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This paper distinguishes between "strategic autonomy" (the freedom to set one's own research agenda) and "operational autonomy" (the freedom, once s problem has been set, to attack it by means determined by oneself, within given resource constraints). The paper argues, and presents preliminary corroborating data, that the optimal position for the start of careers in the R&D lab is to be low on strategic but high on operational autonomy. Most labs, however, seem to espouse a philosophy of strategic autonomy. This confusion between strategic and operational autonomy creates dilemmas and contradictions in the technical

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Autonomy in the industrial R-and-D Lab.

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Sloan School of Management
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Autonomy in the Industrial R&D Lab

by

Lotte Bailyn

Sloan School of Management
Massachusetts Institute of Technology

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Autonomy in the Industrial R&D Lab*

Lotte Bailyn

Sloan School of Management
Massachusetts Institute of Technology

October 1984

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Autonomy in the Industrial R&D Lab

Lotte Bailyn

It has long been assumed that the problem of "professionals" in industrial organizations resides in the conflict between autonomy and organizational goals. It is the thesis of this paper, based on intensive studies of employees in a few central R&D labs in the United States and Britain,[1] that this assumption is oversimplified and hides the real issues facing technical employees in industrial R&D. Proper understanding, it is proposed, requires a more differentiated view of the meaning of autonomy, as well as a better appreciation of the orientations of people who populate the professional ranks of the R&D lab.

Symptomatic of the confusion is the issue of nomenclature. What should one call the technical staff employees in such a lab? Some are scientists, others are engineers; some have doctorates, others have various degrees of lesser "professional" standing. The differences between these groups have been well documented (Allen, 1977; Kerr et al., 1977; Bailyn, 1980). The most frequently used term is "professional," but the characterization in some labs of a technical staff, rather than a professional staff, is really more accurate. For these technical employees are not professional in the classic sense: they are not "free"; they have no easily identifiable clients for whom they perform their services; and they are subject to organizational controls of various kinds (Scott, 1965; Child & Fulk, 1982).[2]

What these R&D employees do share with the professions is a specialized knowledge base, stemming from their formal technical education. But education alone does not determine people's orientations, and the assumption that these employees both need and desire the autonomy characteristically associated with professional work is not necessarily true. We know, for example, that engineers are unlikely to require or desire professional autonomy.[3] And even among Ph.D. scientists, those who work in industry often do so, in part, because of a low priority on professional autonomy. For example, in one R&D lab where I interviewed 16 professionals in depth, only two were oriented to autonomy in this sense; in another lab, where I made 14 such detailed interviews, only three could be classified as desiring such autonomy. Whether through pre-selection or through adaptation to the existing reward structure, or both, it seems that many "professional" employees in the industrial R&D lab do not seek such autonomy. It does not seem to be the case, therefore, that the main issue facing technical specialists in industrial organizations is a conflict between the need for autonomy and bureaucratic control.

I would locate the main issue, rather, in a misunderstanding of the meaning of autonomy in the industrial research career. This misunderstanding stems from the assumption that R&D employees fit the traditional mold of the academic scientist. According to this traditional view, scientific work is guided solely by the curiosity and inclinations of the individual scholar, and is motivated entirely by the activity itself. Science brings its own rewards, and is an activity pursued for its own sake, needing no other recognition. In one lab, for example, during discussion of whether or not to introduce a technical ladder, which would bring the salaries for technical work closer to managerial pay, a manager expressed the fear that "if we do that, no one would want to be a manager." The implication was that the pull of science as an activity is so great that only high salary could induce someone to leave that work and turn to managerial tasks. Further, since the object of science is to add to knowledge and understanding, potential application is not seen to play any role in a scientist's motivation. It is presumed, however, that sooner or later something useful will emerge from experimentally verified scientific theories (Feibleman, 1961). Thus, an atmosphere in which individual creativity has maximum play should maximize the yield, both for knowledge and for application, of scientific research.

Not even academic science is realistically covered by this description (Ziman, 1981). And when applied to industrial R&D, the fit is even less good. Moreover, the assumption that R&D employees fit this mold gives rise to procedures that are clearly counterproductive.

The labs I studied recruit their employees from the top universities, and departments vie with each other for the best people. Thus the recruitment problem gets defined as attracting the best scientists available, against both external and internal competition, which leads recruiters to promise more exploratory work than is usually desired. They thus foster expectations that have a high likelihood of being unfulfilled:

> When I was hired, the department head tried to oversell the job. He did not make it clear that this was a development area, not only research. My first year was very disappointing.

In other words, recruitment procedures that rest on the belief the lab is dealing with the stereotypical scientist whose only interest is the pursuit of inner ideas (Kubie, 1953), may misfire.

The same set of beliefs also guides the initial experiences of these recruits. As stated by managers in a number of different labs:

> We give no orientation. It would be offensive to professionals.
>
> We don't train professionals. Training is only for mechanics.
>
> Ph.D.'s are treated with kid gloves.

And this despite the fact that the work in these labs often depends as much on experience acquired on the job as it does on formal education.

Such behavior, so obviously counterproductive when observed, reflects the deeply held belief that scientists function best when left alone, and the conviction that R&D employees fit this model. That the situation is seen differently by the people affected by these procedures is obvious in the cynical explanation offered by one physicist:

> They seem to think that everybody is so super intelligent that they don't have to tell them anything.

Nor are the practices that emanate from this assumption seen to fit the industrial lab's reward system, which in the end gives high priority to the relevance of technical work for corporate products:

> Management gives you enough rope to hang yourself, for one can do a lot of work without direction and find out after the fact that that work will not reap rewards. They may tell you you are doing well, to carry on, and then in the merit review write that you are not working on a bread and butter project.
>
> I was never assigned a project and my supervisor failed to communicate to me that there were needs I was failing to meet.
>
> I found that I could do a perfect job and still be a flop because it was the wrong job to do.

There is irony, therefore, in a situation where management tries to provide an autonomous environment which does not fit the needs of the lab nor of its technical employees. It stems from a misunderstanding of the meaning of autonomy in the industrial R&D lab.

The Meaning of Autonomy

One of the key norms of academic science is autonomy: the freedom to choose the problems on which to work, to pursue them independently of directives from anywhere except the precepts of a discipline, and to publish freely the results of research. This set of values is inculcated and reinforced by the university, as educator and employer of scientists. Indeed, the central control mechanism of the university—the granting of tenure—evolved in order to protect this freedom from outside pressure.

Such autonomy requires an organizational context geared to its expression, and technical specialists dedicated to the pursuit of science for its own sake. The university provides such a setting and reinforces this orientation in its employees. The industrial research lab, in contrast, is a more "heteronomous" organization (Scott, 1965), subject to controls emanating from the business goals of the parent organization. A different orientation, therefore, tends to be inculcated, which fits the fact, already stated, that most of the lab's employees do not desire such professional autonomy. Indeed, those few who do must confront the costs of the disjunction between orientation and setting. One scientist, for example, who has published papers and has a number of patents to his name, made this point clearly:

> My management respects me and leaves me alone. But this freedom also means that my avenue of movement is closed.

But even here, the effect of the difference in setting was visible. For when this man was finally given a specific assignment by a new supervisor, he found the work very satisfactory:

> Last year I was assigned to the development of a device and it was successful. I enjoyed this. it is a different challenge.

Most R&D employees, in fact, are not concerned with setting their own problems:

> It is not easy to find good problems.
>
> Supervisors don't tell what to do, but I would prefer to be told. People want to be told; they desire strong management.

And this means being told "what is needed." "We want to have an impact on the corporation."

What they do care about, though, is their lack of "authority," the fact that they have no say over "the light bulbs, the number of people in the projects . . . no say in choosing technicians, or in hiring decisions." What they want, therefore, is to be given some discretion in the process of solving the problems that they are assigned. It is at the level of implementation that they want autonomy, and it is here, often, that controls are imposed through a series of required authorizations and sign-offs. The effect is demoralizing:

> These approval processes destroy initiative. It is the wrong place for controls.
>
> If people get thwarted, if there is over-controlling, one gets the stuffing knocked out.

It is easy to see why such procedures exist. With very few exceptions, industrial R&D labs cannot afford to follow professional norms, and must impose organizational controls (cf. Child & Fulk, 1982). But they do so inappropriately. They emphasize autonomy initially, when intersecting with the university in the search for recruits, which seemingly defines it in accordance with the norms of academic science as the freedom to set one's own problems. But once recruits are established in the lab, controls are imposed in an effort to ensure that the actual work done will contribute to business goals. Managers are responsible for organizationally relevant results. And when, because of the presumed need for an autonomous environment, they do not give clear assignments, then they are inclined to impose controls at the level of implementation. Thus, while seemingly providing <u>strategic autonomy</u>--the freedom to set one's own research directions--they withhold <u>operational autonomy</u>--the discretion to decide how to puruse this goal.[4]

It is important, therefore, to think of autonomy in more differentiated ways than has often been the case.[5] It is the failure to make a distinction between strategic and operational autonomy that creates many of the dilemmas and contradictions confronting the industrial scientist.[6]

Relation Between Strategic and Operational Autonomy

It is the thesis of this paper that strategic autonomy--the freedom to set one's own research agenda--and operational autonomy--the freedom, once a problem has been set, to attack it by means determined by oneself, within given organizational resource constraints--may be thought of as independent dimensions on a two-dimensional grid on which one can chart the position of R&D tasks and employees (see Figure 1). Further, I would hypothesize that, in general, the most productive and satisfactory position for the technical staff is to the left of the diagonal: with operational autonomy ≥ strategic autonomy; and that the optimum position for the manager of research is to the right of the diagonal, with strategic autonomy > operational autonomy.[7] Finally, I would suggest that career procedures--particularly systems of evaluation and rewards--should vary according to the position on this grid.

To test some of these ideas, I looked at data from 18 professionals in the central research lab of a large consumer products company. It is a centrally funded lab committed to doing research in a variety of fields, though research that is relevant to its products. These 18 professionals varied in age from 30 to 60, and spanned four technical levels in the lab. The group included two women, and encompassed both science and engineering fields. I asked them all where they would place themselves on the grid, and which position they would consider ideal for professionals and for managers in the R&D lab.

As can be seen in Figure 2, these 18 fall at many points: 6 place themselves on the diagonal line (from low on both to very high on both), 7 to the left (with higher operational than strategic autonomy), and 5 to the right (with higher strategic autonomy). The mean point is close to the middle of the chart (strategic: $\bar{x} = 5.3$ with a standard deviation of 2.4; operational: $\bar{y} = 5.9$ with a standard deviation of 2.6), and there is a positive correlation between the two dimensions ($r = .48$). This group, of course, represents a wide range of experience. Of the four people high on both dimensions, three have been at the lab for more than 15 years, and are at a high technical level—a level to which promotion is a fairly major event. Further, these three are all ranked within the top quarter of their groups in performance. The fourth, who is at a middle level and has been at the lab for five years, describes the current position as 9,8 and reports that "when I first came operational was lower, but strategic would have been the same." And, a further comment is relevant:

> The ideal—and this may be blasphemous—would be to be lower strategic, to have more of an idea of what is relevant, but to be 9 on operational.

In contrast, two of the three people whose strategic autonomy is considerably greater than their operational autonomy are the only newcomers to the lab in the sample. Both have been there less than one year. It would be interesting to know what their view of this position will be after a number of years of work at this lab.

When asked to indicate the ideal position for professionals and managers in an R&D lab, this sample places the professional fairly high on both dimensions and locates the manager lower, but to the right of the diagonal (see Figure 3). They see the ideal managerial role as somewhat lower in strategic autonomy than the professional and considerably lower in operational autonomy.[8] In both judgments, further, people place the role toward which they themselves are oriented in the more strategic direction, and the other role in a more operational one. The technically oriented—those most interested in following a technical career route—who are fairly close to the diagonal for both roles, place managers clearly lower on both dimensions (see X_1's in Figure 3). But the managerially oriented attribute much more operational autonomy to professionals, and give the edge on strategic autonomy to managers (see X_2's in Figure 3).

It is in the judgment of the ideal position for managers in the R&D lab that one gets the biggest differences by personal orientation. Technically oriented professionals are likely to see the proper role for managers as either primarily operational or basically strategic. In fact, the correlation between the two dimensions for this group is strongly negative ($r = -.70$). Those managerially oriented, in contrast, are more likely to insist on a strategic role for managers, and they show a positive correlation between the two dimensions ($r = .55$). These differences are summarized in Table 1.

Table 1

View of Ideal Manager's Role by Orientation

	Technically Oriented (N=9)*	Managerially Oriented (N=7)*
Ideal Manager		
Mainly Operational	3	0
Mainly Strategic	4	4
Low on both	2	1
High on both	0	2

*One technically oriented person gave no response to the question asking for the ideal position for a manager; and one person (who placed the ideal manager at 4,0) was neither clearly technically nor managerially oriented.

The modal characterization, that of a manager who is primarily strategic (defined as being at least four points higher on strategic autonomy than on operational autonomy, with a mean position of 7.2,1.6), fits well the hypothesized placement.

In general, one finds a complementary relation between the placement of professionals and that of managers. With one exception, all those who believe that managers in the R&D lab should primarily be strategic give high operational autonomy to the professional, higher than the ascribed strategic autonomy (mean position for professionals: 6.2,7.5). In contrast, those who believe that managers should primarily play an operational role show the opposite pattern (mean position for professionals: 8.3,3.2). This complementarity was stated explicitly by a highly rated, technically oriented scientist:

> To start, a professional should be low strategic and low operational. The movement would go up a curve starting with increases in operational, and strategic later. The manager would be the inverse: with respect to a starting recruit the manager would have to be high on both; with an established professional it would depend. The manager is the inverse of the professional. If the professional is high/high, then he would be low on both.

In other words, in the view of these technical professionals, the work of the R&D lab requires both strategic and operational control. It is the distribution of these tasks between the specialists actually performing the technical work and the managers supervising and coordinating it that varies according to experience and orientation.

On ten of these 18 professionals, I had considerably more information, including their performance evaluations. Though I saw no poor performers, five of these ten were rated as top performers, whereas the other five were more average.[9] Not surprisingly, the top performers placed themselves higher on both strategic and operational autonomy, which is probably an accurate reflection of differences in the actual position of these two groups (Top: 7.6,8.0; Average: 5.5,6.0). What is of greater interest, though, is that the top performers reported that they had started their careers much lower strategically (Top: 3.1,5.8; Average: 5.6,5.6). They started, therefore, closer to the position that has been hypothesized as optimal for technical professionals in an R&D lab.[10]

It seems, then, that the hypothesized optimal placement fits the top performers, especially during the early stages of their careers. Career stage, therefore, is a critical consideration. In an attempt to capture this with the scanty data at hand, I went back to the total group of 18 (no longer divided by performance) and plotted where they reported they had started (indicated by a Δ in Figure 4) and the present position of three sub-groups: those who have not been at the lab much longer than five years or so and who are in the lower (entry or entry+1)[11] technical levels; those who have been at the lab considerably longer and are in high technical positions; and those who have been at the lab longer but have not progressed to these positions (see Figure 4).

On the basis of these data—suggestive at best, not only because the numbers are small but also because cross-sectional data may be a misleading indicator of individual development—I revised an initial hypothesis on what the ideal career movement in the R&D lab might be. The revised picture is given in Figure 5.

At the beginning of a technical career, it is proposed, operational autonomy is more important than strategic autonomy, and increases initially more rapidly. But as the technical employee becomes more experienced, increases in strategic autonomy become critical, not only for managers, but also for other technical roles.[12] Thereafter, as indicated in Figure 5, technical employees can follow a number of different paths and, it is proposed, could usefully move among them during their careers.

Autonomy and Setting

The main thrust of the argument so far has been to establish the difference between strategic and operational autonomy, between autonomy and control over ends and over means. But there are other distinctions, already alluded to, that are also important. One of these relates to setting—the organizational context in which the work takes place.

As has already been indicated, autonomy takes on a different meaning in an "autonomous" professional setting—a setting, like a university, where professionals both set and implement the organizational goals—and a "heteronomous" setting, in which professional work is subordinated to non-professional goals set from within a larger administrative framework (Scott, 1965). From the analysis already given, it is clear that most R&D employees do not consider themselves academic scientists. "At the university," claimed a scientist with five years of academic experience, "the most one can do is teach and write, and maybe no one will read it. Here there is the possibility of having an impact." And yet, they also do not feel they should be bound by short-run corporate goals. In one of the labs I studied, the "story" was circulating that "if you can point to a part of a product and say that comes from the research lab, then something is wrong."

These comments reflect the dilemma of the central research lab, which is caught between the desire to translate current technical knowledge into profitable product innovations and the need for more basic research in order to produce new ideas with not entirely predictable and certainly more long-range consequences. It is this basic dilemma between long-range research and short-term product improvement that gets translated into the contradictory career procedures already outlined (cf. Bailyn, 1982). A different way of dealing with this dilemma is to build diversity into the R&D lab's procedures. Figure 6 indicates the hypothesized position on the strategic/operational grid of the various technical tasks that comprise research and development, each of which will attract people with different orientations who require different modes of evaluation and rewards. And when one adds to this picture the non-technical requirements of the lab, it is obvious that there is great need for a wide variety of talent in this setting (cf. Roberts and Fusfeld, 1982).

Unfortunately, however, the career procedures in these labs tend to be narrow and homogeneous. They neither respond to the variety of necessary tasks nor to the large differences in career orientations of R&D employees.

Autonomy and Career Orientations

I have already alluded to some of the differences between research employees who are technically oriented and those who are managerially oriented. This distinction--though the most generally acknowledged--does not, however, span the variety of orientations actually present. To get a sense of what these orientations are and how they relate to career procedures, I have taken data from one particular lab in which I had detailed interviews with 16 members of the professional staff. These interviews covered their present work, their career history, and their expectations and hopes for the future.[13] Five different orientations emerged from an analysis of these data, which are shown in Table 2 along with the number of people who fit them in this lab and their hypothesized ideal position on the strategic/operational grid.

Table 2
Career Orientations of Technical Staff
(N=16)

Orientation	N	Hypothesized Ideal Position on Strategic/Operational Grid
Oriented to science	2	9,9
Oriented to production	3	1,1
Oriented to administration	3	5,1
Oriented to engineering	5	1,5
Oriented to technical management	3	9,5

Each of these groups had a different reaction to their work experiences, and felt positive and negative about different aspects of the career procedures that governed them. The lab in which they work exemplifies the basic R&D dilemma. It prides itself on being a "research site" and had recently hired a number of bright scientists--some attracted from the university -- and had just instituted a technical ladder based on well specified criteria of scientific productiveness. At the same time, it was under pressure to show a return on this investment, and to justify to the corporation that the work it produced could be translated profitably into improvements in product. It therefore needed the talents of all these orientations. But its career procedures seemingly satisfied only a small minority.[14]

At the time of my interviews, only the two people concerned with science, with adding to knowledge, giving papers, etc., were fully satisfied with their careers. They were responding, of course, to the recent changes in the lab, but even they had a "wait and see" attitude to the future. They also were fully aware that without others in the lab paying attention to administrative tasks and to the issues involved in making the transfer to production, their bubble might burst. And these others were much less satisfied with their positions.

Those oriented to production—in whose hands, in some sense, the future of the lab could be said to lie—were deeply committed to the follow-through on R&D, and worked hard to ensure that the lab's work would get translated into profit for the corporation. They knew they were playing a critical role, and yet they felt unappreciated. Neither the managerial route nor the newly defined technical ladder captured their talents. All three were toying with the idea of trying new fields or new settings at some future time. They would have responded positively, I think, to public recognition of their critical role.

Nor did the lab's career procedures fit the needs of those oriented to administration who were less involved with the technical side of their work and more with the lab's administrative tasks: scheduling and budget control of projects; evaluation and development of people. They recognized the importance of these tasks and the inability of many of the more technically oriented to carry them through effectively. But they were concerned about the repetitiveness of these demands; they feared stagnation. They would benefit, I think, from two modifications in career procedures: 1) a more explicit recognition of their interests and concerns with people, by more specific assignments (as mentors to newcomers, for example) or by opportunities to take management oriented courses; and 2) recognition and rewards for group output, not only for individual performance.

The five people oriented to engineering were concerned with technical "craftsmanship," with the development of a product or process that can, in some way, be identified with oneself. It is not at all an academic orientation, and hence they were not eligible for the technical ladder. These people were satisfied with their work but felt that, despite a perceived appreciation of what they were doing, the recent emphasis on science had led them to suffer financially. They were more concerned with salary than with status, and would probably respond well to financial recognition.

Finally, the group oriented to technical management were people who desired a combination of technical/scientific work with real responsibility and authority. All three were among the highly qualified scientists recently hired by the lab. But, because of recent hiring, they saw the management road as blocked and felt that the autonomy and recognition of the technical ladder were too circumscribed for them, with too little broad scope. All three anticipated leaving the lab within a few years. And though stock options and other forms of financial recognition might delay this departure, it is unlikely that such rewards could fundamentally alter their reactions.

Given this variety in orientations it should be possible easily to meet the needs of the technical and non-technical tasks of R&D. But the lack of formal recognition of this heterogeneity leads most labs to manage their employees in too homogeneous a way, thus losing the advantage of the very diversity they need.

Implications for the Management of "Professionals"

The most general implication to emerge from this analysis is that the diversity in the R&D lab—in tasks and orientations—requires career procedures based on a variety of criteria of successful performance and encompassing a "cafeteria" of rewards and modes of recognition. This general conclusion has been stated before (e.g., Friedlander, 1971; Bailyn, 1980; Schein, 1982; Roberts and Fusfeld, 1982; Von Glinow, 1983). My purpose in this final section is to suggest, briefly, some ways by which this goal might be reached, and to link these means to the distinction between strategic and operational autonomy.

Elsewhere I have indicated that recognition of such diversity requires a process of negotiation between individual and organization that needs to be renewed periodically (Bailyn, 1984b), and I have talked of the value of temporary and multiple work assignments (Bailyn, 1982, 1984a). These suggestions apply, in my opinion, to all positions on the strategic/operational grid. But the analysis in this paper also points to considerations that vary according to position on the grid. For ease of exposition, I will talk about four general positions: H-H (high on both dimensions); L-L (low on both dimensions); H-L (emphasis on strategic rather than on operational autonomy); and L-H (emphasis on operational autonomy).

The H-H position is likely to be held by only a small number of employees with many years of experience in the lab. It represents the lab's investment in the unforseeable future, for which a small effort is probably correct. The output of this group would be an addition to knowledge, though with relevance to the needs of the corporation—one might call it <u>practical knowledge</u>. Criteria of success would necessarily have to be long-term, and the position represents more a bet on someone's potential than a goal that needs close monitoring. The IBM Fellow is a prototype, and like that position, a limited term (possibly renewable) would seem to make sense. Such employees probably have ties to a professional community outside the labs, and easy access to professional meetings would seem to be appropriate. Every lab I studied had a few people in this position, and they were generally satisfied and seen to be contributing. A problem arises when the H-H employee requires a position on the managerial hierarchy for the sake of status and compensation. The academically oriented technical ladder can sometimes overcome this difficulty.[15]

The L-L position, in contrast, is likely to be held by people at the beginning of their careers. But, as has been indicated, it is also likely to be the appropriate place for production oriented employees, and it is a more problematic position for them than it is for new recruits. Success for these people depends on the extent to which the lab's output gets translated into product or process improvements. It is a critical role, which characteristically gets little official recognition from the lab. It makes sense, perhaps, to populate this position by people on temporary assignment from the production companies, or to see it as a bridging role for R&D employees interested in transferring out of the lab and into an operating division. My sense is that the L-L position would gain in meaning and importance to its mature incumbents if it were part of a career path rooted more in production than in research.

The H-L or strategic position is presumed to be the place for the administration and management of the lab. On the whole, the career procedures of most labs are geared to the appropriate selection of people for these roles, and the main rewards and signs of status and recognition are reserved for them.

There is much more difficulty with the L-H or operational position. It is here that most mature professionals reside, and it is here that the main technical tasks of the lab get accomplished. The managerial ladder is clearly not appropriate. But neither is the technical ladder in most cases. It either does not have commensurate prestige or compensation, or, by emphasizing academic criteria, is applicable primarily to those few employees of the lab who appropriately belong in H-H positions. It is for L-H employees that the character of work assignments becomes critical. They must be varying and challenging, and must avoid repetitiveness and overspecialization (cf. Dalton and Thompson, 1971; Zand, 1981; Bailyn, 1984a).

These are very general implications. Their successful translation into specific procedures will depend, of course, on the special circumstances in each lab. What is common to all is a clear distinction between strategic and operational autonomy and the realization that tasks require different amounts of each and that different people at different stages of their careers will also span the various positions. Hence the strategic/operational grid may be a useful diagnostic tool for the proper utilization of the talents of R&D employees.

Figure 1

AUTONOMY IN THE R&D LAB

Strategic Autonomy:

SETTING GOALS; DEFINING PROBLEMS

Operational Autonomy:

CONTROLLING MEANS, MODES OF IMPLEMENTATION, SOLUTION PROCEDURES

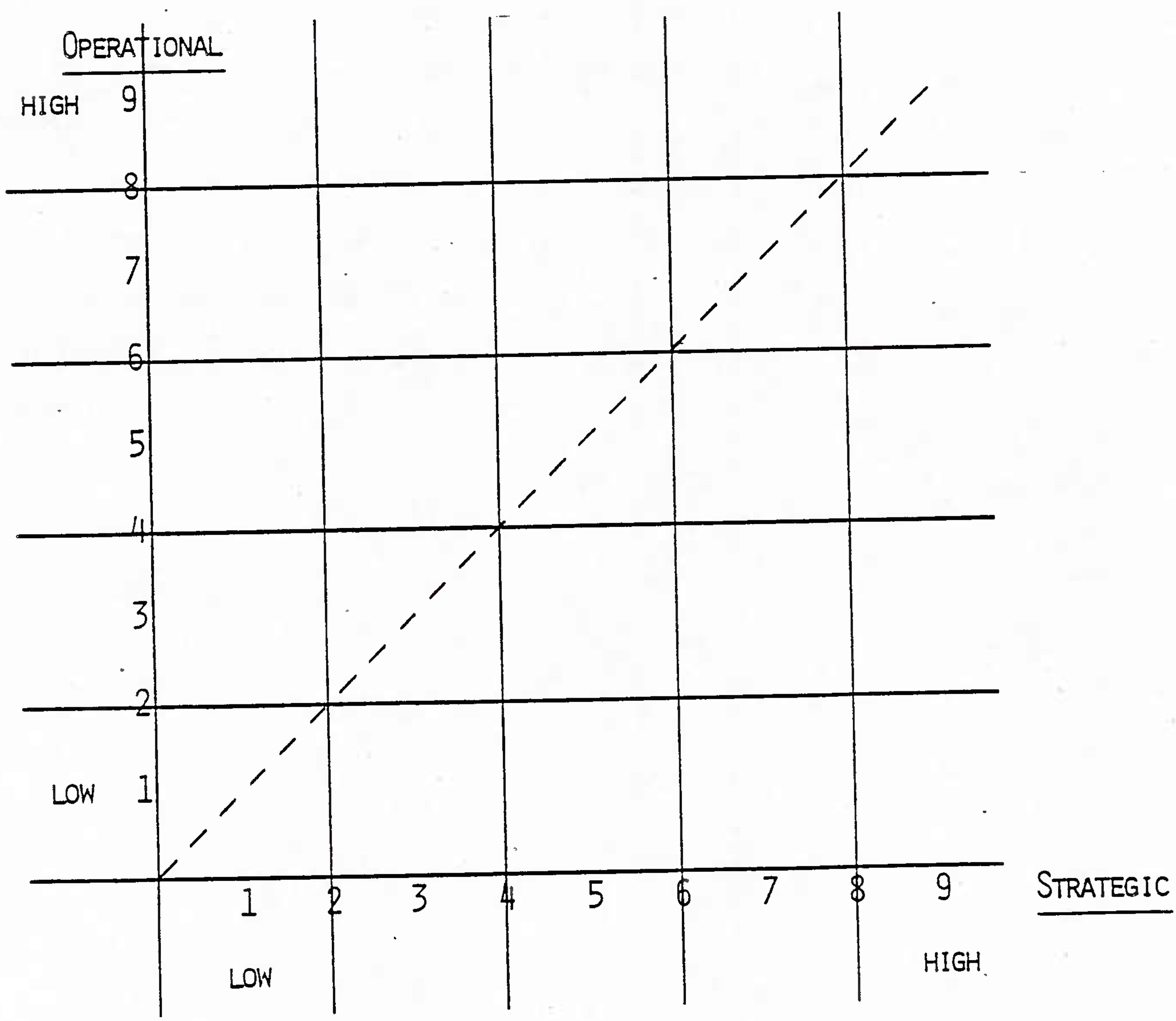


FIGURE 2

PRESENT POSITION OF 18 PROFESSIONALS.

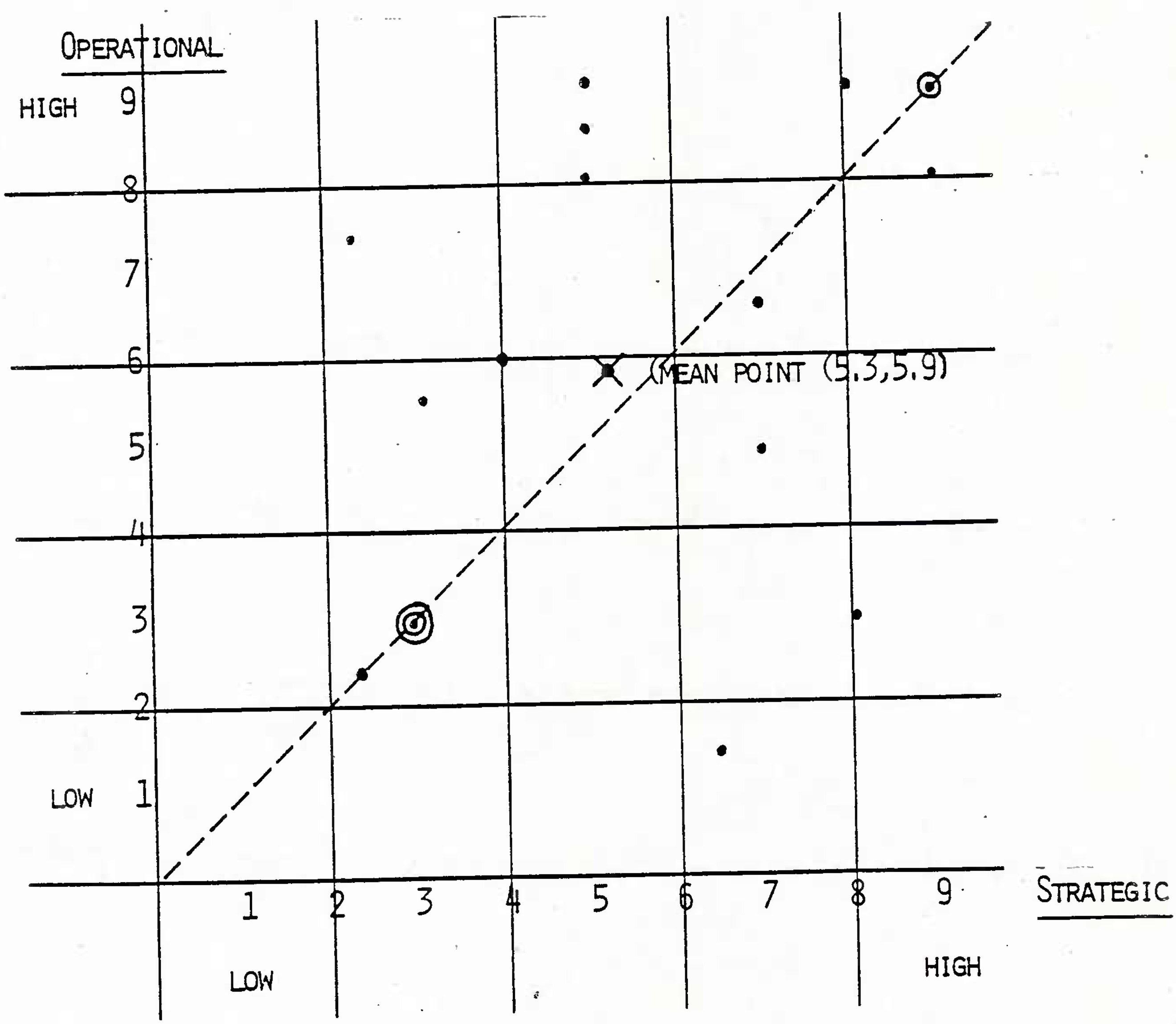


FIGURE 3

IDEAL POSITION FOR PROFESSIONALS AND MANAGERS

X_1 - AS SEEN BY TECHNICALLY ORIENTED

X_2 - AS SEEN BY MANAGERIALLY ORIENTED

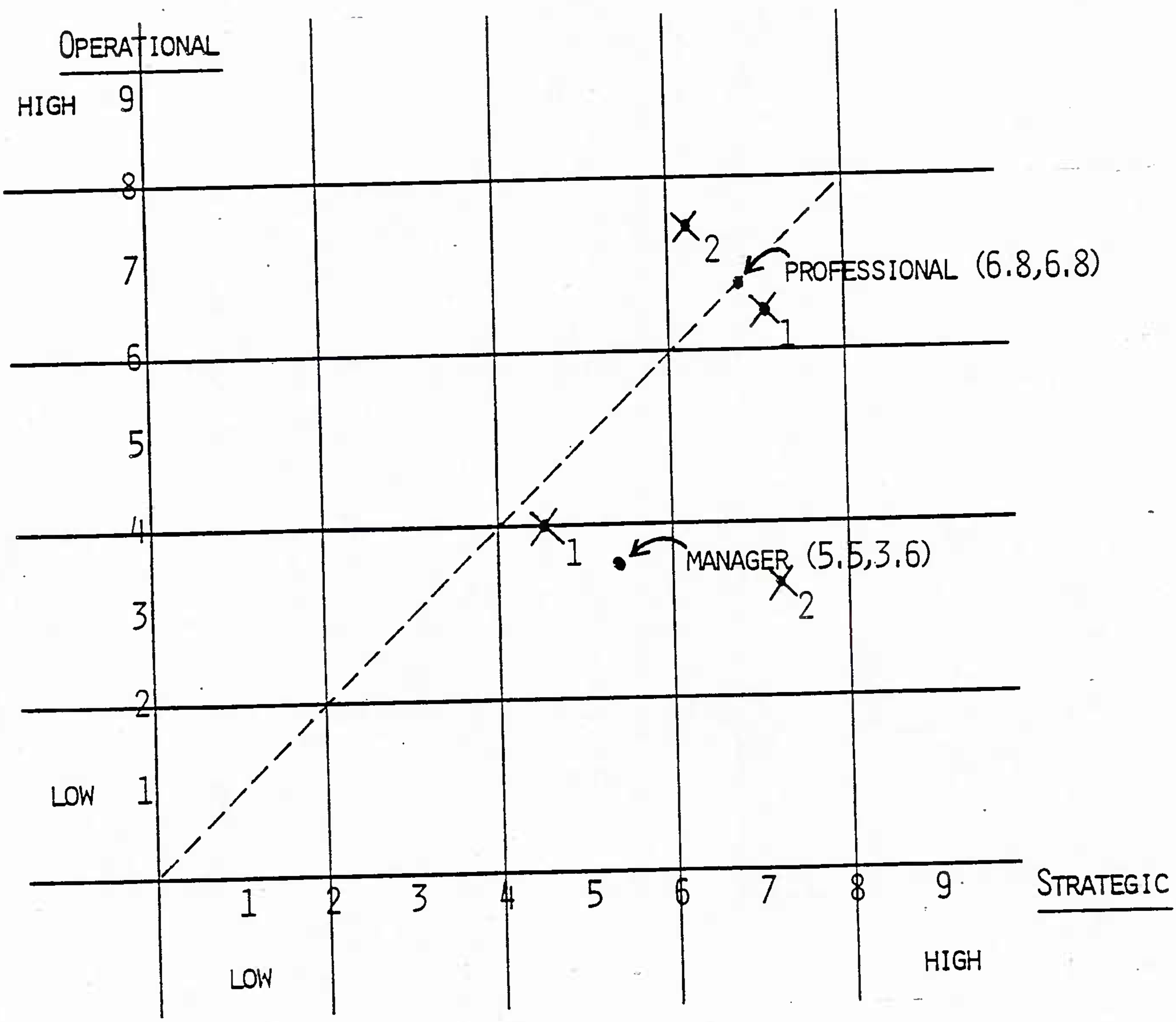


FIGURE 4

POSITION BY LEVEL AND YEARS OF SERVICE

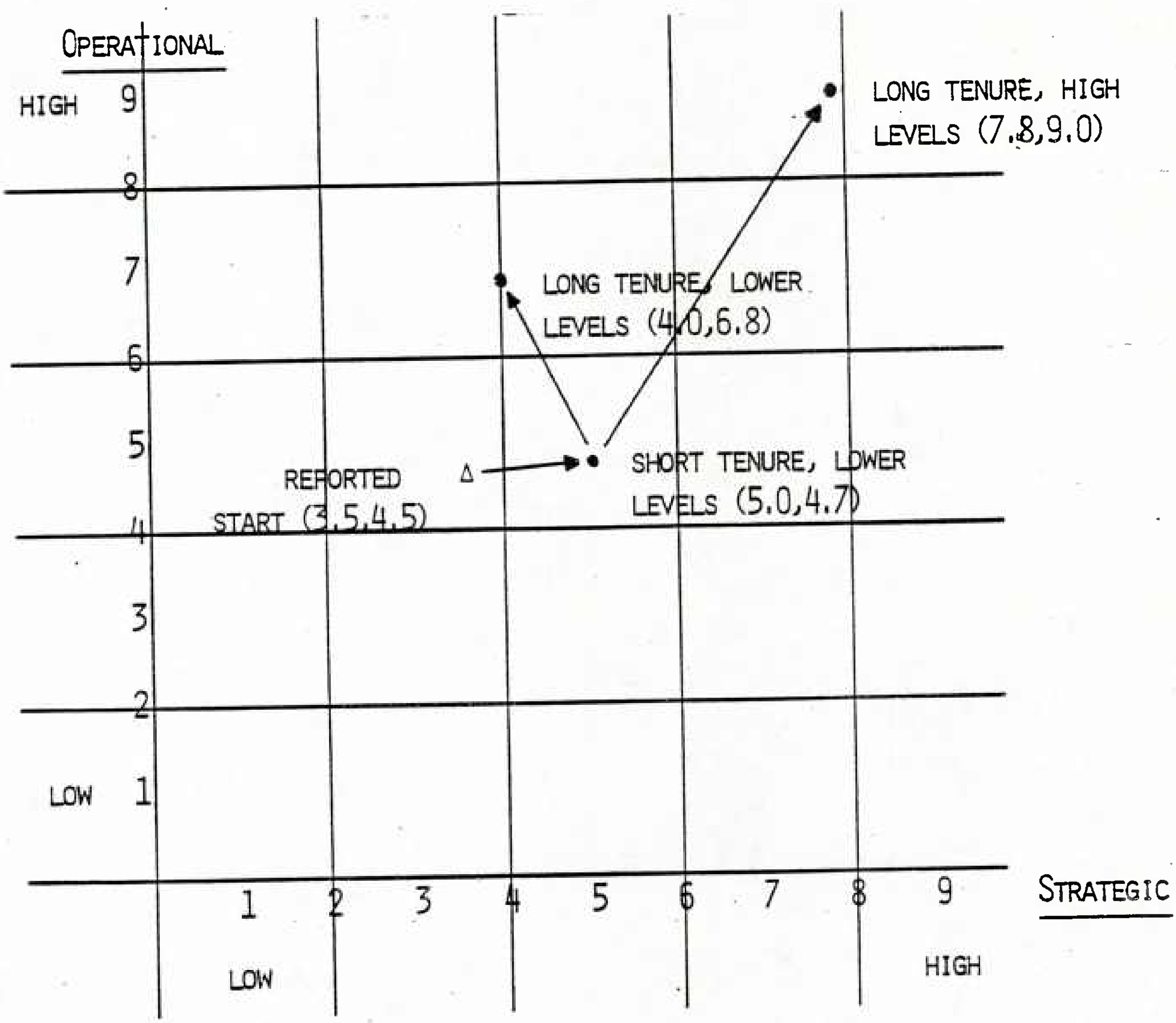
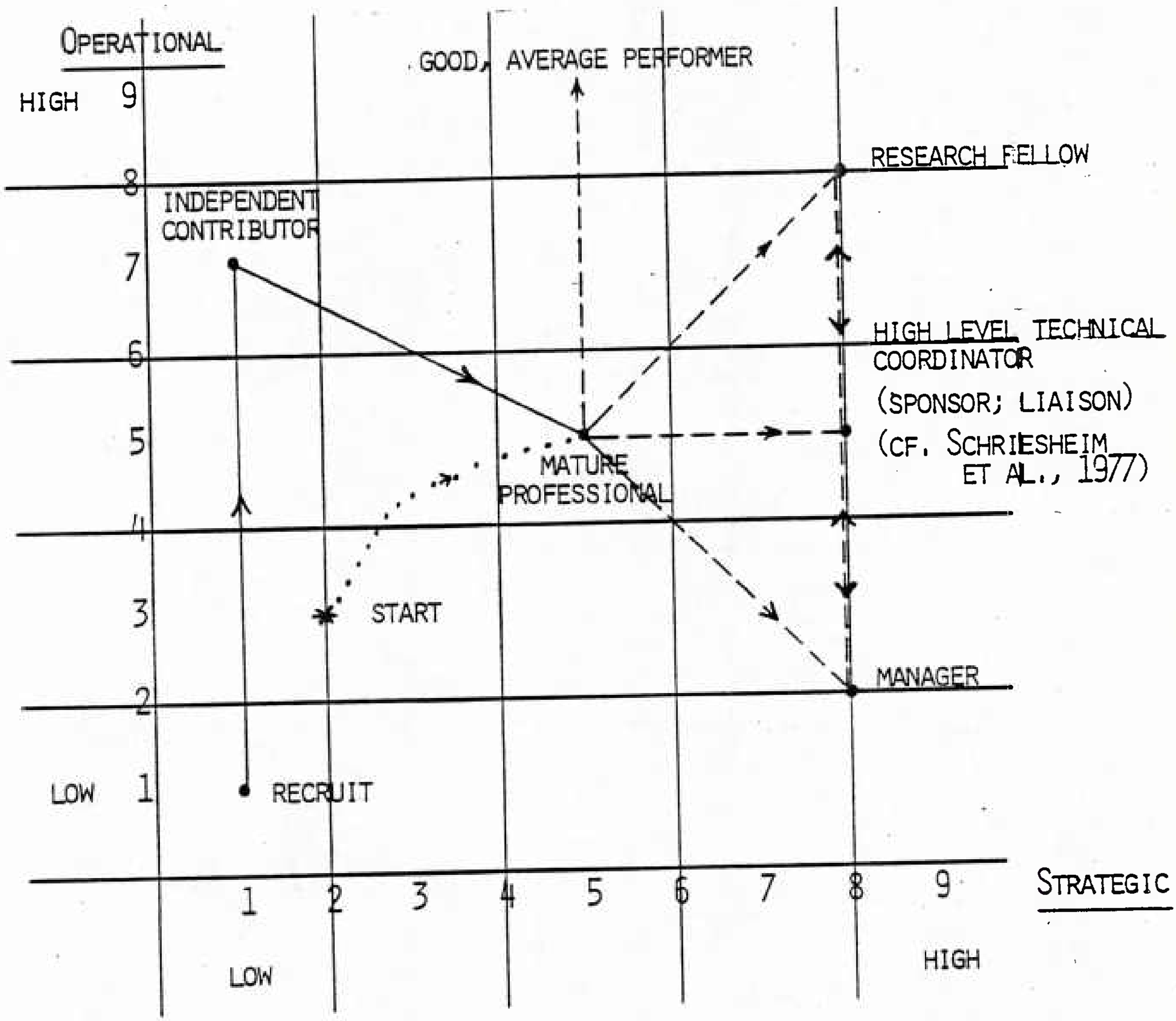


FIGURE 5

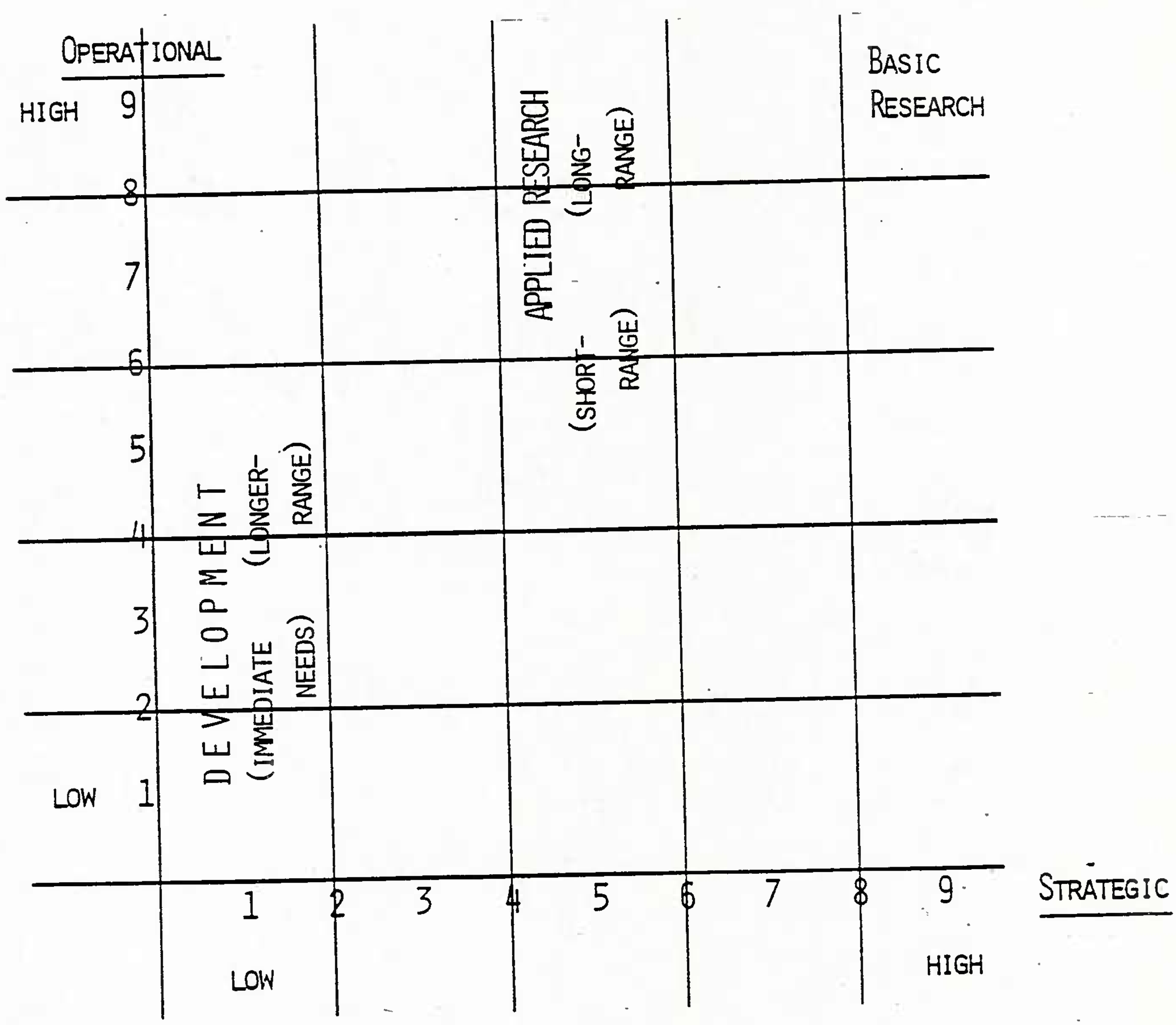
TECHNICAL CAREER MOVEMENT



* .... = REVISED PATH

FIGURE 6

POSITION OF VARIOUS R&D TASKS



NOTES

1. In order to protect the identity of the companies studied, these labs will not be described in detail. All were parts of central R&D units of large, successful corporations, employing engineers, primarily in electronics, and scientists, primarily in physics. Though none was engaged in much long-range "basic" research, the work varied from applied research to prototype development to the specification of more production-oriented processes. Almost all of the technical professionals in these labs were university graduates, many with Ph.D.'s. The data consist of lengthy individual interviews with people at all levels of the hierarchy, and group discussions of preliminary results.

2. It is of interest, in this respect, that Hughes, in 1955, defined three different occupational models: science, business, and the professions. And though R&D employees do not fully fit either the science or the business model, they are closer to both of these than they are to the professional one, particularly in regard to their organizational position (Hughes, 1958).

3. That engineers are not professionals in the accepted sense has been documented (see Kerr, et al., 1977). And, with the possible exception of engineers with Ph.D.s, they have been shown to be quite different from scientists in background, interests, values, and orientations (e.g., Ritti, 1971; Allen, 1977; Bailyn, 1980). They neither form a clearly identifiable occupational community (cf. Van Maanen and Barley, 1984), nor do they necessarily fit the assumptions underlying the hierarchical organizational career (Bailyn, 1982). There seems to be no obvious setting in which engineers can readily cash in on their expert knowledge; both organizational and occupational rewards are problematic (cf. Child and Fulk, 1977). In this respect it is of interest that subcontracting to engineering consultants is becoming more prevalent. It is possible that the engineering consulting firm provides the optimal setting for engineers, at least for those enchanted with the solution of technical puzzles (Bailyn and Lynch, 1983). The industrial setting is preferable for those who enter engineering for security, middle class income, and respectability (cf. Perrucci and Gerstl, 1969).

4. Almost twenty years ago I found a similar situation confronting professional women. They were given seemingly wide choice on initial decisions: should they not work? combine work with children? emphasize only career? But if they decided to work, then they were faced with all the constraints that women faced in those days. Men, in contrast, knew they had to find an occupation, but had wide choice in choosing one that suited them. Psychologically, the women's pattern was a more difficult one (Bailyn, 1965).

5. In the discussion of professionals, the term usually covers both meanings: "a perceived right to make choices which concern both means and ends" (Kerr, et al., 1977, p. 332). The lack of distinction between ends and means is also seen in the suggestion that lack of autonomy is a prime cause of the disaffection of industrial engineers (Bailyn, 1980). In analyses of non-professional work, in contrast, autonomy usually refers only to control over means, as in Hackman and Oldham's definition for their Job Diagnostic Survey: "The degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out" (1980, p. 79). In the case of managerial careers, Schein (1978, 1982) identifies autonomy as one of a small number of basic career anchors. His original discussion of this anchor (1978) centers on setting. He describes the "autonomy" people in his sample as "seeking work situations in which they will be maximally free of organizational constraints", who have "therefore left business or government organizations altogether in the search for careers that would permit more independence and autonomy" (p. 156). In a later summary (1982), based on more extensive data, the meaning of the autonomy anchor seems to be closer to what I have called operational autonomy:

> The autonomy-anchored person prefers clearly delineated time-bounded kinds of work within his or her area of expertise. ....this type of person likes work that clearly defines goals, but leaves the means of accomplishment to the individual. The autonomy-anchored person cannot stand close supervision, but might be happy to agree to organizationally imposed goals or targets. Once those goals are set, he or she wants to be left alone (p. 26).

6. Others have used a similar distinction in different contexts. For example, Mohr (1982) differentiates "operational authority" ("the delegated right to carry out a certain assignment without close supervision but with rather detailed guidelines for action") from "true authority" which tends to occur "when subordinates at any level possess critical skills or manage critical information whose use the executive cannot or at least does not effectively control. In this situation, subordinates will often have some amount of complete autonomy" (pp. 106-7). Anthony (1965) differentiates among 3 hierarchical processes in his analysis of planning and control systems in organizations: strategic planning, which sets the guidelines for management control, which in turn sets the guidelines for operational control. Since the discussion here is limited to only one part of an organization, the R&D lab, the analogy is not precise. The issues surrounding strategic autonomy seem to lie between his first two levels (strategic planning and management control), and the issues surrounding operational autonomy are between his last two levels (management control and operational control). Each of the dimensions used in this paper, in other words, has some relation to Anthony's level with the same name, but also shares some of the characteristics of management control, his mid-level process. Finally, Derber (1982), in an examination of the validity of the proletarianization of the professional hypothesis (Oppenheimer, 1973) insists on a distinction between "technical proletarianization" ("the loss of control over the process of the work itself (the means)") and

"ideological proletarianization" ("a loss of control over the goals and social purposes to which one's work is put") (p. 169). Still others remark on the loss of strategic control by professionals in heteronomous organizations (Scott, 1965; Child and Fulk, 1982).

7. I do not mean to imply that these are the only important roles in the R&D lab (cf. Schriesheim et al., 1977; Roberts and Fusfeld, 1982). My point is merely to suggest that they can be usefully differentiated according to their position on this grid.

8. In these judgments the dimensions are seen as independent or, in the case of managers, as even somewhat negatively correlated (professionals: $r=-.07$; managers: $r=-.28$).

9. The average length of service of both groups is approximately equal (Top: 13.4 years; Average: 13.2 years), but the top performers are somewhat younger (Top: 31.2; Average: 42.8). There is an almost perfect correlation between age and length of service among the average performers ($r=.98$). In contrast, among the top performers this correlation disappears ($r=-.07$), partly because of a lower variation in age (Top: standard deviation = 7.0; Average: standard deviation = 12.9), but mainly because one relatively young person in the top group has unusually long service since his employment coincided with his education.

10. There also exist differences between these groups in their ideal placements of an R&D professional, with the top group assigning a place near the diagonal, and the average group, against the initial hypothesis, giving the professional more strategic than operational autonomy (Top: 7.8,8.2; Average: 7.3,5.6). Both groups assign the ideal manager more strategic than operational autonomy, with the average group higher on both dimensions (Top: 4.8,3.4; Average: 6.5,4.3).

11. There is no difference in position reported by short tenure people at entry level (5.1,4.8) and those at the next level (5.0,4.6). This conforms to what I was told about the practices in this lab, that the first advancement is relatively automatic, related more to length of service than to level of competence.

12. A possible exception is the average technical employee who follows a career consisting of a series of challenging assignments (cf. McKinnon, 1980; Allen, in progress; Epstein, in progress; Bailyn, 1984a) whose path might consist of increases in operational autonomy once a certain degree of strategic autonomy has been reached.

13. Schein formulated his career anchors on the basis of similar data (1978). It is important, therefore, to consider the relation of the career orientations identified here to his understanding of career anchors. The key difference, in my mind, is that by dealing with one particular organizational setting, these career orientations are more situationally bound and less individually stable than his career anchors. I would not be at all surprised, for example, if all the professionals in my sample would fit into his technical/functional career anchor. In this sense, career orientations are much more context

specific and hence more responsive to changes in organizational procedures and priorities.

14. Career procedures in the R&D lab fluctuate in response to corporate fluctuations between general support for technical work and the time that it requires, and demands for immediate proof of value by means of profitable products and processes (Kantrow, 1983, p. 72). At the time of my interviews, this lab was coming to the end of a period of strong corporate support for the more scientific aspects of R&D.

15. In one lab in which I talked to such a person, his position, though satisfactory to him, was shrouded in secrecy. The explanation given was that others would be envious and angry, an explanation based on the theory of relative deprivation. I am not at all sure whether the more applicable psychological phenomenon is not better caught by what Hirschman (1973) calls the "tunnel effect." Here one gets solace from the fact that one of the lines of traffic approaching the tunnel is moving, even when it is not the one in which one finds oneself. If this is true, then secrecy is exactly the wrong approach, and public recognition would be superior.

REFERENCES

Allen, T.J. Managing the flow of technology: Technology transfer and the dissemination of technological information within the research and development organization. Cambridge, MA: M.I.T. Press, 1977.

Allen, T.J. Career orientations of R&D employees. In progress.

Anthony, R.N. Planning and control systems: A framwork for analysis. Boston: Division of Research, Harvard Business School, 1965.

Bailyn, L. Notes on the role of choice in the lives of professional women. In R.J. Lifton (ed.), The Woman in America. Boston: Houghton-Mifflin, 1965.

Bailyn, L. Living with technology: Issues at mid-career. Cambridge, MA: M.I.T. Press, 1980 (in collaboration with E.H. Schein).

Bailyn, L. Resolving contradictions in technical careers. Technology Review, October 1982, 40-47.

Bailyn, L. Careers in high technology: Notes on technical career progression with special reference to possible issues for minorities. Sloan School of Management, 1984a.

Bailyn, L. Work and family in organizations: Responding to social diversity. In M.B. Arthur, L. Bailyn, D.J. Levinson, and H.A. Shepard, Working with careers. Center for Research in Career Development, Graduate School of Business, Columbia University, 1984b.

Bailyn, L. and Lynch, J.T. Engineering as a life-long career: Its meaning, its satisfactions, its difficulties. Journal of Occupational Behaviour, 4, 1983, 263-283.

Child, J., and Fulk, J. Maintenance of occupational control: The case of professions. Work and Occupations, 9, 1982, 155-192.

Dalton, G.W., and Thompson, P.H. Accelerating obsolescence of older engineers. Harvard Business Review, September-October 1971, 57-67.

Derber, C. Managing professionals: Ideological proletarianization and mental labor. In C. Derber (ed.), Professionals as workers: Mental labor in advanced capitalism. Boston: Hall, 1982.

Epstein, K.A. Ph.D. dissertation, Sloan School of Management, M.I.T., in progress.

Feibleman, J.K. Pure science, applied science, technology, engineering: An attempt at definitions. Technology and Culture, 2, 1961, 305-317.

Friedlander, F. Performance and orientation structures of research scientists. Organizational Behavior and Human Performance, 6, 1971, 169-183.

Hackman, J. R., and Oldham, G. R., Work redesign. Reading, MA: Addison-Wesley, 1980.

Hirschman, A. The changing tolerance for income inequality in the course of economic development. Quarterly Journal of Economics, 87, 1973, 544-566.

Hughes, E.C. Men and their work. Glencoe, IL: Free Press, 1958.

Kantrow, A.M. Management of technology. Harvard Business Review, July-August 1983, 66, 70, 72.

Kerr, S., and Von Glinow, M.A. Issues in the study of "professionals" in organizations: The case of scientists and engineers. Organizational Behavior and Human Performance, 18, 1977, 329-345.

Kubie, L. S. Some unsolved problems of the scientific career. American Scientist, 41, 1953, 596-613.

McKinnon, P. Career orientations of R&D engineers in a large aerospace laboratory. M.I.T. Working Paper No. 1097-80, January 1980.

Mohr, L.B. Explaining organizational behavior. San Francisco: Jossey-Bass, 1982.

Oppenheimer, M. The proletarianization of the professional. Sociological Review Monographs, No. 20, 1973.

Perrucci, R., and Gerstl, J. Profession without community: Engineers in American Society. New York: Random House, 1969.

Ritti, R. The engineer in the industrial corporation. New York: Columbia University Press, 1971.

Roberts, E.B., and Fusfeld, A.R. Critical functions: Needed roles in the innovation process. In R. Katz (ed.), Career Issues in Human Resource Management, Prentice-Hall, 1982.

Schein, E.H. Career dynamics: Matching individual and organizational needs. Reading, MA: Addison-Wesley, 1978.

Schein, E.H. Individuals and careers. Forthcoming in J. Lorsch (ed.), Handbook of organization behavior, 1982.

Schriesheim, J., Von Glinow, M.A., and Kerr, S. Professionals in bureaucracy: A structural alternative. TIMS Studies in Management Sciences, 5, 1977, 55-69.

Scott, W.R. Reactions to supervision in a heteronomous professional organization. Administrative Science Quarterly, 10, 1965, 65-81.

Van Maanen, J., and Barley, S. R. Occupational communities: Culture and control in organizations. In B. Staw and L. Cummings (eds.), Research in Organizational Behavior, Vol. 6, Greenwich, CT: JAI Press, 1984.

Von Glinow, M.A. Incentives for controlling the performance of high technology and professional employees. Technical Report No. G 83-3 (34). Graduate School of Business Administration, University of Southern California, Los Angeles, 1983.

Zand, D.E. Information, organization, and power: Effective management in the knowledge society. New York: McGraw-Hill, 1981.

Ziman, J. What are the options? Social determinants of personal research plans. Minerva, 19, 1981, 1-42.

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NAVAL MEDICAL R&D COMMAND
NATIONAL NAVAL MEDICAL CENTER
BETHESDA, MD 20014

E00700
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BETHESDA, MD 20014

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DEPT. OF LEADERSHIP & LAW
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F00700
PROF. CARSON K. EOYANG
NAVAL POSTGRADUATE SCHOOL
CODE 54EG
DEPT. OF ADMIN. SCIENCES
MONTEREY, CA 93940

F00800
SUPERINTENDENT
ATTN: DIRECTOR OF RESEARCH
NAVAL ACADEMY, U.S.
ANNAPOLIS, MD 21402

G00100
OFFICER IN CHARGE
HUMAN RESOURCE MANAGEMENT
DETACHMENT
NAVAL AIR STATION
ALAMEDA, CA 94591

G00200
OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DETACHMENT
NAVAL SUBMARINE BASE
NEW LONDON
P. O. BOX 81
GROTON, CT 06340

G00300
OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DIV.
NAVAL AIR STATION
MAYPORT, FL 32228

G00400
COMMANDING OFFICER
HUMAN RESOURCE MGMT. CENTER
PEARL HARBOR, HI 96860

G00500
COMMANDER IN CHIEF
HUMAN RESOURCE MGMT. DIV.
U. S. PACIFIC FLEET
PEARL HARBOR, HI 96860

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OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DETACHMENT
NAVAL BASE
CHARLESTON, SC 29408

G00700
COMMANDING OFFICER
HUMAN RESOURCE MGMT. SCHOOL
NAVAL AIR STATION MEMPHIS
MILLINGTON, TN 38054

G00900
HUMAN RESOURCE MGMT. SCHOOL
NAVAL AIR STATION MEMPHIS (96)
MILLINGTON, TN 38054

G00900
COMMANDING OFFICER
HUMAN RESOURCE MGMT. CENTER
1300 WILSN BLVD.
ARLINGTON, VA 22209

G01000
COMMANDING OFFICER
HUMAN RESOURCE MGMT. CTR.
5521-23 TIDEWATER DRIVE
NORFOLK, VA 23511

G01100
COMMANDER IN CHIEF
HUMAN RESOURCE MGMT. DIV.
U. S. ATLANTIC FLEET
NORFOLK, VA 23511

G01200
OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DETACHMENT
NAVAL AIR STATION WHIDBEY ISLAND
OAK HARBOR, WA 98278

G01300
COMMANDING OFFICER
HUMAN RESOURCE MGMT. CTR.
BOX 23
FPO NEW YORK, NY 09510

G01400
COMMANDER IN CHIEF
HUMAN RESOURCE MANAGEMENT DIV.
U.S. NAVAL FORCE EUROPE
FPO NEW YORK, NY 09510

G01500
OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DETACHMENT
BOX 6?
FPO SAN FRANCISCO, CA 96651

G01600
OFFICER IN CHARGE
HUMAN RESOURCE MGMT. DETACHMENT
COMNAVFORJAPAN
FPO SEATTLE, WA 98762

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WASHINGTON, DC 20350

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NAVAL MILITARY PERSONNEL
HRM DEPARTMENT (NMPC-6)
WASHINGTON, DC 20350

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COMMANDING OFFICER
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TEST & EVALUATION
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ALEXANDRIA, VA 22311

H01000
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P.O. BOX 85122
SAN DIEGO, CA 92138

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HEADQUARTERS, U.S. MARINE CORPS
CODE MPI-20
WASHINGTON, DC 20380

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HEADQUARTERS, U.S. MARINE CORPS
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CODE RD-1
WASHINGTON, DC 20380

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EDUCATION CENTER (E031)
MCDEC
QUANTICO, VA 22134

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COMMANDING OFFICER
EDUCATION CENTER (E031)
MCDEC
QUANTICO, VA 22134

I00500
COMMANDING OFFICER
U.S. MARINE CORPS
COMMAND & STAFF COLLEGE
QUANTICO, VA 22134

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DEFENSE ADVANCED RESEARCH
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TECHNOLOGY OFFICE
1400 WILSON BLVD., RM. 625
ARLINGTON, VA 22209

J00120
DEFENSE ADVANCED RESEARCH
PROJECTS AGENCY
DIRECTOR, CYBERNETICS
TECHNOLOGY OFFICE
1400 WILSON BLVD., RM. 625
ARLINGTON, VA 22209

J00130
DEFENSE ADVANCED RESEARCH
PROJECTS AGENCY
DIRECTOR, CYBERNETICS
TECHNOLOGY OFFICE
1400 WILSON BLVD., RM. 625
ARLINGTON, VA 22209

J00200
MR. MICHAEL A. DANIELS
INTERNATIONAL PUBLIC POLICY
RESEARCH CORP.
6845 ELM STREET, SUITE 212
MCLEAN, VA 22101

J00300
DR. A. F. K. ORGANSKI
CENTER FOR POLITICAL STUDIES
INSTITUTE FOR SOCIAL RESEARCH
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ROCKVILLE, MD 20852

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U.S. COAST GUARD
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WASHINGTON, DC 20036

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BRITISH EMBASSY
SCIENTIFIC INFORMATION OFFICER
ROOM 509
3100 MASSACHUSETTS AVE., N.W.
WASHINGTON, DC 20008

N00300
CANADIAN DEFENSE LIAISON STAFF
WASHINGTON
ATTN: CDRD
2450 MASSACHUSETTS AVE., N.W.
WASHINGTON, DC 20008

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LT. GERALD R. STOFFER, USN
NAVAL AEROSPACE MEDICAL INST.
CODE 11
NAVAL AIR STATION
PENSACOLA, FL 32508

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DEPT. OF PSYCHOLOGY
HOUSTON, TX 77004

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TALLAHASSEE, FL 32306

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INSTITUTE OF BEHAVIORAL
SCIENCE 6
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BOX 482
BOULDER, CO 80309

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UNIVERSITY FACULTY ASSOC.
710 COMMONWEALTH AVE.
NEWTON, MA 02159

000800
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GRAD. SCHOOL OF INDUSTRIAL
ADMINISTRATION
CARNEGIE-MELLON UNIV.
PITTSBURGH, PA 15213

000900
DR. J. RICHARD HACKMAN
SCHOOL OF ORGANIZATION
AND MANAGEMENT
YALE UNIVERSITY
BOX 1A
NEW HAVEN, CT 06520

000910
DR. JERRY HUNT
COLLEGE OF BUS. ADM.
TEXAS TECH. UNIV. (BOX 4320)
LUBBOCK, TX 79409

000920
DR. RICHARD ILGEN
DEPT. OF PSYCHOLOGICAL
SCIENCES
PURDUE UNIVERSITY
WEST LAFAYETTE, IN 47907

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DR. LAWRENCE R. JAMES
SCHOOL OF PSYCHOLOGY
GEORGIA INSTITUTE OF
TECHNOLOGY
ATLANTA, GA 30332

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DR. ALLAN P. JONES
NAVAL HEALTH RESEARCH CENTER
UNIVERSITY OF HOUSTON
4800 CALHOUN
HOUSTON, TX 77004

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DR. SARA KIESLER
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DEPT. OF SOCIAL SCIENCE
PITTSBURGH, PA 15213

001130
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DEPARTMENT OF PSYCHOLOGY
PURDUE UNIVERSITY
INDIANAPOLIS, IN 46205

001200
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THE PENNSYLVANIA STATE UNIV.
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LINCOLN, NB 68598

001700
DR. R. R. MACKIE
HUMAN FACTORS RESEARCH
CANYON RESEARCH GROUP
5775 DAWSON STREET
GOLETA, CA 93117

[illegible]
DR. WILLIAM H. MOBLEY
COLLEGE OF BUSINESS ADMIN.
TEXAS A&M UNIVERSITY
COLLEGE STATION, TX 77843

[illegible]
DR. LYNN OPPENHEIM
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PHILADELPHIA, PA 19104

DR. THOMAS M. OSTROM
THE OHIO STATE UNIV.
DEPT. OF PSYCHOLOGY
116E STADIUM
404C WEST 17TH AVENUE
COLUMBUS, OH 43210

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DR. WILLIAM G. OUCHI
UNIV. OF CALIFORNIA, LOS ANGELES
GRAD. SCHOOL OF MANAGEMENT
LOS ANGELES, CA 90024

002050
DR. CHARLES PERROW
YALE UNIVERSITY
I.S.P.S.
111 PROSPECT AVENUE
NEW HAVEN, CT 06520

002100
DR. IRWIN G. SARASON
UNIV. OF WASHINGTON
DEPT. OF PSYCHOLOGY, NI-25
SEATTLE, WA 98195

002200
DR. BENJAMIN SCHNEIDER
DEPT. OF PSYCHOLOGY
UNIVERSITY OF MARYLAND
COLLEGE PARK, MD 20742

002300
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INTERNATIONAL RESOURCE
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LA GRANGE, IL 60525

002400
DR. H. WALLACE SINAIKO
PROGRAM DIRECTOR, MANPOWER
RESEARCH AND ADVISORY SERVICES
SMITHSONIAN INSTITUTION
801 N. PITT ST., SUITE 120
ALEXANDRIA, VA 22314

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DR. RICHARD M. STEERS
GRAD. SCHOOL OF MANAGEMENT
UNIV. OF OREGON
EUGENE, OR 97403

002700
DR. SIEGFRIED STREUFERT
THE PENNSYLVANIA STATE UNIV.
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HERSHEY, PA 17033

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UNIV. OF OREGON, WEST CAMPUS
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EUGENE, OR 97403

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DEPT. OF PSYCHOLOGY
UNIV. OF ILLINOIS
CHAMPAIGN, IL 61820

003000
DR. HOWARD M. WEISS
PURDUE UNIVERSITY
DEPT. OF PSYCHOLOGICAL SCIENCES
WEST LAFAYETTE, IN 47907

003100
DR. PHILIP G. ZIMBARDO,
STANFORD UNIVERSITY
DEPT. OF PSYCHOLOGY
STANFORD, CA 94305

003200
DR. ROBERT HAYLES
DEPT. OF THE NAVY
OFFICE OF NAVAL RESEARCH
ORGANIZATIONAL EFFECTIVENESS
RESEARCH PROGRAMS
ARLINGTON, VA 22217

003250
DR. ROBERT HAYLES
DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
ORGANIZATIONAL EFFECTIVENESS
RESEARCH PROGRAMS
ARLINGTON, VA 22217

003300
MR. DENNIS J. REYNOLDS
ADMINISTRATIVE CONTRACT OFFICER
OFFICE OF NAVAL RESEARCH
MIT
ROOM E19-628
CAMBRIDGE, MA 02139

003400
OFFICE OF NAVAL RESEARCH
E/C REGIONAL OFFICE
BUILDING 114, SECTION D
666 SUMMER STREET
BOSTON, MA 02210

003500
MAJ. R. HARRIS
COMMANDANT
HEADQUARTERS, MARINE CORPS
MPI-20, ROOM 4025
WASHINGTON, DC 20380

003600
MAJ. R. HARRIS
COMMANDANT
HEADQUARTERS, MARINE CORPS
MPI-20, ROOM 4025
WASHINGTON, DC 20380

003750
CAPT. A. T. EYLER
DEPT. OF THE NAVY
ARLINGTON ANNEX
OP-15, ROOM 6B01
COLUMBIA PIKE
ARLINGTON, VA 20370

003[illegible]
CAPT. A. T. EYLER
DEPT. OF THE NAVY
ARLINGTON ANNEX
OP-15, ROOM 6B01
COLUMBIA PIKE
ARLINGTON, VA 20370

000160
OFFICE OF NAVAL RESEARCH
RESIDENT REPRESENTATIVE
M.I.T. - E19-628
CAMBRIDGE, MA 02139

000203
DONNA BREEN
OFFICE OF NAVAL RESEARCH
ORGANIZATIONAL EFFECTIVENESS GR.
(CODE 442)
ARLINGTON, VA 22217

R02100
ROBERT F. MORRISON, PHD
PERSONNEL RESEARCH PSYCHOLOGIST
DEPARTMENT OF THE NAVY
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CENTER
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