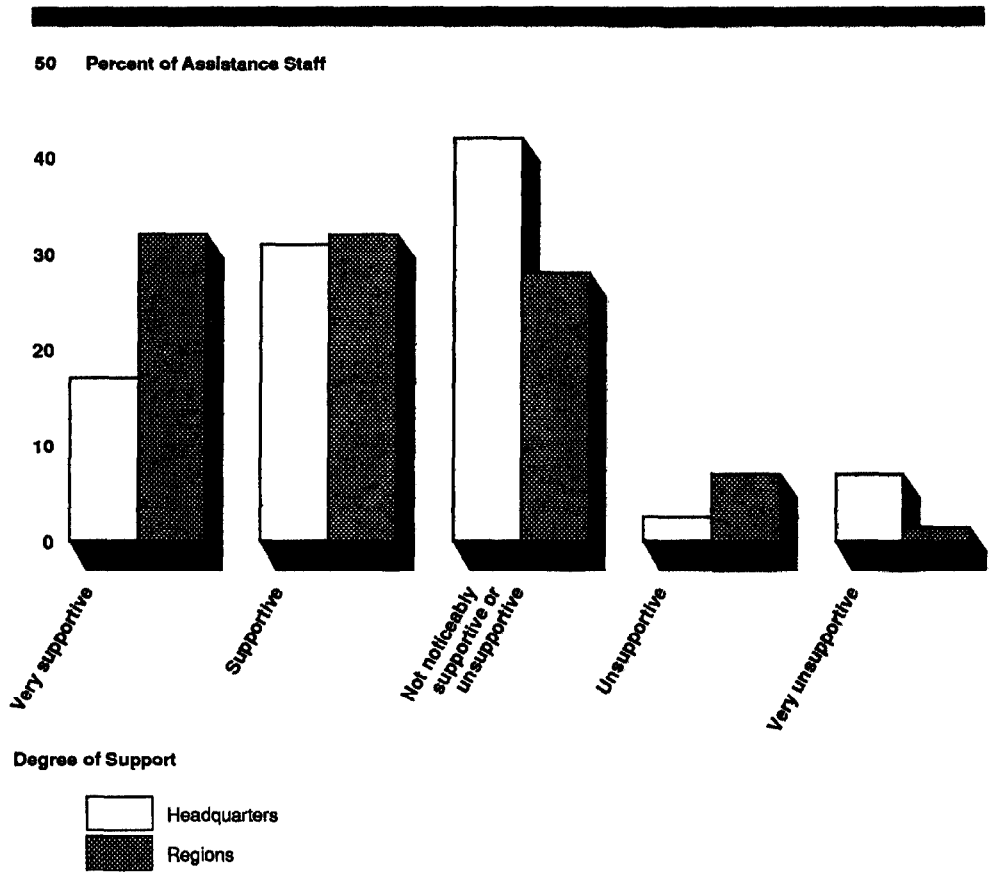
Figure VI.6: Frequency With Which Assistance Is Used in Reports



On the important question of the accuracy with which the results of their work are reported, the great majority of assistance staffmembers, both in headquarters and in the field, felt that most of the time the results of their work are accurately portrayed in the final report. A smaller proportion, but still a majority, of the assistance staffmembers expressed the view that in most cases the results of their work received what they considered to be adequate prominence in the final report.

On the issue of whether technical adequacy might be being sacrificed by evaluator staff whom they assist, the responses of the members of the assistance staff were somewhat reassuring. When asked about the resolution of disagreements between the evaluator staff and themselves, 60

Figure VI.7: Views on Management Support

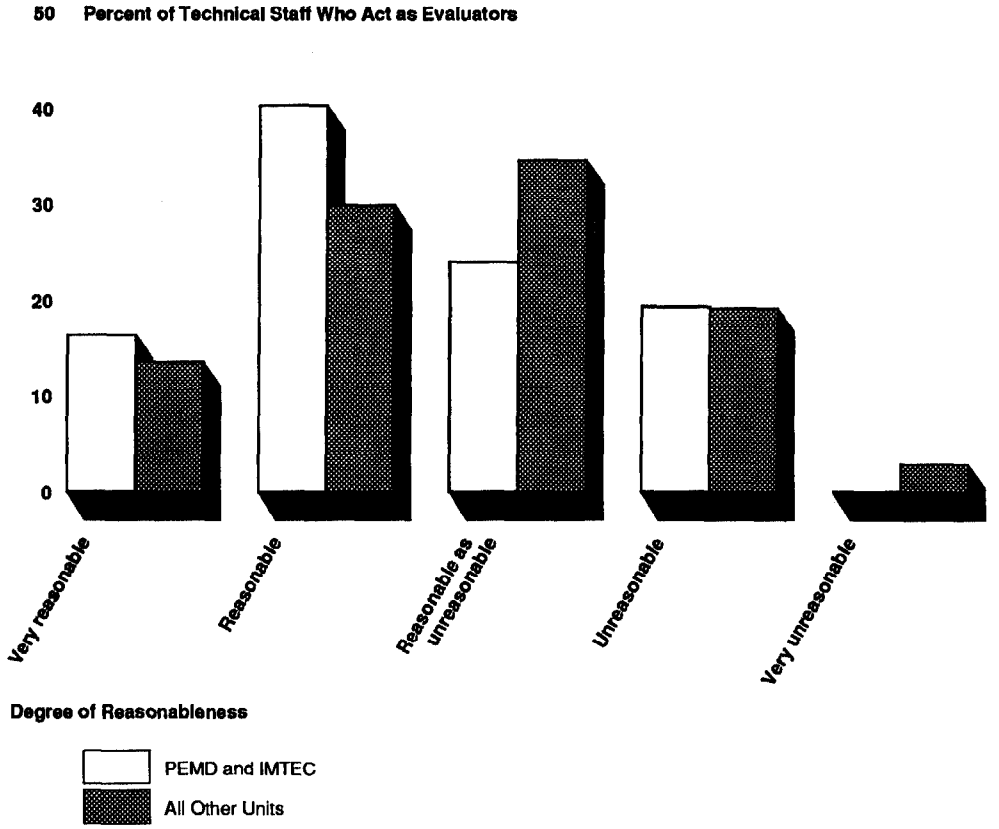


Acclimatization of Technical Staff to GAO Evaluator Role

Unlike those members of the technical staff engaged in providing advice and assistance, those who perform evaluator functions have control, to a large extent, over the report products for the jobs on which they work, and thus over the extent to which their work is used. For them, therefore, the issue related to GAO's success in its efforts to integrate varying disciplines into the work of the agency would seem to center around how well they as individuals have been able to adjust to an organization in which the mainstream professionals are from disciplines and/or educational levels different from their own.

To this segment of the technical staff, therefore, we addressed a short series of questions intended to elicit an indication of the extent to which as individual professionals they have encountered difficulties in GAO resulting from those differences. The areas into which we inquired were:

Figure VI.8: Reasonableness of GAO Documentation Requirements



Here, as in other areas addressed in the survey, although the general picture may be fairly positive, there are individual members of the technical staff who report high degrees of frustration. Thirteen staffmembers, nine who perform evaluator functions and four who serve in assistance roles, expressed frustration with the documentation requirements. One, in the evaluator function category, expressed his frustration through this comment:

"I suspect that virtually every specialist in GAO has had to pull an introductory textbook off the shelf to index some statement. When that specialist was hired for his or her specialized knowledge and ability, this frequently comes across as an insult to the specialist's professional competence."

In the survey, we attempted to obtain an indication of the extent to which technical staffmembers who are performing evaluator functions in the program divisions or regions, and are thus functioning in the mainstream evaluator community, felt isolated professionally. We asked those individuals how much opportunity they have to interact with GAO colleagues of background similar to their own. Only 34 percent said that they have great or very great opportunity to do so. Thus, it appears that professional isolation may be a problem for technical staff performing evaluator functions in the mainstream evaluator community.

Introducing Technical Staff to GAO

It seemed to us that an important aspect of GAO's movement toward the development of an interdisciplinary staff is the foundation established during a technical staffmember's first year with the Office. For this reason our survey inquired into the first-year experiences of those members of the technical staff hired during the 1980's.[2] We were primarily interested in the thoroughness with which the incoming staffmember had been informed of what to expect, the staffmember's experience with his or her first supervisor, and the extent of training provided the new staffmember in fundamental GAO procedures. With the exception of the supervision provided the new staffmembers, there seems to be a need for improvement in all of these areas.

About 40 percent of the technical staffmembers joining GAO in the 1980's reported that before starting work at GAO they thought they had a clear understanding of the nature of the work they would be doing. Twenty-seven percent said they had only a vague idea about it, and the remaining 33 percent recalled being somewhere between clear and vague in their idea of the nature of the work they would be doing. We then asked how closely their first year work experiences matched their expectations. Nearly one-fourth of the respondents reported that there was a great match, somewhat more replied that the match was slight, at best, and nearly half reported that their first year moderately matched what they expected work at GAO to be.

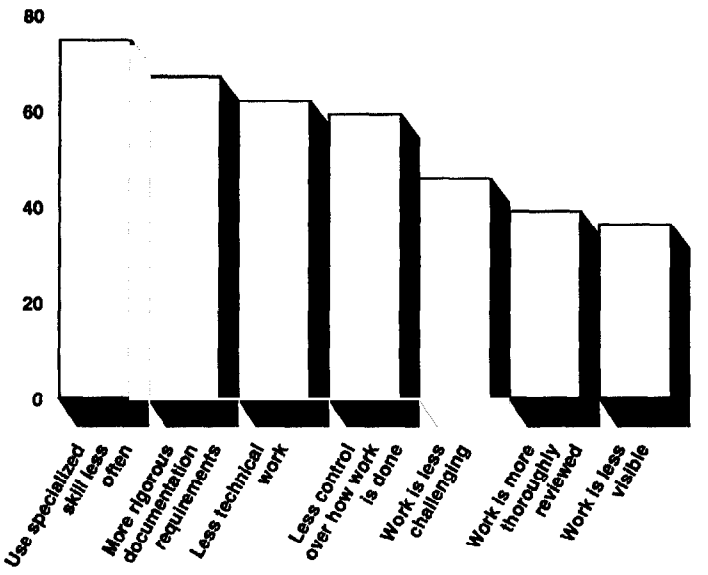
Expectations vs. Reality

To the nearly three-fourths of the respondents who reported that there had been only a moderate or slight match between their expectations regarding, and the reality of, their first year at GAO, we asked in what ways their work during the first year differed from what they had

[2]We excluded staff hired before 1980 from our questioning about first year experiences for two reasons: possible difficulty in recall and insufficient relevance to current and recent GAO operations.

and actuality was in the direction of less control rather than more control. Only 17 percent were surprised in the opposite way.

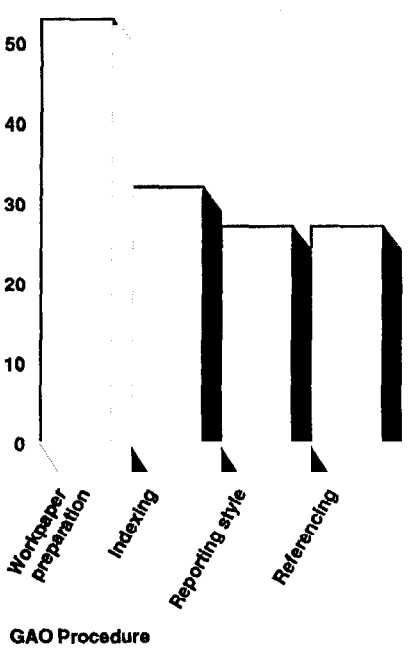
Figure VI.10: Ways GAO Work Differed From New Staff Expectations



Note: This group includes only the 177 new staff members whose expectations were not matched by their GAO work. New technical staff includes people who were hired since 1980.

It is unrealistic to assume that in our recruiting discussions with prospective staffmembers we could provide them with completely accurate pictures of their work life at GAO. These survey results suggest, however, that we ought to do better than we have thus far. Further, they indicate some directions in which we ought to go in better explaining what the new technical staffmember will encounter, at least in the early stages of his or her career. There is a consistent thread in the areas of "surprise" listed above. It is that, at least in their view, new staffmembers have not been fully informed that they will not be doing a great deal of technically sophisticated work and that they will be subjected to documentation and review requirements that are more stringent than those encountered in other employment settings.

Figure VI.11: New Staff's Understanding of GAO Procedures



Note: New technical staff includes people who have been hired since 1980.

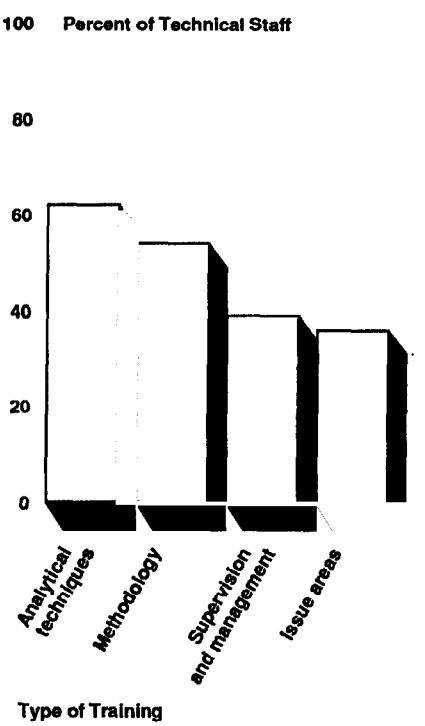
In each of the topic areas, a higher proportion of staff who perform evaluator functions than assistance staff reported an adequate understanding. This disparity was the greatest for reporting style, 11 percentage points.

Training and Professional Development

The members of GAO's technical staff generally want additional training but believe that in-house courses are not the appropriate vehicle to deliver that training. Although many have been unable to attend desired training courses, seminars, or meetings during the past 3 years, most do not believe that their training opportunities have been constrained to a greater degree than have those of members of the evaluator staff.

We asked all technical staffmembers how closely the current selection of GAO in-house courses matches their training needs. As shown in figure VI.12, only a very small number of respondents felt that the in-house courses provide a good match with their own training needs.

Figure VI.13: Additional Training Desired



Large majorities of staffmembers involved primarily in providing advice and assistance expressed interest in additional analytical and methodological training, while among those performing evaluator functions there was widespread interest in issue-area-related training and training in supervision/management.

Having established the nature of the training desired by technical staff, the survey then asked the respondents to indicate their three most preferred methods for obtaining additional technical knowledge or experience. Nearly 60 percent cited "seminars by professional societies" as one of their three most favored methods. The second most frequently cited method was "attending professional meetings," with 47 percent citing it. The relative popularity of various methods of obtaining training is displayed in figure VI.14.