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NOTES ON CAREER GROWTH IN NASA  
PATTERNING OF INTERVIEW RESPONSES

David R. Peters

April, 1963

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A working paper prepared under the direction of Professor Edgar H. Schein as a part of the research study in career growth of the Organization Research Project (NASA) of the School of Industrial Management, Massachusetts Institute of Technology.





## Introduction:\*

This paper is a descriptive and qualitative synthesis of data elicited in about ninety semi-structured interviews of professional and supervisory personnel at the Langley and Lewis Field Centers. The responses involved were representative of many people but were not unanimous nor a complete picture for any one person or group. The patterning observed in the responses is an attempt to summarize some of the complexity of the data in terms of general trends. This synthesis, then, is both a partial summary of interview data and a simplified model to be used for heuristic purposes in elaborating the research project. It will be supplemented with a formal quantitative analysis as the classification and coding of the interviews proceed.

In the interview we were seeking information on four kinds of variables:

- 1) the individual's own career development;
- 2) role stresses in his present position and their resolutions;
- 3) performance feedback and its effects upon careers;
- 4) the individual's perceptions of general career patterns in the Field Center and the organizational variables which influence career structure and development.

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\*I wish to thank Prof. Edgar H. Schein and John M. Thomas for their reading and helpful suggestions on the previous draft.



I. The Individual's Career Development:

Very few of the people we interviewed report having made any concrete career plans at the time of college graduation. Most of the interviewees had held only some vague goal about working in a particular area of research or development aligned with their academic background and interest. Few of the people had extensively searched out the potential market for their services; rather, they focused upon several of the larger and more visible scientific organizations in government or industry in which to begin their work.

The men seldom recalled any expectations about promotion or transfer during their initial years. Exclusive of men with advanced degrees or previous research experience, many of the interviewees felt that they initially had had very limited knowledge of the technical possibilities in their research area and often inaccurate ideas of what research and development work really involved. They realized in retrospect that their understanding of these became crystallized only after many months of work. Some of the young interviewees commented here on the impossibility of having more concrete or longer range career expectations at present, in view of the rapid fluctuations of technical specialties as well as the accelerated evolution of NASA goals.

At the time of their entrance into NASA (or NACA) many respondents recall initial expectations, however, concerning the general working conditions connected with their assignments. Autonomy, avoidance of routine work, security, opportunity for advanced education, and freedom to follow up on research ideas of personal interest were most often specified here.

Among the older interviewees, the availability of attractive research facilities and the research freedom expected had been predominant among their expectations and reasons for originally choosing NACA. Among younger interviewees these were more often taken for granted and the opportunities for personal scientific growth and graduate education plus the aura of working on space frontiers



were emphasized more.

In short, the comments concerning their entering expectations suggested a general desire to settle down into some research niche for an extensive period of technical learning and growth, often including advanced technical study in the area.

A few of the young interviewees characterized their initial experience in research (with NASA or elsewhere) as disillusioning when their entering expectations met with contradiction. For example, one new engineer cited his routine assignments and the prevalence of "cookbook engineering" as disturbing to his beliefs about what research is or should be. Another young NASA engineer described his reaction to his first industrial research job as one of disgust over the triviality of assignments and the profit-centered, non-theoretical nature of the research work.<sup>1</sup>

During the initial phase of their employment the men did not seem to feel identified with or committed to NASA as an institution. This may be inferred from their frequent emphasis of the educational value of these early years and the applicability of this experience as a "stepping stone" toward some other venture. Their value-orientation might be said to have been essentially professional and technological at the outset. This tended to be true especially if the respondent had some graduate education, a degree in the basic sciences, or a job assignment in research of more basic nature. The few exceptions who had either explicit managerial aspirations or highly institutional identifications were found among the B.S. engineers in development work and the ex - "Co-op" students.

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<sup>1</sup>The reduction of this dissonance between their experience and their entering beliefs about the technical area and research work might be an important leverage point for future investigation. The latter interviewee specifically said that these feelings in combination with apparent "credit stealing" by the industrial research supervisors caused him to readjust his career aspirations toward research management, as well as precipitated his search for other employment alternatives.



Our question about "high spots in your career" elicited quite a wide variety of specific responses, which partially reflected the unique orientation and motivations of the particular interviewee. However, there were many more answers which encompassed professional success or recognition than managerial or promotional success. Examples here are "initiating a new research area," "bringing a project into successful completion," and "receiving recognition for a technical paper or contribution." The initiation and inaugural phases of new research or project work were generally felt to be most exciting. It was interesting to note that even most of the lower level research supervisors also seemed to feel that instances of technical recognition were the high spots in their career.

The complementary question about "disappointing experiences" also elicited responses which were technical in nature, such as "being forced to continue on a routine or dying project," "not being allowed to follow up an interesting sidetrack," and "having a paper unwisely edited or suppressed."

The questions asking "where do you expect to be in five or ten years?" and "what is a successful career?" received answers which seem to fall into two different classes; one technical and professional, and the other managerial and institutional. Responses in the first class, "technical-professional," include anticipations and career values which involved an intensive focus on some technical specialty, finishing a graduate technical degree, or making some scientific discovery. The second class, "managerial-institutional," involved the acquisition of more responsibility and scope at the Field Center, or the direction of some large-scale project or research inquiry.

These two response classifications reflect two basically different long-term orientations to one's career, the professional versus the institution-





al,<sup>1</sup> These differ with regard to the reference group with which the man identifies as well as with the nature of the job functions involved (technological vs. managerial). Probably a third kind of job function might be distinguished in the Field Centers among what are termed "staff" or "administrative" positions. This type might include "assistant-to" supervisory positions, other staff positions like personnel, and possibly some "support" functions such as technical service engineering. We had initially excluded most of these positions from our sampling strategy because strictly they were neither really professional nor research management, yet this third category of administrative functions should be included in a complete classification of career alternatives. (These were often viewed disparagingly by the professionally oriented scientists as "escape hatches" for the technically untrained, obsolete or incompetent.) Whether these positions may be said to provide a possible orientation to career seems somewhat uncertain but worthy of further consideration.

An interesting sidelight is that some respondents in both classes would mention that there existed "many others" who primarily wanted to "get ahead" in another way. They were quite conscious of the existence of an alternative career route. Some "technical-professional" respondents tended to distinguish carefully between their aspirations and success and those who were striving toward mundane goals of money and power. On the other hand, many "managerially oriented" people seemed quite conscious of having been at a career decision point, having chosen a route of managerial responsibility entailing many advantages of prestige and salary, but having defected from their commitment to the scientific orientation and values. Their lingering regret was manifested in many ways, often in direct admissions, sometimes in fears of being promoted further up

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<sup>1</sup>It is an intriguing and unsolved issue as to the extent or conditions under which these two orientation types may be fused or resolved.



and away from technical research work, and sometimes indirectly in their value-judgments about various issues.

A systematic exploration of perceived growth and development was undertaken with a Growth Areas Checklist given to the interviewees.<sup>1</sup> One aspect of this topic which emerged more clearly in the interview data is that in general the younger respondents tended more often to desire and conceive of their growth in terms of technical competence, while older, higher status and especially supervisory respondents tended more to specify past growth in terms of "dealing with people." Organizing skill and self-confidence were often mentioned by these latter respondents too.

It may be that there exists a necessary transition in attitude orientation from technical growth toward interpersonal growth within certain types of research career routes. This transition would reflect the underlying problems of coping with and emotionally accepting the reality of the human aspects of organization, which parallel those issues identified by Schein among first year graduates of S.I.M. in industry.<sup>2</sup> For professional scientists in NASA these problems may become more salient with certain changes in role requirements. Promotions which bring the professional into contact with supervisory responsibilities or position changes toward work of a more developmental nature would be likely to focus these problems and sensitize the attitude areas. At the same time any prior attitudinal transitions may function to facilitate position changes.

## II. Role Stresses and Their Resolutions:

In this section of the interview our original objective was to investigate any strains on scientists which would arise from incompatibility of expectations

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<sup>1</sup>The analysis of these results is contained in our Progress Report dated November 1, 1962.

<sup>2</sup>Schein, E. H., Problems of the first year at work: report of the first career panel reunion, Working Paper, School of Industrial Management, Massachusetts Institute of Technology, 03-62, 1962.



that various others might have about his role. We had anticipated that these stresses would be prevalent since there is growing use in NASA of "matrix" organization which places the scientist or engineer in a situation of multiple reporting responsibility and thus multiple role-sender expectations. However, it happened that the two Field Centers which we visited in the pilot phase generally did not have this characteristic of organization structure. Seldom did an interviewee report being in the type of situation we had anticipated.

When the interviewees were asked to whom they felt responsible, the answers were quite varied and individualistic. Usually the interviewee was content to select one or two people, with the two modal responses being: responsible to his supervisor and/or to himself. Perhaps the response of "myself" is indicative of the high valuation on autonomy, self-sufficiency, and internalized motivation which is characteristic of our study population.

When queried about the most important of his relationships to others, the most frequent responses were his supervisor, his co-workers, his subordinates, or the groups that he advised or serviced.<sup>1</sup>

When we asked about the existence of pressure at the Field Center the respondents generally implied that most of the pressure one might feel was not externally imposed but rather was self-imposed, most often in the form of one's level of aspiration.

By far the largest number of interviewees suggested that to the extent that stress was present in their work-life it existed in the form of conflict between job or role requirements and personal interests or self-concept. For supervisory personnel this assumed the form of conflict between administrative or supervisory duties and time that he would rather spend on his research interests. Some supervisors

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<sup>1</sup>It was our feeling that these two questions were also useful in gaining insight into a respondent's present attitude orientation toward his career. When the author was later trying to assess the respondents' career orientation from the interview protocol, these particular questions were found to supply important clues.



classified not only "paper shuffling" but also "guidance needs of my subordinates" and "helping to orient new people" in a category of distractions preventing them from pursuing their personal research interests and the "important" parts of their research management function.

For non-supervisors the conflict was usually a case of incompatibility between the research assignment and their various personal interests, such as a different technical specialty, the lure of a tangential research trail, or the prospect of returning to school.

Occasionally a second kind of conflict was perceived between the quantity and the quality of work reports. Some men felt pressured to turn out reports frequently and quickly because this led to faster recognition for them and quicker utilization, yet their scientific values dictated a more perfect and completely finished piece of research.

These conflicting demands were not the sorts of dilemmas which build up to a critical point and then have some quick, visible, and dramatic outcome. Rather they were forces of low pressure yet continual application because, as one person said, "Well, ultimately I have to be doing what I'm interested in."

We did not gain much insight into the effects of these conflicts over the career span because the interviewees could not easily identify the somewhat subtle and preconscious workings of these conflicts. Perhaps the strain was slightly relieved by the general realization that their present job allowed more sway to personal interests than most industrial alternatives.

Our questions about their "criteria for allocation of time under conflicting demands" again elicited responses which were varied and idiosyncratic. Some of the more common ones, though, were the criteria of deadlines, personal interest, delaying the longer term research work, and supervisory decision.





The interviewees often confided with embarrassed dismay that they lacked defensible and consistent criteria and that such decisions were usually made by some intuitive juggling among the above factors and others.

### III. Performance Feedback:

In this section of the interview we asked the respondents by what means they ascertained how they were doing in their jobs, which of this information was most rewarding and important to them, and how they would like to get more feedback.

Regarding the first question, once again the responses were somewhat varied but the modal answers were "no one ever tells you -- no feedback," or "you can never find out directly." There was general agreement that the formal "report cards" were meaningless and that salary advancements did not discriminate greatly between the performance of employees because of the predominant seniority factor. This lack of information being innately frustrating, most people appeared to compensate by becoming more sensitive to indirect and subtle clues and cues, such as "the quality of the subsequent job assignment" or the "amount of autonomy allowed." Needless to say, these indirect substitutes are subject to uncertainty and misinterpretation, as well as making it difficult consciously to plan one's professional development or career.

A few of the older research managers did not feel this issue to be a problem for them (although they were quite oblivious to the problems their subordinates felt in this respect) because they had intuitively developed over the years some internal personal standards by which they judged their own performances, at least to their own satisfaction.

Some of the more professionally oriented scientists responded to this question of performance feedback in terms of publication requests, acknowledgments, and general stature in their professional society.



The question about "which means of getting performance feedback is most important or rewarding" elicited two modal answers, supervisor and scientific community. This may again illustrate the familiar institutional vs. professional types.<sup>1</sup>

As might be expected, whatever feedback source was termed inadequate in the first question was named for the answer to "where and how would you like to get more feedback?" It is important to note that there was emphatic consensus among the non-supervisory professional that they desired more direct, explicit and faster feedback from their supervisor.

It was judged by the research interviewers that this issue of performance feedback posed a difficult and threatening problem for the research supervisors. The problems of subordinates in obtaining feedback were seldom recognized by the research managers, and, if raised by the interviewer, were quickly dismissed by some panacea suggestion of a modified formal "report card." Already feeling overburdened with administrative and managerial duties for which there was often small interest, they apparently had little tolerance for these needs of subordinates which would further distract the supervisor from his personal research as well as constitute a ticklish interpersonal problem for which he had little training or skill.

#### IV. Perceptions of General Career Patterns and Organizational Influences:

The objective in this section of the interview was to obtain data on general career patterning in the organization and to identify the organizational

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<sup>1</sup>This distinction is clouded by the fact that in many cases of young researchers the supervisor was of high professional prestige, and thus provided technical guidance and represented relevant professional standards.



factors which influence attitude orientations and career development.

A. Promotion Patterns --

In this section there were several questions intended to develop information about promotional phenomena as perceived in the Field Center. For example, the interviewees were asked to give advice to an ambitious young scientist, and to describe "how one gets ahead" and "what kinds of people get ahead most rapidly."

A number of ideas emerged from the responses. First, many respondents prefaced their answers by noting that initial grade advancement was somewhat automatic, perhaps through GS-11.<sup>1</sup> Secondly, some people felt the answers to getting ahead were partially dependent upon the stage of the career. In advising an ambitious young research scientist these respondents would emphasize improved technical competence, being responsive to his boss's suggestions, and perhaps specializing. Later, they would advise different behavior and development of other skills, for example, showing initiative and being independent in his work, being ready to accept responsibility, and making himself visible in the organization. In short, it was suggested that different criteria or requirements become salient as the career evolves through various stages.

Thirdly, many people in answering felt they needed to distinguish between two different kinds of "getting ahead"; one involving a syndrome of respectability, influence, and authority, and the other one pertaining more to professional esteem and progression. To get ahead in the sense of power and influence one should "go the managerial route" which was facilitated by gaining internal recognition for your work, selling your ideas, being respon-

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<sup>1</sup>It was suggested that promotion progress might be assessed most realistically as a rate which is relative to the legal minimums of time-in-grade and to the average pace of peers in one's particular division.



sive to organizational needs, and demonstrating administrative and organizing capabilities. To get ahead in the professional sense was seen as a slower process which involved concentrating upon creative research, being independent, and building a technical reputation in the scientific community.

Another important point is that people at both Field Centers seemed to be in agreement about how these two routes were associated with salary progression and GS level. After the rather automatic increases during the first few years, promotion became very much slower and most people felt that it was very difficult to progress beyond GS-13 without getting into a research management or section head position. As one interviewee described it, "the parallel ladder for researchers shrivels up at #14 and vanishes into mid-air at #15."

This shared conception among the interviewees was in sharp contrast to the assertion of some higher officials in the Field Centers. They had emphasized to us that it was quite possible for excellent scientists with purely research interests to get ahead as easily and as far as those who were managerially oriented. Except for two or three instances of famous and highly visible personages though, our interviewees could not point out people who fit the pattern asserted by the higher officials. In other words, there is a marked discrepancy in this aspect of the cultural premises of the Field Centers.

The main points here are: automatic initial advancement; different criteria depending on the stage of the career; common recognition of two career routes; and differential association of these routes with promotion and salary advancements. Considering these topics at a more abstract and theoretical level, we have been exploring here the influence of the perceived organization reward structure upon attitudes and career development.

#### B. Perceptions of "how to get ahead" --

Let us return now to the question of how people progress in the organization and analyze the content of the answers to "how one gets ahead rapidly."





Most of the responses might be grouped under one of four categories:<sup>1</sup>

- a) those having to do with technical performance;
- b) those with recognition-getting phenomena,
- c) those with "personality" attributes; and
- d) those with one's relationship to some organizational phenomena or characteristics.

Answers in the first category, performance, emphasized the quality of technical performance as important in getting ahead quickly.<sup>2</sup> Almost all respondents agreed that at least some degree of technical competence was necessary in order to get ahead.

Secondly, there were a cluster of responses sharing the common core of recognition-getting. Examples of responses in this category are "making yourself visible to the higher officials," "straining to publish often," "building up the right image initially and projecting it widely," "playing politics," etc.

Thirdly, there was a group of comments about attributes of "good personality," referring to some particular valued kind of behavior or skill. Examples of this are "ability to handle people" (generally reducing to mere 'tact'), "being mildly aggressive and independent," "having the right attitudes and showing initiative." (This "personality" category was occasionally associated with the "recognition-getting" response -- an illustration of this being "ability to communicate and sell your ideas.")

Fourth, there were a group of answers which concerned one's relation to organizational phenomena, such as "being on a hot project," "following the footsteps of a rising star," "empire building," "luck," or "waiting your

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<sup>1</sup>There are other meaningful ways of classifying this data, such as idealistic versus cynical, or active striving versus passivity. These will also be dealt with in a formal quantitative analysis.

<sup>2</sup>There was often a note of professional pride and ethical justness in the responses of those emphasizing the importance of the technical performance criterion in the Field Center. This may be contrasted with occasional overtones of cynicism in some of the other categories, especially "recognition-getting."



turn."

Some interviewees listed multiple factor "formulas" using more than one of these categories and a few respondents gave a four-part answer corresponding to each of these four categories.

Managers and researchers who were located in development divisions or on project work seemed to mention more often the importance of organizational phenomena such as "being on a hot project," etc. They also made frequent reference to organizing ability, drive, and initiative. Perhaps the simplest interpretation here is that these comments reflect the actual increased importance of such factors in the movement of people in these divisions.

It seemed that the interviewees who were research supervisors very often proposed a combination of two ingredients, technical performance plus "personality," ("initiative," or the "ability to communicate"). Non-supervisory interviewees generally named technical performance too, but more often combined this with a "recognition-getting" ingredient, ("prolific publishing" or "playing politics"). One plausible inference here is that the actual behavior being identified is identical but that the status or position of the respondent is associated with differential perception. The research managers may have had a tendency to conceive of the behavior as a desirable and stable personality attribute, e.g. "initiative," while the non-supervisory professionals tended to view the behavior cynically as recognition-getting. If so, this phenomenon may have partial roots in a) the supervisor's inclination to avoid taxing interaction with subordinates (note page 10) which would lead them to view very favorably any "initiative" and "independence," while b) the non-supervisors slightly resented and rationalized this same upwardly mobile behavior among their peers.



There were also instances where the respondent's attitudes and values about his own work life seemed to be associated with his description of how one gets ahead at the Field Center. For example, the "managerial-institutional" type (see page 5) seemed more likely than others to emphasize recognition-getting and slightly deemphasize technical performance. The interrelationships between the perceptions of career patterns and organization influences and other variables such as the respondent's orientation, position, tenure, etc. are very complex and will be more systematically explored in a formal quantitative analysis.

### C. Other Influences --

We have already discussed role stresses, performance feedback, and the perceived reward structure as possible organization determinants of career orientation and development. There were several other variables which seemed to emerge in the interviews.

One conceptual connection which suggested itself from the interviews was the striking congruence between the prescriptions for "getting ahead" made by interviewees in development divisions or project work (show initiative and drive, organizing ability, concern for needs of the Field Center) and the "managerial" attitudes and orientation of the higher level supervisors (discussed below). One hypothesis which might be entertained is that the experience of a project assignment or development work tends to influence the researcher's orientation to his career, perhaps operating through a change in values, tending to induce him to seek more actively the managerial promotion.

Another possible determinant of change in career orientation and development may be the phenomenon of specialization. In many of the interviews this word spontaneously arose in the context of something of importance



occurring early in the career of a scientist in basic or applied research. People were often highly ambivalent toward this idea and specialization might well be thought of as an important dilemma in the early stages of a scientific career. On the one hand many interviewees felt that specializing helped a young researcher to carve out some secure niche and establish a reputation as an expert in it. This often was seen as accelerating one's promotion pace. On the other hand, however, there always lurked the attendant anxiety of getting caught in an obsolete or passé specialty and thus being left behind, as for example has happened to some aeronautical specialists at Lewis. The primary escape, through what is called "technical retreading," is both frustrating and painful, especially among the older men.

In addition, it seems likely that intensive specialization will have consequences for attitude orientation and later career development. Perhaps specializing reinforces the professional orientation and makes a researcher less willing and/or less able to assume the broad and more general frame of reference necessary for research supervision, thus operating to restrict his career route alternatives.

#### D. Within Research Supervision --

There was great variation among the lowest formal level of research supervision (section heads) as to how they defined their role and allocated their time. Some emphasized the managerial or supervisory aspect of the role, performing differentiated functions and concentrating upon giving research help and guidance to the professionals under them. Others, however, emphasized the research aspect of the role, performing the same functions as their subordinates. They thought of themselves as technical "spearheads" cracking the most difficult part of the research problem and then distributing the more programmable pieces to their subordinates. It might be interpreted here that these latter section heads were thus trying to straddle the two career routes, attempting to combine





the managerial rewards with professional work functions.<sup>1</sup> It seems that this phenomenon would be an important one for further investigation. One question might be the relative distribution of these supervisory role orientations among the functions at the Field Center. More important, perhaps, would be questions of the differential impact of these orientations upon the enculturation and development of young professionals, or upon the effectiveness of the work group.

There was also consensus among most of the interviewees that maintaining a technical orientation within a research management position was not possible at or beyond the next higher level of branch head. Although our interviews with branch heads and division chiefs were not numerous, there seemed to be a distinctive difference between their role conceptions and those of the lower section heads or informal group leaders. The higher level research managers tended more to describe their functions as sending ideas and projects down to the sections and selling the results to upper levels in the Field Center. We might characterize them as having a managerial or executive orientation and being somewhat removed from their previous professional orientation. In contrast, the lower supervisory levels tended in general to see themselves as more involved in the skills of planning and directing the technical program of the scientists and engineers. They might be characterized as retaining more of a professional orientation. Another area of fruitful inquiry might be to investigate the consequences of holding a "supervisory" versus a "research" orientation for the career development and promotion of lower level research supervisors.

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<sup>1</sup>It is also interesting to note that most of the researchers optimistically tended to overestimate the amount of time that a section head or branch head could pursue his personal research interests.




APPENDIX

The Ruminations of a Hypothetical Interviewee

I came to NACA with a master's degree several years ago to work on basic research in aeronautics. I didn't seriously consider industry and its larger salaries because I would be able to do basic research and have more freedom at NACA, would be more secure, and could publish in journals, etc. I started working on a basic research assignment as a GS-7 and stayed with that work for 6 years, also being promoted to GS-9, 11 and 12. Became known as the expert in X around here. After several years I became somewhat tired of it and wanted to switch into Y, but it took a long time to get permission and to make the transition. (Even now, people box me in with their expectations of solving all the X-type problems.) It took a long time for me to bring myself up to snuff in Y and probably I wasn't very useful to them for a while. I took some more course work at night as well as a couple "in-house" courses -- I'm quite uncertain as to how useful these were but the people here rather expect you to do this.

Recently a project arose in an applied research aspect of Y<sup>1</sup> and I was pressured to try the work for a while. I was somewhat concerned about making the shift because you know it's usually a one-way street from basic to applied research to development work -- once you leave the basic scientific work you never get back.

Most of the men in basic and applied research seem naturally to specialize after they come here. There are at least twice as many specialties among people at my level (GS-12) as among new GS-7's. I've also noticed that among people at GS-14 and 15 there are very few specialties or specialists -- but then most of them are in supervisory positions anyway. Probably you could picture the distribution of grade and specialties like this: "  ". In a way,



specializing can be a pit that you dig yourself into -- an increasingly deeper commitment that is hard to get out of -- your niche could become obsolete and dead-end you -- although specializing probably helped me progress faster when I first began here.

It's a little difficult to see far into my future now -- NASA is evolving rapidly, its goals are yet unclear and the relations between NASA and this Field Center have yet to be worked out. Frankly, it's harder to identify myself with the Field Center now that it's shifted its programs and the goals seem so vague. Also, I was a physicist in college and used to go to most of our society meetings, but that kind of thing seems less important now. I was reclassified as a "space environment technologist" (!) when the new functional classification came out and the traditional backgrounds never get used much any more. Perhaps functional classification is more realistic but I vaguely miss my identity as a physicist. Maybe it will become possible to build an image of a "space scientist" but I don't feel that this is yet established.

My promotion pace has slackened sharply. The step from GS-7 to 9 is almost automatic, and from there to 11 and 12 is partly a matter of waiting your turn. But to get to 13 and 14 is much more difficult -- some people don't make it even after many years. Recently I have been thinking wistfully of industry's higher salaries, but not really seriously because I'd miss the autonomy and research freedom too much to leave. You might say though that this characteristic promotion plateau around GS-12 or 13 represents a crossroads point in the career of many people.

I've never thought much about going into supervision -- it usually takes about 8-10 years just to become a section head. Not sure I'd really want to do that kind of non-scientific work, but yet it's very hard to progress much further if you don't get some sort of managerial title -- you can often keep on doing much of your own stuff as a section head anyway. Perhaps specializing makes



it harder to visualize and adapt to being a more broad and general supervisor. Occasionally your specialty sprouts and you find yourself a supervisor, but more often it is a case of showing an interest and ability for administrative tasks that makes you liable for promotion. Perhaps people here sort of subtly advertise their willingness for supervision in this way. If I had stayed on basic research I might have gone back for a Ph.D. because it helps you get ahead in basic research, but it doesn't matter very much here in applied research and not at all in development. The more you get into development work the more emphasis there is on having a good personality and being politic and that stuff, and you really don't have to be as technically competent -- same thing with supervising development work. But back in basic you had to be the best guy technically in order to get promoted into management -- in a way the boss's technical expertise was admired and it represented a sort of incentive to keep on top of your field.

If I were really after money and promotion I might accelerate my progress by trying to sell my ideas harder, making myself visible, and maybe transferring to some new area in development. But then I'd have to become overly concerned with how my boss feels about my work (which is quite a mystery), and be very tactful with people -- and other things which aren't very professional somehow.

I have mixed feelings about the promotion system. It's equitable, but it should be based more on merit than on tenure. The promotion pace is quite slow and the within-grade raises are small -- you have to be very patient. I'm not sure how it really operates as a system and there's no provision for letting you know where you stand. I wish there were more room at the top of the technical rungs, and that there weren't so much emphasis on publishing. I probably feel forced to publish more than I'd like, which is painful for me and sometimes





very wasteful for the Center. As to barriers, if you're technically competent there aren't many real barriers for the first few years, just the Civil Service restrictions and slow pace. If you get stuck on a cold project which isn't progressing or on something like technical services work then you'd never get ahead. Sometimes your supervisor's attributes or characteristics have an influence -- you may be limited by his status, competence, training ability and promotion philosophy.

When NASA took over from NACA two years ago there were a lot of changes in climate. We used to be a poor but honest group of researchers, committed to discovering knowledge and disseminating it to industry. Now we're much larger and richer, perhaps a little less pure, and there's more a feeling of mission to be accomplished -- but I'm not as interested in the mission and hardware aspects as some of the new people are. The Field Centers have been expanding rapidly and many of the people here have been spun off to one of the new Centers, especially people who like the managerial and project kind of work. Many of these new people were brought to NASA at the cost of lowering our classification standards and giving them higher rankings than many of the older personnel, especially in development and project areas. It would be a problem to reintegrate them if the work should fold up.

A few of the groups here have more influence than others -- e.g., like the "hot" projects get priority and some of the glamorous new research areas have more prestige. Sometimes, too, the divisions with very dynamic leaders carry more weight. The support and service groups here are definitely at the low end of the totem pole. As far as individuals go, at a given level possibly the people with the best technical reputations have more influence than their peers. More degrees help boost your status a little -- being Center-oriented helps you have influence and being compatible with your boss helps, especially on the hot projects.



Although I haven't had experience in industry, my image of it is different from NASA. The orientation is more toward profits than toward real science -- they have non-professionals managing research, too. Probably there is more technical freedom here and opportunity for individual growth. Industry has higher wages and promotion potential although there's more competition, more danger and they don't retain any non-producers. Most of these differences, though, have been decreasing and are not nearly as clear in NASA as they used to be in NACA.

It's very difficult to say in general why some people leave here while others stay. Out of my acquaintances, there were many different reasons and these were usually quite idiosyncratic. I could list a dozen reasons for staying or leaving but these will depend mostly on the individual.

It is difficult to identify the main opportunities for personal development here because these depend mostly upon what the particular individual needs. There are the advanced education programs, but these vary a good deal in quality and appropriateness to your work. I suppose that things like our good facilities, breadth of research areas available, freedom to work in many research directions, and the general high competence of the co-workers are all things which could help anyone a little.

Anyway, it's been rather interesting talking to you. I seldom get a chance to think about these longer range or larger scope issues and never talk to anyone here at work about them.

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