

MANAGING PEOPLE IN THE R & D LAB:  
THE HYBRID CAREER

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## Abstract

This paper deals with four career routes in the R&D lab. It is based on data from interviews with selected employees in a number of different central R&D labs of large successful companies. It proposes the hybrid career as a useful way of thinking about the management of technical employees in R&D.

In a highly competitive world, where technology is of ever increasing importance, the industrial R&D lab plays a critical role. How its employees are managed, therefore, and how it is organized, become issues that are integrally linked to a company's success--even to a nation's productivity. So it is not surprising that much recent work has dealt with the problems of managing this important group in the work force (e.g. Miller, 1986; Dalton and Thompson, 1986; Von Glinow, 1988; Badawy, 1988). There is agreement, now, that there are more roles in the R&D lab than previously envisioned--and more different kinds of tasks to be done--and that the problem is more complicated than a simple conflict between professional autonomy and bureaucratic control (cf. Bailyn, 1985).

The dual ladder was an early organizational response to this complexity, but almost from the start it has been seen as problematic (e.g. Shepard, 1958; Cantrall et al., 1977; Gunz, 1980; Roth, 1982; Epstein, 1986; Allen et al., 1986). For two tracks, even if they could be made equivalent, do justice neither to the necessary tasks in the R&D lab (cf. Schriesheim et al., 1977; Roberts et al., 1982) nor to the variety of career preferences of its employees. It is the multiplicity of roles and functions, matched by the many different orientations that people bring to this career, that has only recently been recognized. In it lies both the hope of allocating tasks in a more effective and satisfactory manner, as well as the complication of managing a diverse set of career paths.

The purpose of this paper is to discuss four possible career routes that capture this multiplicity.<sup>1</sup> They reflect both the needed tasks of an R&D lab and the orientations and preferences of the people who perform those tasks. While some are well established career paths, others wait to be explicitly recognized. The paper includes consideration of the implications for management of such a diversity, and proposes the hybrid career as a useful way of approaching this problem.

## Career Routes in R&D

R&D careers take a number of different forms and evolve in a variety of different ways. The most easily described, and most usually defined as "successful," is the managerial route, which slowly moves a person away from technical work. It is the route that led Hughes (1958, p. 137) to say that "the engineer who, at forty, can still use a slide rule or logarithmic table, and make a true drawing, is a failure." It is because of this career disjunction in the "successful" managerial route, that organizations tried to formalize a technical route, where the employee "progresses" while still remaining involved in technical work. Recent work by Allen and his associates (McKinnon, 1980; Epstein, 1986; Allen et al., 1986) has shown, however, that a number of R&D professionals neither desire nor expect promotion up a managerial or technical ladder and would prefer, rather, a career that evolves from project to project. Finally, concern with bridging the gap between R&D and operations, points to a fourth career route--the technical transfer route--which consists of transferring with technology: moving out of the R&D lab and into another part of the corporation. This path was described by one lab as a move "into other [non-research] parts of the company . . . The ideal basis for making such a move is to go with a new product or process."

### Managerial Route

In the central R&D lab the managerial route is the most attractive because it carries with it the highest compensation and prestige, and because it often is the only way to have real influence on the technical work:

Managers move much more quickly and have better working conditions--get cars, secretaries, a dining room, and phones. They have carpets and curtains.

It is easiest to get a project started if you are a manager, you are recognized for getting projects started.

But the attraction to management is also accompanied by misgivings:

The managerial obviously dominates. I have mixed emotions personally whether I would enjoy it. It is tempting because of the money, but for the job satisfaction I am not convinced that it would be pleasant.

Managerial I would like. Everyone wants it. But when one looks at management I wonder why. What seems to happen is that at every level the only thing you want is the next level.

I said I would like managerial, but after I would be in I may not like it. I am stuck in technical.

Managers are assumed to be the most technically competent and are given the authority to make the technical decisions in the lab. It is an assumption, however, often contradicted by the reality of the R&D manager's actual situation. As managers move up they gain responsibility for a greater variety of technical projects, and thus it is less and less likely that they can actually be expert in all the technologies or processes involved in the work for which they are responsible. Further, to be successful they necessarily must emphasize a new set of tasks, particularly budgeting, the evaluation of people, and liaison activities with other organizational units. Some turn to these tasks because in many ways they are more easily and quickly accomplished than is true for technical work. But primarily this shift results from the process of resource allocation in the R&D lab, which depends on managers at every level making their case in competition with others at the same level. Further, in those labs that are not fully funded by the central corporation, managers must also bring in funds through government contracts or from "customers" (other parts of the lab or other units of the corporation) to which they have to "sell" their wares.

A number of difficulties stem from this contradiction between the technical expertise presumed to be necessary for managers in R&D and the actual tasks required by that role. Some people, rewarded for a particular

technical accomplishment by promotion, discover that they have neither liking nor ability for this aspect of managing. Characteristically they stay as much involved in technical work as possible, which has negative consequences for their group and for the people they supervise. Such a group is deprived of a "champion" to fight for resources for its projects and for the individuals who are working on them. Even worse, such a technical expert may prevent the people of that group from showing their own technical expertise by allocating to himself (or herself) the most challenging technical tasks. It is just such situations that led professionals in a lab contemplating the introduction of a dual ladder system to lament that "we already have a technical ladder; what we really need is a managerial ladder!"; and the chief engineer in another lab to comment that "you don't keep a dog and then bark yourself."

Others, of course, can adapt to this transition and slowly transform themselves into managers. (Though I have seen some who even at high managerial levels still chafe at administrative duties and hanker after "real" [technical] work.) In one lab I studied, an innovative arrangement had evolved which might serve as a model of how to deal with this contradiction. In that lab the person who had been promoted was not the best technically but the one most willing and able to do the administrative tasks of management. The promotion for this man was more an assignment to a new set of tasks rather than a reward for technical excellence. In his group, however, there was a technical superstar who served as an informal co-leader. It was he who made the technical decisions for the group (though it came out as a joint decision), and he then pursued his scientific work, only participating in formal group activities when there were technical presentations for potential backers of the research. The manager took care of all the administrative tasks, managed the evaluation and development of the people in the group, and worried about getting the resources they needed. It was a successful arrangement which

worked because the manager, who had no technical pretense, was proud of the expertise and competence of his "subordinate" and openly depended on him for technical advice, and because the scientist had no ambitions for a title and was financially rewarded in line with his actual level of authority, not with his formal hierarchical position.<sup>2</sup> What such an arrangement requires therefore--besides mutual respect and trust between the people involved--is an accurate assessment of the orientations of technical professionals and personnel procedures that allow one to reward people in line with their performance at the tasks to which they are assigned, rather than with the particular formal position they occupy.

It is clear from this discussion that a key issue for technical employees who follow the managerial route is a change in the requirements for successful performance. One typically gets promoted into these positions because of technical competence, but if one is to be successful one must then shift to new and different tasks for which no clear guidelines exist. One must learn how to have authority over and be accountable for work that is performed by others whose technical competence in a particular area is actually greater than one's own, in a situation where expertise is presumed to lie with the manager. Neither doing the technical work oneself nor delegating all the responsibility will be successful. To find the right middle road takes an interpersonal and organizational sense that is not easy to acquire, and for which the labs typically provide no training.

#### Technical Route

The difficulties described above have led companies to try to define a technical career route whereby "advancement" is possible without leaving technical tasks for management. But it does not often work:

I would definitely choose the technical ladder. There is supposed to be one here but I do not see it in effect. They are not as high as managers.

They say we have a dual ladder, and maybe we have it, but it is more lip service--there are very few people on it...I am stuck in the technical.

To the technical I am a strong believer. It does exist, but not enough. It has done well for me and a few others, but realistically it is pretty flimsy--very narrow.

Only under special conditions was it seen as possibly beneficial:

Technical would be best for a female doing the kind of research that I am--because there is less opportunity for discrimination...what attracted me here were the technical resources.

As officially described by one company, the technical route consists of "maintaining responsibilities for one's own research while demonstrably increasing in technical achievement." Recognition, typically, consists of titles with associated salary increases and, occasionally, perks. The difficulties in this route are inherent in its definition:

1. Here one "maintains" responsibility; the same company starts its description of the managerial route with the words "taking more responsibility" (emphasis added).
2. Increased technical achievement is "demonstrated through the usual 'peer review' process"--an academic judgment.

These two points are critical constraints on the functioning of a technical ladder. The first highlights the fact that technical "advancement" does not include any increase in authority--in organizational influence. In one lab, for example, the route was informally known as a "rungless ladder": there are no rungs because nothing changes in one's work or organizational functioning as one moves up this ladder. It was described, rather, as a "continuum: no slots, and one does not have to wait for a position." Nor does movement along this continuum necessarily increase one's visibility or status, since the main difference it makes is to increase one's salary. But such a change, which merges with general cost of living and seniority increases, is private and thus

precludes the public recognition that accompanies a managerial promotion. And even title changes or visible changes in perks are an ephemeral form of recognition if the working position remains the same: if no added responsibility or authority accompanies the move.

And so, some companies have tried to build an academic review process into their technical ladder. It is modeled on the university system, and the responsibilities of academics do not, in fact, change very much as they move up the academic ladder. In the industrial context, however, a different situation prevails. First, there are few top academic scientists in industrial labs, and those who exist are probably the very ones least in need of organizational recognition. Second, by not including the up or out characteristic of the university tenure decision, the introduction of academic judgment creates an even steeper pyramid than is true for the management side. For example, in one company which prides itself on its recognition of technical excellence, 83% of those on the technical ladder are at the first point of that progression as compared to only 42% of those on the managerial side (Epstein, 1983). And this is not unusual. Indeed, many companies have positions high on their technical ladders with no people in them at all. Obviously, there is no structural necessity for this. In fact, official policy in one lab specifically states that though "the size and structure of [the lab] will determine the number at senior levels of the managerial route, there is no such inhibition in the technical route." It results, rather, from the unwillingness (or inability) to define a technical ladder that encompasses increases in responsibility and authority (Bailyn, 1982a).

There are systematic difficulties, therefore, with the technical route (cf. Gunz, 1980; Roth, 1982; Allen et al., 1986). In situations where it is not artificially constrained it serves as a convenient dumping ground for plateaued managers and becomes seen as clearly second rate. In those cases

where it is supposedly working well, the constraints imposed limit its benefits to those most academic scientists who are primarily rewarded and motivated by their professional community. For the great bulk of the industrial lab's technical employees, who are organizationally oriented (Bailyn, 1982b), the technical ladder, no matter how administered, is unlikely to serve as a challenge and reward.

#### From Project to Project

Of all the career routes in the R&D lab, the movement from project to project is least explicit. Generally there are no specific personnel procedures to guide this path and it seldom appears as part of official company policy. And yet, because of the constraints on movement up a managerial or technical ladder, it seems likely that a high proportion of professional employees of the R&D lab are, in fact, proceeding in this manner.

Only two of 18 people whom I specifically asked about these routes chose this alternative. It was not seen as desirable for two reasons. First, because it is not recognized in this lab:

It is not a career route, there is no advancement. It is the status quo and it happens anyway.

It is not obvious enough a motivation. We do that all the time. There is not reward at the end of each project. No public recognition.

And second, because the tendency in this lab, as in many others, is not to introduce new technical challenges for non-managerial employees, but rather to push them in the direction of narrow technical specialization:

I don't see this as a major route in [this lab]. It is highly technically oriented to a narrow area where one tends to stay.

Initially there were varied projects, but then you get funneled in. You work for recognition, and you become the focal point and work only in that area. This [career route] is hard to do.

In principle, however, the prospect is appealing. For example, McKinnon (1980), Allen et al. (1986), and Epstein (1986) have shown that a relatively large group (between one third and one half of the R&D professionals they surveyed) say they are more interested in a series of challenging research projects than they are in promotion or advancement up either a managerial or technical ladder. Those who fall into this group are older and have been in their jobs longer, and are less likely to have an advanced degree. They are less concerned with either professional reputation or organizational advancement than are those who would like to move up one of the two career ladders.<sup>3</sup>

The employees who are actually following this route probably do the bulk of the technical work in the R&D lab. It is also the group most likely to become disgruntled and dissatisfied (Ritti, 1971; Bailyn, 1980), and to show the characteristic drop in performance associated with technical employees as they get older (Dalton and Thompson, 1986). These consequences, however, are more a reflection of a poorly managed career route than of any inevitable decline with age. In particular, the following organizational realities are relevant:

1. This group is most subject to salary compression: younger people come in with higher and higher starting salaries, and rates of increase tend to decrease with age.
2. This group tends to be pushed into narrow technical specialization, with resulting dangers of obsolescence (Jewkes, et al., 1979) and stagnation (Katz, 1982; Bailyn, 1982a).

Both of these factors actually contribute to the decline that they seemingly only reflect.

In order to keep this group productive and satisfied, work assignments must involve new challenges and perhaps even new technologies. In one lab, for example, the computer regularly identified those technical employees who had been in their current assignments for more than four years, and personal attention

was then given to their development. In another case, management insisted (by monitoring and evaluation) that 10% of each employee's time be spent learning a new technology, which then would lead to a different project assignment.

Further, reward systems must be devised that assume continued high performance by this group instead of projecting the opposite assumption. That employees do adjust to what they perceive is expected of them is evident by the following comment of an R&D professional:

The flattening of the salary curve assumes that older scientists and engineers are less productive. And since salary is the dominant mechanism, they are forced into being less productive.

#### Technical Transfer Route

By transferring with technology, the employee crosses the boundary of the central R&D lab and joins a production or operating division of the corporation. It is recommended by the R&D lab as a useful career move because it benefits both the individual (by greatly increasing available opportunities) and the company (by smoothing the transition from research to production). But despite these obvious advantages, it is usually not part of any systematically defined career path. Both structural and attitudinal factors get in the way.

R&D employees, the scientists more than the engineers, often do not fit into the structure of other divisions. Their salaries, particularly if they are Ph.D.s, may be too high, and employees at their level in other parts of the company may have too large a management responsibility:

This is a problem. It happens very little. I am told that it is a salary problem. That at the research lab we are so highly paid that to get to the same salary in the operating divisions you would have to have 100 people working for you. It is a concern of management. They would like to see people move to the divisions. And I think it would be right, if that would be the only way to transfer technology. They are striving for it and I think there is a little upturn. I know some examples, and it has been excellent for the corporation. More would be good, particularly after 15 or 20 years if one is not managerial, and the technical route is such a long shot. It would be good for them to

move. But one would only move if it were up; this is such a pleasant place to work compared to the production divisions. One would only do it if it were a move up or perhaps if one did not like research and wanted to be in the real world.

If you go the technical transfer route you end up in management. In my level in a division you would have to have 50 people to get the same pay. That is a barrier to transfer. If you don't do it when you're quite young you can't do it. It has never worked.

These structural factors make it difficult for professionals to follow the technical transfer route. It is of interest, though, that technicians and technical associates use this route more frequently because they can qualify as professionals in almost any other part of the company.

Such a move also requires a change in attitude on the part of R&D employees. In one lab where this path was officially recognized and where policy specifically stated that "such a move should not be thought of as irreversible," the perception was quite different. It was seen, in fact, as a "one-way valve," a "different career." And the assumed pressure and lack of flexibility in production, as opposed to research, deterred R&D employees from trying something they perceived to be irreversible.

Further, I found no company that had a systematic way of managing such moves. On the contrary, transfer arrangements are usually quite ad hoc and must be individually negotiated. Success on this route, therefore, depends on establishing contacts in other parts of the corporation and on making oneself visible and palatable to a production unit.

An example of the successful use of this route is the 47-year-old engineer in an electronics lab who wanted to move to another location. He negotiated with his supervisor to shift from being a design engineer to a product engineering job so that he could develop the skills he would need to be transferred to a production facility opening up in the area where he wanted to live. And though he used to get "real satisfaction" from designing--"an interesting job

because you work from beginning to end and you see everything"--he saw the production work as an "interesting new challenge." His subsequent transfer to the production unit was accompanied by a promotion to supervisor. He is more satisfied and because of his design experience is able to be particularly useful in the new job.

The problem here is that this career route depends on individual negotiation based on information that has to be acquired through informal contacts throughout the company. On the other hand, if R&D employees do find a niche in production units they not only aid the process of transferring technology but often are able to progress to levels of influence that would have been closed to them in the R&D lab.

#### Managing R&D Careers

There are a number of ways, therefore, to pursue R&D careers. Some are better defined than others, some are seen as more or less "successful." All, however, contain ambiguities and contradictions (cf. Bailyn, 1982b). And all unfold in settings that share a number of general characteristics. These factors may be summarized in four points:

1. Initial selection (and some subsequent judgments) are based on academic criteria.

Recruitment into these organizations is usually from universities and technical institutes, with grades and other academic qualifications playing an important role. And, in many high technology organizations such "academic" criteria continue to be used even for initial evaluations of performance, and sometimes even for first promotions and subsequent advancement (cf. Bailyn, 1985).

2. There are no unambiguous, agreed upon criteria by which to gauge a particular individual's performance.

In the R&D lab there is a complicated and not easily defined relation

of technical expertise to responsibility and authority. The boundary between supervision and the technical workforce tends to be blurred. Procedures define supervision as the locus of technical expertise since it is there that authorization and sign-off on technical work take place. The actuality, though, is usually different, with the real technical competence residing in the workforce. Thus technical goals are achieved by a fluid combination of people and tasks, in which evaluation of individual contribution is full of ambiguity and difficulty.

3. It is difficult to describe, learn, or teach the best way to meet the requirements of the tasks to be performed, since such knowledge is characteristically tacit and depends on understanding and maneuvering in the informal organization.

To function effectively in such an amorphous setting, with its unclear signals and ambiguous criteria to guide behavior, requires knowledge of existing networks and sources of information, as well as an awareness of the distribution of resources and the paths of access to them. There typically is no attempt to impart such knowledge to newcomers or to help them decipher the new setting.

4. There are contradictions embedded in technical career paths and career procedures that make it difficult for individuals to get accurate self-understanding and to shape their careers appropriately.

Employees in the R&D lab enter with a variety of motivations. These motivations merge with an evolving knowledge of actual talents and interests to form career orientations, what Schein (1978) has called career anchors. A career anchor is a joint product of initial motivation and self-knowledge gained from actual experience with the work in the field. Schein has repeatedly shown that knowledge of one's career anchor is crucial for satisfactory career progress. But if there is no easy way to get experience with diverse career paths, and if there

is difficulty in providing accurate individual feedback, as happens in this setting, then the acquisition of this self-understanding becomes problematic.

The best way to deal with these issues will obviously depend on the particular character of the specific organization in question. Still, some general considerations are possible.

The main idea I would like to suggest here is the possibility of a hybrid career, one which encompasses aspects of all the career routes described above. To make this work, one would have to think of individuals' tasks in terms of multiple work assignments, each with different forms of evaluation and reward; and, one would have to consider careers in terms of discrete, discontinuous chunks.

Even though the technical work force is, almost by definition, specialized --and technical specialists play an important role in the R&D lab--the assumption behind multiple work assignments is that over-specialization must be avoided. To achieve this, professionals must be forced to develop "minors"-- areas of knowledge and competence outside of their major specialization. Two kinds of approaches are possible: first, temporary assignments (perhaps 6-18 months) to a new setting or task; and second, partial assignments that run concurrently with one's main work. The latter have already been alluded to in the example of the company that mandated 10% of each employee's time to the learning of a new technology. But other partial assignments are also possible: though mainly in research, an assignment might call for a certain proportion of time on development, or a design assignment could be accompanied by responsibility for "continuing" engineering for a product already in production. Such assignments could serve important boundary-spanning functions: from research, for example, to production or administration. Participation in QWL or QC efforts is another example. In all cases the outcome would be more integration

for the company and less probability of stagnation and obsolescence for the individual.

Similar functions are served by temporary assignments to altogether different tasks, perhaps to a different setting. In one company, for example, there was great resistance by one unit to implementing a new system that had proved to be highly efficient and cost effective. The chief engineer in the R&D lab of the company--who had been "relieved" of a management position--felt that he could be useful in this situation by spending six months in the production company involved in order to help them implement the new system which he had helped design. But there were constraints in the way: he did not want to make a permanent move; management feared that a temporary assignment would preclude a permanent solution; etc. Clearly, the notion of temporary assignments was not part of the accepted procedures of this organization, even though it was an obvious answer, in this case, to a troublesome organizational impasse.

Such multiple work assignments would also serve the purpose of preparing the person for the next career chunk. The notion of career chunk is similar to that of a temporary assignment but of longer duration: typically five to ten years. I think of career chunks as preplanned, discontinuous periods of a career, each of which may have a very different major assignment. So, an individual may be involved for one chunk in a long range, perhaps risky technical effort: an IBM Fellow is an example. This may be followed by a chunk in management, or by a more programmed technical task assignment. At each stage the technical employee would carry, also, some secondary assignments for the purposes already stated. The important point is that because they are preplanned, such discontinuities would not be seen as failures. The chief engineer mentioned above underwent such a transition. But since the underlying assumption had been that once in management, always in management, he perceived

this as a failure and it took some time before he began again to function effectively.

The hybrid career, therefore, would allow people to move easily among the various career routes, both sequentially and concurrently, all of which are associated with critical R&D tasks. But it clearly complicates career procedures. First, it presumes disaggregation of status and salary from task. It would mean, also, that no particular assignment, such as the supervision of a group, could be given as a reward for good performance in a different task. Finally, there are implications for evaluation: rather than a uniform system of performance review, it would be necessary to establish a variety of evaluative procedures to fit different periods of the career and different aspects of the work assigned at any given time (cf. Bailyn, 1984).

Despite such complications, however, it is the thesis of this paper that the R&D lab would benefit by supporting hybrid careers for its employees. For we know that R&D employees have a variety of career orientations and that these change over the course of a life time. And thus, no matter how seemingly difficult, it behooves the lab to take advantage of this diversity, rather than trying to channel people once and for all into a few, rigidly defined career paths.

## Notes

1. The formulation is based on research in a number of different R&D labs (in the US and the UK), all central facilities of large successful corporations. All quotes stem from detailed interviews with employees in these labs.
2. It is of interest that this group was in a division led by a female manager--a highly respected physicist--whose explicit philosophy was to work through her people and not herself to get involved in the technical work (see Bailyn, 1987, p. 309).
3. Because these results are based on cross-sectional data, it is hard to know to what extent this orientation is merely an adaptation to lack of movement in an organization. Longitudinal data on mid-career engineers (Bailyn and Lynch, 1983) have shown that orientations are indeed responsive to particular career experiences. Nonetheless, because of the numbers involved, it is likely that there is more here than merely a rationalization for organizational "failure" and that the movement from project to project represents a genuine career orientation which warrants an explicitly managed career path.

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