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Living with Technology: Issues at Mid-Career

by

Lotte Bailyn

in collaboration with Edgar H. Schein

May 1979 WP1066-79

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Preface

The study on which this book is based was an attempt to understand the career patterns and reactions to work of a group of M.I.T. graduates who were well established in their careers. It was undertaken out of both a specific interest in the fate of M.I.T. alumni and a more general interest in the development and patterning of technically based careers. Such careers were found to be neither as varied nor as homogeneous as one might assume. They were experienced, however, in widely different ways. Some were highly satisfactory, others surprisingly alienating, and the differences seem to lie as much in the structure of technical jobs in organizations as in the people who pursue them.

In studying the career patterns of M.I.T. alumni, we had no illusion that they were representative of the general occupational distribution in this country, nor even of its most educated part. On the contrary, attendance at M.I.T. defines a highly pre-selected group of people whose proclivities are further reinforced by the education they receive. But it is exactly this involvement in science and technology that was of primary concern. In our technically based society such beginnings lead to major roles--technical, professional, and managerial--in both public and private organizations. To know the form that such technically based carees may take and the reactions of the people pursuing them is therefore critical to an understanding of our society.

Further, by studying the alumni of a single institution one has a built-in control for undergraduate education and all the self-selective factors associated with that experience. The differences observed within such a relatively homogeneous group, therefore, would be greatly magnified in the general technical work force. Thus, if the implications drawn for

organizational policies are valid for this sample, they must hold even more for the more varied backgrounds found in most organizations.

The main theme that emerges from the findings in this study is that of pluralism: in orientations to work at mid-career, and in organizational roles for technically trained personnel. The management of pluralism is a major challenge for organizations in today's world, and promises to be even more critical in the decades to come. Too often, however, the need for multiple career paths is not even recognized by employing organizations, which perpetuate policies based on monolithic assumptions about individual orientations and organizational requirements. That these assumptions are outmoded, and result in dysfunctions for organization and employee alike, is amply documented in the chapters of this book.

Chapter I

Introduction

The plight of the alienated worker has been of concern to social analysts for more than a century. Fragmented work, monotonous meaningless jobs, lack of autonomy or control over working conditions are among the factors contributing to this condition. In contrast, the situation of the professional worker or manager who enters the occupational world with the benefit of at least four years of advanced education seems strikingly different. It has been assumed and argued that occupations are available for this highly educated group that are challenging and fulfilling throughout life. In these careers one can be the master rather than the slave of one's work. But is this true? Evidence is mounting, including some from the research to be reported here, that negates this assumption: there are executives who have mid-career crises, there are engineers who become bored with their work, and there are people who leave high organizational positions to start alternative careers. Events such as these point to an underlying problem as yet largely unexplored, indeed not yet fully identified.

To be sure, partial explanations lie readily at hand. Such events can be viewed as responses to a changing social order in which technology plays an ever more complicated role. They may also be partially explained by the patterns of personal development and by the changes in people's expectations about the kinds of lives they want to lead. Such societal and individual developments, however, define the boundaries within which all technical careers develop. To differentiate among them, to find out why some technically trained people flourish and others become alienated,

requires that one look at the way specific technical careers evolve as a function of both individual orientations and organizational procedures. The present study is an effort to provide such an analysis. It examines the careers of a group of people trained in an elite technical institute some ten to twenty years after their graduation.

The development of a person's career depends on how the needs, talents, and values of an individual fit with the demands of a job. It represents a complex process because individual abilities and concerns are themselves shaped by a person's organizational and job experiences. In looking at such careers at one point in time, therefore, we view the results of a process of continuous, interactive accommodation between the individual and his or her work environment. Our understanding of this process is reflected in its outcomes: in the person's level of work involvement, extent of job satisfaction, and perception of occupational success or failure.

The study reported here deals with one technically trained group which has undergone this developmental process for ten to twenty years, and has reached a stage of some interest at present: mid-career (cf. Pearse and Pelzer, 1975; Rapoport, 1970; Sofer, 1970). It is a group, moreover, that is hard hit by changing values. In the 'fifties, when the respondents in this study were educated, science and technology were hailed as providing the solution to most of the world's problems. They were considered central to national unity and social betterment, and their study was thought to lead to almost certain personal success. Today, both the means and the ends are being questioned. "It would not have been possible to convince me that this would happen twenty years ago," writes a technical manager who graduated in 1951; "however," he continues in a not uncharacteristic way,

"I am now inclined to believe that technology has created more problems than it has solved, and is--in that sense--at least an insufficient answer and possibly a dead end."

The respondents in this sample, therefore, are approaching mid-career at a time when changes in the larger society are exacerbating its effect on them. The value of technical progress--the basic underpinning of most of their careers--is today being questioned. Society is beginning to impose social and legal constraints on new knowledge, and the unique value of the scientific method itself is increasingly under question.[1]

Further, these alumni are confronted with challenges to the accepted meaning of achievement and success. The usual rebellion of youth against parental values has turned, recently, into a more enduring challenge (Yankelovich, 1972). It has meshed with the equalitarian movement for minorities and women, which has gone beyond matters such as voting rights, equal pay, or even equal access to opportunities, and challenges some of the most basic assumptions underlying occupational roles in our society.

Thus we study a group at a time when the very basis of their life styles may be coming into question. These are people, particularly the men, who decided relatively early in their lives to pursue some of the most demanding occupations available--or they would not have come to M.I.T. They pursued a rigorous course of technical study and entered the world of work expecting far more from it than the mere satisfaction of instrumental needs. On the contrary, they probably expected to have jobs at the highest rungs of the occupational ladder in which a close tie between work and a person's basic sense of self would be likely to exist (Wilensky, 1964).

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[1] See, e.g., the recent issue of Daedalus (Spring 1978), on the Limits of Scientific Inquiry.

The assumption was that career success and achievement would insure a satisfactory life. Family and community would be of great importance, of course, but neither would be expected to detract from work as the central focus of a person's life. We will attempt to see how it all worked out--to see what kinds of careers the alumni actually pursued and how they now feel about their work.[2]

The Research Sample

The research population consists of the M.I.T. classes of 1951, 1955, and 1959 (N=2223).[3] The graduates in these classes were sent a questionnaire in 1970 (see Appendix A) and with the aid of one follow-up postcard we were able to obtain 1366 usable responses, a response rate of 61%. The questionnaire covered objective career information through a detailed job history, opinions about educational experiences while at M.I.T., current work attitudes and values, and self-perceptions along a number of dimensions. The graduates were mostly from the School of Engineering (64%), with 16% coming from the School of Science, 13% from the School of Management, and the remainder from Architecture, and Humantities and Social Science. Table 1.1 shows the distribution of undergraduate majors represented in the sample.

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[2] Parts of this picture are already available: some basic occupational data on the group have previously been published (Bailyn & Schein, 1972), selected problems of specific sub-groups of engineers and general managers have been reported (Schein, 1972; Plovnick, 1972; Madrazo, 1974; Johnson, 1975; Bailyn, 1977a), and some analyses have been made of the interrelation of work and family in the lives of this alumni group (Bailyn, 1973, 1977a).

[3] There were 22 women graduates in these classes, of whom 15 responded to the questionnaire.

TABLE 1.1

The Research Sample

Undergraduate Major	#	%
School of Engineering		
Civil Engineering	80	6%
Mechanical Engineering	209(1)[a]	15%
Metallurgy	72	5%
Electrical Engineering	230(3)	17%
General Engineering	25(1)	2%
Chemical Engineering	142(2)	10%
Marine Engineering	20	1%
Aeronautics and Astronautics	82	6%
Construction Engineering	25	2%
TOTAL	885(7)	64%
School of Science		
Chemistry	35(1)	3%
Biology	19	1%
Physics	95(2)	7%
Geology	26	2%
Mathematics	31(1)	2%
Meteorology	6	*
Nutrition	10(1)	1%
TOTAL	222(5)	16%
School of Management	173	13%
School of Architecture and Planning	52(2)	4%
School of Humanities and Social Science		
Economics	25	2%
Humanities	9(1)	1%
TOTAL	34(1)	3%
TOTAL SAMPLE	1366(15)	100%

* less than 1/2%

a--Numbers in parentheses indicate the number of women in a given category.

These respondents came to M.I.T. for professional training in science and technology. As the catalogues available to them put it, the Institute "aims to give its students such a combination of humanistic, scientific, and professional training as will fit them to take leading positions in a world in which science, engineering, and architecture are of basic importance," to prepare them "to become practicing engineers or architects, investigators, business executives, or teachers" (M.I.T. Catalogue, 1951). During the decade of the 'fifties, M.I.T. sent forth each year hundreds of students with Bachelor of Science degrees to embark on these careers. In so doing, the Institute fulfilled its three objectives: "the education of men [meant in a generic sense, since its doors were legally always open to women and it graduated its first woman in 1873], the advancement of knowledge, and service to industry and the nation" (M.I.T. Catalogue, 1951).

This sample of graduates of the 1950's represents, then, a population specifically trained for a variety of technical and managerial careers. They were destined for the key technically based jobs in our society; for the positions on which our national welfare must depend. The purpose of the study is to investigate these careers in detail and thereby to illuminate the mid-career issues, both individual and organizational, of technical career paths.

Plan of the Monograph

Chapters II and III deal with the careers of the 1351 men in the sample. Chapter II describes two major career patterns that emerge from an examination of the educational and early career experiences of these alumni, and presents the value norms that are associated with each pattern.

Chapter III deals with the respondents' reactions to their work. In this analysis it becomes necessary to subdivide each career pattern into two major types, according to whether current organizational positions are high or low. It turns out that each of the four resulting types of careers is associated with a characteristic set of issues for the people involved in them.

The fourth chapter considers the alumnae--the women graduates from the same classes--though, because of the small number involved, it necessarily deals with the data in a very different way. This group is probably even more unusual than the men: only 1% of each class at that time was female. (By now there are close to 20%.) But the subsequent lives of these highly selected women are of particular interest because they are suggestive of career accommodations that seem to be becoming more prevalent among recent college graduates of both sexes.

Finally, in Chapter V, we deal with the implications of our findings. What can we learn from the careers of these alumni about how to manage technical careers in organizations? What new organizational roles and changes in personnel policies would optimize the effectiveness of these employees and increase their satisfaction with their work?

The chapters are arranged in such a way that the general reader can obtain the highlights of the findings in the main part, with the details of the analytic procedures presented in technical appendices at the end of each chapter. It is not always easy to make inferences about career questions from survey data based on alumni's own perceptions. It is a final goal of this monograph, therefore, to illustrate how cross-sectional survey data can be used to explore such complex questions. And for this purpose the technical appendices are important.

Technical Appendix to Chapter I

Population and Sample by Year of Graduation

Though there are some discernible age trends in the sample (see Bailyn and Schein, 1972), the differences among the three classes are relatively small. Throughout most of this report, therefore, the classes are combined. Data given separately for each class include the distribution of undergraduate majors in this appendix and the occupational distribution by class in the technical appendix to Chapter II.

Table IA1 shows the distribution of undergraduate majors in the sample and the population of each class. The population figures given in the last line of the table represent the number of questionnaires actually sent out. This number is somewhat less than the total number of graduates in each year because some alumni's addresses were not available at the Institute. In general, there was a 7-8% loss of this kind for each class. The relevant figures are given below:

	# graduated during year	# questionnaires sent out	# responses received
1951	953	883	539
1955	672	614	377
1959	779	726	450

We do not know why these classes are of such uneven size, though the Korean War may be responsible for the reduction in size of the class of 1955.

The body of the table shows, in the first two columns, the number and percentage in each undergraduate field who responded to the questionnaire. A comparison of this information with the percentages in the third column (representing the population as given by the number of questionnaires sent out) indicates that at least as far as undergraduate major is concerned,

TABLE IA1

Undergraduate Majors of Population and Sample by Class

Undergraduate Major	Class of 1951			Class of 1955			Class of 1959		
	sample #	sample %	pop. %	sample #	sample %	pop. %	sample #	sample %	pop. %
School of Engineering									
Civil Eng.	37	7%	6%	20	5%	7%	23	5%	5%
Mechanical Eng.	87(1)[a]	16%	15%	54	14%	13%	68	15%	14%
Metallurgy	27	5%	4%	16	4%	4%	29	6%	5%
Electrical Eng.	73	14%	16%	71(2)	19%	22%	86(1)	19%	21%
General Eng.	10(1)	2%	4%	14	4%	4%	1	*	[n=2]
Chemical Eng.	64(1)	12%	12%	44(1)	11%	10%	34	8%	9%
Marine Eng.	10	2%	2%	5	1%	2%	5	1%	1%
Aero. and Astro.	32	6%	5%	27	7%	6%	23	5%	5%
Construction Eng.	19	4%	4%	6	2%	1%	0[b]	0	[n=0]
TOTAL	359(3)	67%[c]	68%	257(3)	68%[c]	68%[c]	269(1)	60%[c]	60%
School of Science									
Chemistry	14	3%	3%	8	2%	2%	13(1)	3%	3%
Biology	5	1%	1%	3	1%	1%	11	2%	2%
Physics	30	6%	5%	24(2)	6%	7%	41	9%	11%
Geology	13	2%	2%	6	2%	2%	7	2%	1%
Mathematics	5	1%	1%	7	2%	2%	19(1)	4%	4%
Meteorology	6	1%	1%	0	0	[n=1]	0	0	[n=1]
Nutrition	3(1)	1%	1%	4	1%	1%	3	1%	1%
TOTAL	76(1)	14%[c]	14%	52(2)	14%	14%[c]	94(2)	21%	22%
School of Management	68	13%	12%	49	13%	13%	56	12%	11%
School of Architecture and Planning	23(1)	4%	4%	19(1)	5%	5%	10	2%	3%
School of Humanities and Social Science									
Economics	13	2%	2%	0	0	[n=2]	12	3%	2%
Humanities	0[d]	0	[n=0]	0[d]	0	[n=0]	9(1)	2%	2%
TOTAL	13	2%	2%	0	0	[n=2]	21(1)	5%	4%
TOTAL	539(5)		883(6)	377(6)		614(10)	450(4)		726(6)

* - Less than 1/2 %.

Notes to Table IA1

a Numbers in parentheses indicate the number of women in a given category.

b Discontinued after the Class or 1957.

c Percentages do not always sum exactly because of rounding errors.

d This major was only approved by the Faculty in January 1955, and only available to the Class of 1958 and succeeding classes.

there is no bias in the sample.

It is evident also that the distribution of majors in the class of 1955 is almost identical to that of the class of 1951. But the class of 1959 begins to show a trend away from engineering and towards science. This trend became much more marked in the years that followed: only 43% of the graduates from the class of 1977 received degrees in engineering, while 39% were in science. But even though these changes are anticipated in the youngest class we studied, the differences are still so small that it seems entirely justified to treat the three classes from the 'fifties as one unit.

Chapter II

Technically Based Careers: Patterns and Values

In speaking of technically based careers, we are referring to a number of general characteristics of the sample. First, all are graduates of a technological institute in which a core of mathematics and science courses was an absolute undergraduate requirement, even among those who majored in "non-technical" fields. And though some respondents now have jobs seemingly unrelated to their undergraduate major (e.g. a physicist now doing photography), the bulk of the careers under study directly reflect this initial technical training.

Second, the decision to come to M.I.T. presumably reflects a particular pattern of talents, motives, and values already present in high school. The desire to be educated in science and technology implies, on the part of a high school graduate, an already existing commitment to a particular range of fields. Such people have certain personality traits and needs that distinguish them from those who enter the field of humanities. As a rule, those in science and engineering show, at an early age, an inclination toward scientific, mechanical, quantitative activities rather than aesthetic ones (Sternberg, 1955; Hudson, 1967). Compared to those in humanities, they are less people-oriented and more thing-oriented--they would rather deal with objects than with human beings (Roe, 1957; Rosenberg, 1957; Perrucci and Gerstl, 1969). Scientists and engineers have a

high need for achievement (Dipboye and Anderson, 1961; Izard, 1960). They are concerned with order and stability (Moore and Levy, 1951; Steiner, 1953; Izard, 1960; Roe, 1961; Perrucci and Gerstl, 1969) and are less flexible than those in humanities. They also differ in their cognitive styles, being more convergent than divergent (Hudson, 1967; Kolb and Goldman, 1973).

Though there is no direct evidence of the personality, cognitive style, and values of the respondents when they first entered M.I.T., they most likely fit this pattern, a pattern that would have been further reinforced by their undergraduate curriculum. As graduates, therefore, they were a relatively homogeneous group: over half (51%) entered the world of work in basic engineering positions.[1] And though, subsequently, their careers followed a variety of paths, it is important to keep this common base in mind in analyzing their current occupations.

The first step in this analysis was to code all of the career histories into a set of occupational groups that reflect both the standard societal occupational categories and the actual career histories that the respondents described. By using objective data--job title, type of organization, and type of work, as reported in the questionnaire--we devised a classification that reflects the manifest, external careers of the respondents. The categories needed to encompass the bulk of the male alumni are given in Table 2.1, grouped in terms of the degree to which the occupation directly

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[1] A further 12% combined, in their first jobs, engineering with other duties. The figures given are based on the 87% of the respondents for whom information on first jobs is available.

TABLE 2.1

Occupational Classification

		N	%*
BUSINESS: NO TECHNICAL CORE		359	27%
Entrepreneur		82	6%
General Manager		50	4%
Functional Manager		157	12%
Business Staff		70	5%
OCCUPATIONS WITH A TECHNICAL CORE		749	55%
Technical Manager:	Science	20	1%
	Engineering	232	17%
Staff Technologist:	Science	60	4%
	Engineering	306	23%
Professor:	Science	69	5%
	Engineering	62	5%
OTHER OCCUPATIONS		103	8%
Consultant		60	4+%
Architect		43	3+%

* These percentages are based on all the 1351 men in the sample, not only on those whose occupations fall into these basic categories, and hence do not add up to 100%: 140 men (10% of the sample) are unemployed or in occupations that do not fit these categories.

reflects the technical education of the respondent.[2]

Occupations with a clearly technical core include technical managers in both science and engineering types of laboratories or organizations, staff technologists in both science and engineering, and engineering and science professors. These occupations together comprise 55% of the total occupations of the male alumni. Some 27% fall into occupations that more clearly reflect a business orientation: entrepreneurs who had successfully started up some enterprise of their own that employed at least 50 or more people; general managers who had attained through promotion positions as president, executive vice-president, and other comparable jobs that clearly reflect a level of reponsibility above functional management; functional managers who had titles such as vice-president of finance, marketing manager, or personnel director; and business staff, such as financial analyst, salesman, or marketing research. If the functional or staff area was clearly technical, such as engineering or computer programming, the person was classified into one of the technical occupations in the first part of the table.

The bottom of the table shows the architects, the only group in the sample that represents a "pure" profession, and the consultants, some of whom are operating in technical areas while others are in

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[2] The decision rules for the full occupational distribution are given in the technical appendix to this chapter. It should be said, however, that the distinction between "manager" and "staff" in this classification is based entirely on an evaluation of the extent to which a particular job entails responsibility for and supervision of other people. This is different from the use of "staff" as distinct from "line" (see Pigors and Myers, 1977), which is based on functional categories; and from the use of "manager"--e.g. a portfolio manager in an investment firm--based solely on rank.

management consulting. Only a little over 8% of occupations fall outside of these categories and include some professionals such as doctors, lawyers, and secondary or junior college teachers; and a small group involved in family businesses of various kinds. Less than 2% of the male respondents said they were unemployed at the time of the survey.

Career Patterns

The occupational classification presented in Table 2.1 reflects the technical background of the sample. Thus, engineers and scientists are not combined, as is often done in more general occupational classifications, and technical managers are kept separate from other functional managers. Despite the overall homogeneity of background, however, certain differences in undergraduate major, academic performance as an undergraduate, graduate school attendance, and first job, do exist. Through an analysis of these differences a more basic occupational patterning emerged. It is evident from Table 2.2, which presents these data, that there are two basic clusters of occupations which are more or less homogeneous with respect to these early career events[3].

One cluster, which we have called the Engineering Based Careers (Pattern E), includes the entrepreneurs, general and functional

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[3] There is also a third cluster, the small group of architects and planners trained specifically for their current positions while at M.I.T. As already mentioned, they are the only group of any magnitude in the sample from what is often referred to as the "free" professions--the only representatives of the more usual professional career. Because of their uniqueness and small number in this sample, the emphasis in this report is on the first two patterns.

TABLE 2.2
Career Patterns Based on Early Career Events

	PATTERN E: ENGINEERING BASED								PATTERN SP: SCIENTIFIC/ PROFESSIONALLY BASED				
	TOTAL E	Entr.	Gen. Mgr.	Fctl. Mgr.	Bus. Stf.	Cons.	Eng. Mgr.	Eng. Stf.	TOTAL SP	Eng. Fac.	Sci. Fac.	Sci. Mgr.	Sci. Stf.
N=	957*	82	50	157	70	60	232	306	211	62	69	20	60
% from school of:													
ENG.	77%	70%	64%	63%	66%	60%	85%	87%	34%	74%	7%	30%	23%
SCI.	6%	11%	4%	4%	6%	8%	6%	7%	60%	6%	90%	70%	77%
MGT.	15%	18%	32%	27%	27%	27%	6%	6%	3%	10%	-	-	-
% with honors (overall grade average $\geq$ B+)	19%	19%	29%	16%	16%	23%	20%	19%	47%	64%	46%	31%	35%
% with Doctorates	11%	8%	24%	6%	6%	12%	13%	11%	88%	98%	86%	80%	72%
% whose first jobs were in engineering staff positions	61%	54%	48%	51%	59%	46%	57%	77%	21%	33%	12%	22%	18%

*These N's are reduced by the number about whom information on any category is not available.

managers, business staff, consultants, engineering managers, and engineering staff. These are the various roles in which an engineer may find himself some ten to twenty years after his engineering training. The alumni whose careers fall into this pattern tended to be graduates of the School of Engineering, to have obtained no more than average grades, not to have doctorates, and to have started their careers in some sort of engineeering staff positions. While there are some variations within the cluster, for example some obvious contrasts between general managers and staff engineers, what is more striking is the degree to which these occupations have a similar kind of early career origin.

In contrast, the second major cluster, the Scientific/Professionally Based Careers (Pattern SP), shows a different history. This group of alumni, which includes the professors of science, professors of engineering, science managers, and science staff, more frequently graduated from the School of Science (with the exception of the engineering professors), obtained relatively higher grades, were very likely to have gone on for a doctorate, and were less likely to have started in engineering jobs.

Seventy-one per cent of the alumni fall into the engineering based career pattern and one half (56%) of that group are still in clearly technical jobs such as engineering manager or engineering staff. Almost one tenth (9%) have become entrepreneurs and the remaining 35% have gone into various other business roles or into consulting.

Only 16% of the male alumni fall into the SP pattern, but several things are noteworthy about this group. Almost one tenth are managers, but they are a special kind of manager distinguished both from the

business oriented and the engineering oriented managers: they are a more formally educated group and are associated with more scientifically oriented organizational settings.[4] At the staff level, too, the scientists and engineers fall into different patterns, which again reflects the different degreee of professionalization of the two groups, as indicated by obtaining the doctorate.

In contrast, the professors in the two fields (and over 60% of the alumni in the SP pattern were in academic careers at the time of the survey) fall into the same cluster. The engineering professors fit into the SP pattern by every criterion except undergraduate major. What this seems to imply is that in engineering the academic career represents quite a different path from the staff or managerial one, whereas in science the academic, staff, and managerial roles are more interchangeable.[5] Further, this branching of the academic career in

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[4] They work in universities and for the government (particularly the military) or in R&D settings in industry. Seventeen of the 20 have PhDs and all but 5 of these identified themselves primarily as scientists of various kinds who were managing the research of other scientists. The 5 PhDs who identified more with management perform the same tasks, however: e.g. an assistant director of a military solid state physics research lab, a research manager of R&D in the chemical industry, the manager of an environmental and applied science center. Two are R&D managers (one self styled a "chemist"; the other in "physics")even without PhDs. Only one has neither a PhD nor an identification with science, but at the time of the survey was on a temporary assignment as chief scientist in one of the military branches.

[5] As further corroboration of this difference, we note that there is much more movement into universities from companies or labs among scientists than among engineers. If we look at all people whose first jobs were in engineering staff positions (no matter what career pattern they now fall in) only 5% are now teaching. If, in contrast, we take all those whose first jobs were in science staff positions, almost one third (29%) are now teaching in some capacity.

engineering from the other engineering paths seems to occur in college. The engineering professors have the highest grades of any group in the sample, suggesting that high academic performance as an undergraduate acted as a selective force toward graduate school, the obtaining of a doctorate, and the ultimate selection of an academic career.

All in all, the engineering based career pattern is more varied than the scientific/professional one because it leads not only to technical engineering positions but is also the primary source of the business oriented careers in this sample. In contrast, the SP pattern is more homogeneous and leads to a more circumscribed set of occupational roles.

Occupational Differences in Job Values

These two major patterns emerged from an examination of differences in external or objective indicators, particularly those surrounding early career events. But though these differences are clearly evident, they do not ensure that these two career patterns are experienced differently by the people in them. If career patterns are to be a useful way of understanding people's work lives, they must represent not only differences in external characteristics but must also have an internal reality for the people who are in them. It is important, therefore, to investigate the subjective differences among and within these patterns, and to see if there are internal indicators that parallel the differences already described.

The aspects of a job that a person considers particularly important are an indication of the internal needs he would like to

have met by his work. A number of previous studies have tried to identify occupational differences in job values, and have found such differences even between closely aligned occupations such as scientists and engineers. The need for autonomy, for instance--the freedom to follow one's own ideas--is an especially important goal for the scientist, who seeks a job that allows him to have the flexibility to pursue his own interests (Pelz and Andrews, 1966; Reiss and Balderston, 1966; Glaser, 1964). The scientist, also, has been shown to be particularly likely to have "intellectual" values: to want a job where he can be creative, select his own research areas, and have the opportunity to work with ideas (David, 1971). The engineer, in contrast, is more likely to want to move up the organizational ladder and to see his ideas put to use in his organization (Marquis, 1965; Perrucci and Gerstl, 1969). He is less concerned with intellectual values and more with external factors surrounding his work (David, 1971; Rosenberg, 1957).

Results from the present study also show that job values differentiate among technical careers. The data are based on the following question:

> The list below shows a number of characteristics of a job. Please circle the appropriate number to show how important you feel each characteristic is to you with regard to your present and future jobs.

The response scale ranges from 1 ("not at all important") to 5 ("very important"). The list consists of 22 job characteristics and includes highly intrinsic values such as "challenging work to do" and highly

extrinsic or instrumental ones like "good physical working conditions" or "good fringe benefits" as well as items concerned with the value placed on working with people and being concerned with society.[6] All the items are presented in Table 2.3, in the order in which they were deemed as very important by the total sample.[7] It is obvious from the table that those job characteristics considered most important in this sample concern the actual work done, whereas those viewed as least important are concerned with more peripheral aspects of the work situation.

It should also be noted that concern with society and its problems is very low in this group--at least it does not enter these people's job decisions. One would expect more recent classes to be more socially concerned, though whether this would persist through the mid-career years will be interesting to watch.

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[6] The list has been adapted from similar ones used in studying occupational values of students (Rosenberg, 1957; Davis, 1965) and in a survey of sales, service, and technical personnel in the IBM World Trade Corporation (Sirota and Greenwood, 1971). A number of previous studies have grouped such items into three similar areas. Rosenberg (1957) determined three major "value-orientations" or "value foci": a "people-oriented value complex," an "extrinsic reward-oriented value complex," and a "self-expression oriented value complex"; Davis (1965) identified three independent dimensions of values: "people," "money," and "original and creative"; David (1971) defined three "values indexes" to describe the occupational values of scientists and engineers: a "people-orientation index," an "external factors index," and an "intellectualism index."

[7] Only if a person rates a given characteristic as "very important" would it make sense to say that it represents an internal need he would like met by his work. It is for this reason that the percentage of a given group rating a particular characteristic "5" is used as a measure of job values.

TABLE 2.3

List of Job Values with Percentage Rating Each as Very Important

Work from which I could get a personal sense of accomplishment.	70%
Challenging work to do.	66%
Considerable freedom to adopt my own approach to the job--to be creative and original.	52%
Opportunity for advancement.	48%
Job which allows me to make a real contribution to the success of the organization.	45%
Opportunity to exercise leadership.	33%
Recognition for doing a good job.	30%
Opportunity for high earnings.	27%
Job which leaves sufficient time for family and personal life.	21%
Location.	20%
Department where people are friendly and congenial.	17%
Reasonable work load.	15%
Job which allows me to make a contribution to society.	14%
Highly regarded organization.	13%
Opportunity to work with people rather than things.	12%
Job highly regarded by others in company--a job with some prestige.	11%
Training or educational opportunities (to improve my knowledge and skills).	11%
Efficiently run department.	10%
Job security.	10%
Work that is relevant to social problems.	5%
Good fringe benefits.	5%
Good physical working conditions.	5%

Note: The order in which these items appeared in the questionnaire may be seen in Q. 17, Appendix A.

Thus the sample expresses most concern with the intrinsic end of the spectrum. This finding--indicating the expectation that internal needs of competence and achievement can be met by the work one does--corroborates the view already set out about the men in this sample and the importance they attach to the careers they are pursuing.

But the main concern is not with the job values held by the sample as a whole. Rather, the emphasis is comparative, on the differences in job values among the various occupational roles and career patterns represented in the sample: Do engineering based careers conform to different needs and values than scientific/professionally based careers do? Are there variations in job values among occupations within a career pattern?

In attempting to answer such questions, one faces an immediate problem. Some people find themselves in occupational roles that do not, in fact, permit fulfillment of their job related needs and values. The characteristics they consider most important about a job may not be found in their current work. Since the concern in this chapter is with the pattterning of careers, rather than with individual reponses to work, we would like to eliminate cases of such lack of fit as much as possible. This is particularly important because the extent of such incongruence may itself vary in different occupational groups. There is no way, with the data at hand, to isolate exactly those people whose needs or values fit their occupational roles. But we can approximate such a fit by limiting the analysis to those in each occupational group who consider themselves to be successful. By looking only at the job values of those who

perceive themselves as successful,[8] we are likely to have a group among whom the fit between expressed needs and occupational requirements is high. It is such a group that allows one best to answer questions concerning patterning of careers on the basis of internal or subjective characteristics.

Table 2.4, therefore, presents data only for those respondents who consider themselves successful at work.[9] It gives the percentage of these "successful" men in each occupational group or pattern who consider a particular job characteristic as "very important." The items shown in the table are limited to those that differentiate the engineering from the scientific/professional career pattern: those in which there is an overall difference between the two patterns that is not dependent only on a particularly high or low percentage in a single occupational role but is reflected, rather, in a majority of the occupations within a career pattern. (The responses to those items not included in this table are given in the appendix to this chapter). The first two columns present the data for the engineering based and scientific/professionaly based career patterns. Differences between the patterns were used to determine the order in which

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[8] A discussion of the definition and measurement of occupational success and the occupational differences on these success measures is found in the technical appendix to this chapter.

[9] This includes all respondents who when asked "At this point in your professional life, how successful do you think you are in your work?" rated themselves as "very successful" ("5" on a 5-point scale), or who rated themselves as medium ("4") in success at that time but indicated on a later question that they expected to be "very successful" ("5") at the "height" of their career.

TABLE 2.4

Percentage of "Successful" Respondents Rating a Given Value as "Very Important"

JOB VALUES	PATTERNS E	PATTERNS SP	OCCUPATIONS: E-Pattern ENTR	GEN MGRS	FUNCT MGRS	ENG MGRS	CONS	BUS ST	ENG ST	SP-Pattern SCI MGRS	ENG FAC	SCI FAC	SCI ST
N:	314*	71	42	39	53	75	34	20	51	12	25	17	17
OPPORTUNITY FOR HIGH EARNINGS	47 >	13	48	65	53	36	52	55	35	17	4	12	24
OPPORTUNITY FOR ADVANCEMENT	68 >	35	67	71	77	75	67	80	41	42	44	24	29
OPPORTUNITY FOR LEADERSHIP	57 >	25	65	74	70	53	61	45	33	42	39	6	12
CONTRIBUTION TO ORGANIZATION	60 >	39	60	82	72	49	61	75	43	58	33	35	35
FREEDOM TO BE CREATIVE & ORIGINAL	56 <	86	68	63	53	48	61	55	51	54	92	88	94
EDUCATIONAL OPPORTUNITY	13 <	25	10	14	11	11	21	10	16	0	39	24	24
SENSE OF ACCOMPLISH-MENT	77 <	86	74	82	77	75	82	65	80	83	83	88	88
CHALLENGING WORK	76 <	84	78	87	74	68	88	70	74	75	83	88	88

*These N's represent the number of people in each category who consider themselves "successful," reduced where necessary by the number not answering a given item.

the items are presented: the top part of the table consists of those values more characteristic of the engineering than of the scientific/professional pattern; the bottom part refers to those values more characteristic of the scientific/professional pattern. Table 2.4 also gives the results for each of the occupations that comprise the career patterns.

Four job characteristics, as is evident from the top part of the table, are more highly valued by "successful" alumni whose occupations fall into the engineering pattern than by those in the scientific/professional one. These four, which comprise what one might call the "engineering syndrome," consist of:

1) opportunity for high earnings
2) opportunity for advancement
3) opportunity to exercise leadership
4) possibility to make a real contribution to the success of the organization.

With few exceptions, every engineering based occupation rates these items higher than do the scientific/professionaly based ones. Even the engineering staff group, which is relatively low on these items, is higher on them than their counterparts, the science staff group, in the SP pattern. This syndrome is clearly associated with the values of "management," and reflects an orientation toward the career based on getting ahead within the context of an organization rather than as an autonomous contributor. It is not surprising, therefore, that the science managers, among the SP occupations, show these values to the greatest extent. It is of interest, also, that two of these values--advancement and the exercise of leadership--differentiate between science and engineering professors.

It is the engineering faculty who consider both these characteristics as more important, reflecting, perhaps, their initial occupational choice and expectations.

The job characteristics more valued by "successful" alumni from the scientific/professional pattern are shown in the second part of the table. They are concerned with:

1) freedom to be creative and original
2) challenging work to do
3) work from which to get a personal sense of accomplishment
4) training or educational opportunities.

With the possible exception of the last item, these values relate to the intrinsic characteristics of one's work. It is this emphasis that forms the core of the "scientific/professional syndrome." The interpretation of this syndrome is complicated, however, by the fact that though the SP occupations are higher on it than the E occupations, the latter are nevertheless also very high on these job values. In fact, except for the item on educational opportunities, these characteristics are the most valued in the entire alumni sample, and two of them (the last two in this section of the table)--challenging work and sense of accomplishment--are among the three highest values in every occupational group except business staff, in which they rank third and fourth. In calling this set a scientific/professional syndrome, therefore, we are not asserting that the items are high only in the SP group, but that they are relatively higher in this group than in the E group--that these intrinsic values, though important to everyone, are particularly important to the occupations in the scientific/professional pattern. The other item in

this part of the table--training or educational opportunities--is not high in an absolute sense, but it does differentiate the E and SP patterns (except for the Science Managers, none of whom value further education to any great extent). All the other SP occupations, however, value further educational opportunities more than the E occupations do, which probably reflects their greater dependence on initial high levels of education and on the opportunity for subsequent learning.

Overall, the data in Table 2.4 reveal two different value syndromes associated with the two career patterns previously identified. While all respondents say they value the intrinsic job factors such as challenge and accomplishment, these values along with creativity and further education clearly are more important to the scientific/professional occupations. The engineering based occupations also value the intrinsic job factors, but, relative to the SP pattern, are much more concerned about leadership, advancement, contributing to the success of their organization, and high earnings.

The SP occupations, one might say, follow "professional" norms: the work they entail is seen as intrinsically satisfying, allowing, presumably, internal needs of competence and autonomy in work to be met. The E syndrome, in contrast, with its emphasis on "getting ahead through organizational routes," corresponds more closely to the norms associated with the successful "organizational" career.

Socialization or Pre-Selection?

With cross-sectional data it is difficult to determine whether such differences as have been shown in value syndromes result from

pre-selection or from socialization--whether they represent individual values and traits that helped to determine career choice or whether they developed in response to occupational experiences. It seems most likely, of course, that both processes are at work. In studies of college students and their occupational choices, both directions of influence have been adduced: Rosenberg (1957) concludes that values have a greater effect on occupational choice than that choice has on values; Underhill (1967), in contrast, feels that it is more likely that the career itself leads to "appropriate occupational values." Athanasiou (1971), in a study of college students who initially opt for an engineering major and then change their minds, finds that students who transfer are already somewhat different from an equivalent group of engineering majors who eventually remain in that field, even before their freshman year. But the differences between the two groups are considerably greater in the middle of the sophomore year, after the decision to stay or to change has been made, showing that "career" influences accentuate already existing differences. In a panel study of MBAs, Schein (1978) also finds evidence for both initial differences and accentuation: alumni in different careers do start out with different values but some of these differences come to be magnified by further socialization. Similar findings for differences in cognitive style are reported by Kolb and Fry (1974).

It seems likely, therefore, that the same process holds true for the alumni studied here. Certain differences in values and personal traits were no doubt already present while these men were still in school. But since, as has already been mentioned, the M.I.T. alumni group can be assumed to have had many similar predispositions at the

point of entry into their careers, it becomes highly probable that part of the variation found results from career-induced changes.

Though it is not possible to prove this point with the data at hand, we can examine the possible existence of occupational socialization by comparing, within the engineering career pattern, alumni with doctorates to those without them. The logic of this analysis rests on the assumption that at the point of entry into their careers, people with doctorates would be more likely to adhere to the scientific/professional values than those without such advanced degrees.[10] The question then arises, what happens to those values in career patterns or occupations that do not reinforce them strongly? Or, more specifically, what happens to the holder of the doctorate who enters an occupation in the E pattern?[11] If we find that holders of the doctorate in E pattern occupations resemble in their values the SP alumni, one can argue that pre-selection makes the difference; if they resemble other E pattern alumni we have some evidence that occupational roles have modified their values (though, it must be said, it is also conceivable that this group for some reason never "fitted" the doctoral mold in the first place).

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[10] Whether this difference at entry results from <u>educational</u> socialization or from already existing differences between students who seek doctorates and those who do not, is unknown but not crucial for the attempt to investigate the possible effects of <u>occupational</u> socialization later in the career.

[11] The exactly analogous question of what happens to the person <u>without</u> the doctorate who enters an SP occupation, though logically equivalent, cannot be tested here since there are only 10 alumni without doctorates who view themselves as successful in SP occupations (and only 25 in the total sample).

The results shown in Table 2.5 show some evidence for occupational socialization. The first column presents data from those alumni who do not have a doctorate and who are in "congruent" E occupations; the third column from those who have a doctorate and are in "congruent" SP occupations. It is the middle column that permits some test of the socialization hypothesis. It represents men who have doctorates but who are now in "incongruent" engineering based occupations. If their values differ from doctoral degree holders in SP occupations and more closely resemble those (shown in the first column) whose occupations are in the E pattern but who do not have doctorates, then we have some evidence for the effects of the career on the individual.

It is evident from the table that such an effect is present. On items a, c, e, f, and h, the middle group is almost identical with the rest of the E pattern. On the other items in the table, the middle group has a position somewhere between the first and third columns, indicating effects of both pre-selection and occupational socializaton. In no case, however, is there evidence that occupational effects are completely absent.[12] At least in part, therefore, the value differences between the engineering and the scientific/professional career patterns result from career experiences themselves and not only from initial differences between the people

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[12] The data on the 10 alumni without doctorates now "successfully" engaged in SP occuptions, though not very reliable because of the small N, indicate that this minority has almost the same values as the predominant SP group on those items that define the SP syndrome (indicative again of occupational socialization), but shows some deviance in the E syndrome. On these organizational values they seem to exhibit a bimodal distribution: some deem them as quite unimportant (as expected in SP occupations), but some view them as very important (more in line with their lack of doctorates than with their occupational roles).

TABLE 2.5

Job Values of "Successful" Alumni in "Congruent" and "Incongruent" Occupations

% rating each characteristic as "very important"	E Pattern: No Doctorate "congruent" (N=277)*	E Pattern: Doctorate "incongruent" (N=37)*	SP Pattern: Doctorate "congruent" (N=61)*
E-Syndrome Values:[a]			
a) Earnings	47%	46%	5%
b) Advancement	69%	57%	36%
c) Leadership	57%	57%	22%
d) Contribution to Organization	62%	51%	35%
SP-Syndrome Values:[a]			
e) Being Creative and Original	56%	51%	85%
f) Educational Opportunities	13%	11%	25%
g) Feeling of Accomplishment	77%	81%	87%
h) Challenging Work	76%	73%	85%

* These N°s represent the number of people in each category who consider themselves "successful" in their work. They are reduced, where necessary, by the number of No Answers to a given item.

[a] These percentages may be averaged to get an overall view of the importance of each set of values:

E-Syndrome	59%	53%	24%
SP-Syndrome	56%	54%	70%

Such an aggregation clearly shows the crucial impact of occupational role in comparison to that of a doctoral degree. Aggregation allows one, also, to look at the responses of the few alumni without doctorates now engaged in Scientific/Professional occupations. Their average percentages are given below:

E-Syndrome	48%
SP-Syndrome	68%

Comparison with the above figures shows that in the SP-Syndrome of values their responses are identical to their SP colleagues with doctorates, whereas on the values in the E-Syndrome they have an intermediate position, somewhat closer, in fact, to the engineering based occupations.

who enter these fields.

In conclusion, this chapter has shown that a large proportion of the careers of the male alumni from M.I.T. fall into two basic career patterns. Each of these is associated with a characteristic set of educational and early career steps; which lead to a particular range of occupational roles; which are, in turn, related to a particular set of values. In contrast to earlier efforts to define such patterns, which have usually been made by vocational psychologists on an a priori theoretical basis of grouping occupations into clusters on the basis of the kinds of work that an occupation seems to entail (e.g. Holland, 1959, 1966; Strong, 1943; Kuder, 1957; Roe, 1956), these patterns emerged from an empirical analysis of both objective and subjective indicators. We have some assurance, therefore, that they have meaning for the actuality of people's lives and are not only external taxonomic categories.

Further, occupations in the engineering pattern--whether specifically technically oriented or more generally managerial--inculcate organizational values of leadership, contribution, advancement, and earnings. These are superimposed on the more intrinsic values of opportunities for job challenge, sense of accomplishment, freedom to be creative, and educational opportunities. Scientific/professional occupations, in contrast, show no such blending. They are much more geared to the intrinsic "professional" values, and much less to the organizational ones. These differences, as the next chapter shows, have considerable implication for how the occupants of occupations in these two career patterns view their work world and react to it.

Technical Appendix to Chapter II

1. Basic Definitions of Occupational Roles

In evolving the occupational categories that would best fit the technically based careers in the sample, we dealt first with the meaning of "management." In general, we did not consider anyone a manager whose job did not include reponsibility for and supervision of people. Beyond that, we wanted to differentiate unambiguously those respondents who were clearly entrepreneurial in their orientation, those who were oriented toward general management per se, and those who were oriented toward a particular business or technical function. We did not want to confuse any of these categories with that of the manager whose job reflects involvement in a family concern, where it would be difficult to judge how much of his performance was the result of his own achievement and how much reflected the initial family position. Nor did we want to confuse first level supervision with management. Given these initial concerns the managerial categories were defined in the following way:

1. Entrepreneurs are those managers who in one way or another are involved in the founding of their own company, regardless of their present rank. That is, some of these people are now presidents, others are technical managers, others are vice-presidents. What is distinctive about them, as evidenced also in other analyses (Roberts and Wainer, 1971; Schein, 1972, 1978), is not their present rank but the fact that they have been heavily involved in entrepreneurial activity.

2. General Managers are those who clearly occupy a position above functional management. These individuals attained their positions through promotion rather than by founding their own company or joining a family business. Sample job titles are president, general manager, managing director, division president, group vice-president.

3. Functional Managers head a function other than a purely technical one. For example, vice presidents of finance or personnel directors are functional managers. Some company titles such as secretary, chief counsel, and treasurer were found to be ambiguous. In order to find out whether they belonged in the functional or general manager category we looked at the entire questionnaire and attempted to make a judgment as to which group the man belonged in. Similar analyses were made of a few ambiguous jobs such as vice-president of planning or director of corporate development.

4. Technical Managers are those who are clearly in charge of a technical function such as basic research, research and development, engineering, or technical sales support. Excluded from this category are first-line technical supervisors, group heads, or team leaders who described themselves essentially as senior technical people. The individual had to be at least two levels above the working technical level and had to list managerial responsibilities as part of his job. A further subclassification of this category concerned the technical area involved: engineering, computer applications, and science. Decisions of field were made mainly on the basis of self-description, corroborated, where necessary, by checking back on the undergraduate majors of the respondents.

Once the managerial roles were properly defined, the rest of the

classification was simpler. Non-management or staff designations were given to those employees of companies or laboratories who did not fit the management criteria, and included, therefore, first-level supervisors, team leaders, and project leaders. This group was divided into Technologists, which were further differentiated by technical field, and Business Staff. The latter category includes salesmen, financial analysts, and other functional specialists who are neither in management nor in a purely technical role.

The classification of respondents into the Educational and Other categories posed no special problems inasmuch as those categories were straight-forward and unambiguous.

Coding into occupational categories was done by the two researchers in conjunction with Dany Siler, research assistant to the project at that time. We used, where necessary, all the items in the questionnaire touching on the alumni's current occupations, but concentrated mainly on job title and brief description of function. Error was minimized by having at least two of us independently code each questionnaire. In about 95% of the cases (based on a check of one fourth of the questionnaires) the first two coders agreed on their classification, which then became final. If disagreement remained after discussion between the two initial coders, the questionnaire was given to the third person and the final classification was based on the consensus of all three researchers.

A: Occupational Distribution by Class

Table IIA1 gives the occupational distribution in each class. These distributions, though representing more than 60% of the

TABLE IIA1

Basic Occupations of Alumni of the Classes of 1951, 1955, and 1959

Occupational Category	1951 N	1951 %	1955 N	1955 %	1959 N	1959 %
MANAGEMENT	273[a]	51	177	48[a]	130	29[a]
Entrepreneur	40	7	27	7	15	3
General Manager	26	5	15	4	9	2
Functional Manager	75	14	50	13	32	7
Technical Manager						
Science	11	2	5	1	4	1
Engineering	84	16	63	17	45	10
Computer Applications	15	3	7	2	18	4
Other Fields	2	*	-	-	2	*
Other Managers						
Family Business	17	3	8	2	4	1
Other, not classifiable	3	1	2	1	1	*
NON-MANAGEMENT, EMPLOYED IN COMPANY OR LABORATORY	164	31[a]	104	28[a]	173	39
Staff Technologist						
Science	20	4	14	4	26	6
Engineering	108	20	60	16	100	22
Computer Applications	6	1	9	2	23	5
Other, not classifiable	1	*	1	*	3	1
Business Staff	29	5	20	5	21	5
EDUCATION	34	6	38	10[a]	75	17[a]
University or College Professor						
Science	13	2	17	5	39	9
Engineering & Computer Applications**	16	3	16	4	30	7
Other Fields	3	1	3	1	3	1
Junior College, High School & Other	2	*	2	1	3	1
OTHER PROFESSIONS	57	11	45	12	60	13[a]
Consultant						
Engineering & Computer Applications	15	3	9	2	7	2
Management and Other	6	1	8	2	15	3
Architect/Planner	20	4	13	4	10	2
Lawyer	4	1	4	1	8	2
Doctor	4	1	5	1	12	3
Other (minister, writer, artist)	8	1	6	2	8	2
UNEMPLOYED	6	1	7	2	8	2
TOTAL RESPONDENTS	534	100%	371	100%	446	100%

Notes to Table IIA1

* Less than 1/2%

** Professors in computer applications: 1951-0; 1955-2; 1959-9.

a--Percentages do not always add up because of rounding errors.

population surveyed, may not reflect exactly the acutal proportion of alumni in the different occupations, since we have no way of knowing whether non-response is correlated systematically with occupation. In particular, previous experience with response rates to a mail questionnaire of technology and chemistry alumni (Shuttleworth, 1940), indicates that the number unemployed as well as those employed outside the field of their training are likely to be underrepresented. One must keep this in mind when considering the occupational distributions.

Table IIA1 shows that over 50% of the respondents in the oldest class, those almost twenty years beyond graduation, are in some form of management, almost equally divided between technical managers and those in non-technical areas. Another 30% are staff employees of organizations, primarily performing technical functions. Only 6% are in education, and the remainder are in the other professions shown. It is a distribution not unexpected from a group of M.I.T. alumni, and the class four years younger shows a very similar profile, though here the number in education has risen somewhat.

In the youngest class, however, just over ten years after graduation, some differences do emerge. In this group there are even more people in education and more technical employees. The most obvious difference, the smaller number of managers, is undoubtedly due to age and career stage. One would expect that over the next eight years many of those alumni who were in staff or technical positions in 1970 would be promoted into management, thus approximating the distribution of managers found in the older groups. The jump in the number of professors, on the other hand, probably reflects a real

change in initial career choices based on changing national priorities and social values.

In the subsequent decade such social changes led to a decided broadening of the opportunities for other kinds of careers within M.I.T. But in the sample of graduates from the 'fifties, these trends are still minimal. What strikes one more is the degree of similarity across the three classes. Here are a group of people who are fairly well established in a set of primarily managerial and technical careers. They are people who chose a particular occupational direction early in their lives and are now in the process of stabilizing it (Super, et al., 1963). The education they received, the time in which they received it, and the assumptions on which their initial career choices were made, are all reflected in the occupational roles they are now playing.

2. Occupational Differences

A: Background and Current Characteristics

Table IIA2 indicates some of the differences that exist among males in the occupations of the two main career patterns in their background, and in some of their occupational and family characteristics.

Part I of the table shows the occupational status of the respondents' fathers. None of the differences is very large, but a number of things are worth noting. Looking first at the career patterns as a whole, one notes that the engineering based alumni are somewhat more likely to have had businessman fathers whereas scientific/professional alumni are

TABLE IIA2

Some Background and Current Characteristics of Respondents in Twelve Occupational

PATTERN E: ENGINEERING BASED

PATTERN SP: SCIENTIFIC/ PROFESSIONALLY BASED

	TOTAL E	Entr.	Gen. Mgr.	Fctl. Mgr.	Bus. Stf.	Cons.	Eng. Mgr.	Eng. Stf.	TOTAL SP	Eng. Fac.	Sci. Fac.	Sci. Mgr.	Sci. Stf.
	N=957*	82	50	157	70	60	232	306	211	62	69	20	60
						I - BACKGROUND							
Father's Occupational Status:													
Professional													
top	6%	6%	8%	6%	8%	7%	7%	4%	12%	7%	18%	0	14%
lesser	18%	15%	20%	15%	16%	15%	17%	20%	25%	26%	15%	35%	32%
Business													
major	18%	26%	41%	21%	22%	18%	14%	13%	14%	13%	13%	10%	17%
small	23%	28%	16%	22%	25%	23%	26%	19%	19%	23%	19%	20%	15%
Lesser White Collar	19%	14%	8%	24%	18%	23%	16%	22%	14%	16%	13%	25%	8%
Blue Collar	16%	11%	6%	12%	10%	13%	20%	21%	16%	15%	21%	10%	14%
						II - CURRENT OCCUPATIONAL CHARACTERISTICS							
Employment Sector:													
Private	87%	100%	100%	92%	79%	100%	81%	84%	20%	0	0	65%	48%
Nonprofit	6%	0	0	4%	7%	0	10%	9%	72%	100%	100%	10%	30%
Government	6%	0	0	4%	14%	0	10%	8%	8%	0	0	25%	22%
Income:													
<$15,000	10%	5%	0	4%	16%	9%	4%	20%	26%	19%	42%	10%	18%
$15,001-$20,000	34%	8%	4%	28%	56%	18%	27%	52%	34%	29%	33%	15%	46%
$20,001-$30,000	39%	36%	26%	48%	25%	38%	58%	27%	36%	43%	24%	55%	36%
>$30,000	16%	51%	69%	19%	3%	34%	12%	1%	4%	9%	0	20%	0

TABLE IIA2 (cont.)

	PATTERN E: ENGINEERING BASED								PATTERN SP: SCIENTIFIC/ PROFESSIONALLY BASED				
	TOTAL E N=957*	Entr. 82	Gen. Mgr. 50	Fctl. Mgr. 157	Bus. Stf. 70	Cons. 60	Eng. Mgr. 232	Eng. Stf. 306	TOTAL SP 211	Eng. Fac. 62	Sci. Fac. 69	Sci. Mgr. 20	Sci. Stf. 60
III - CURRENT FAMILY CHARACTERISTICS													
Family Cycle													
Single	8%	4%	0	7%	2%	10%	6%	11%	11%	14%	11%	6%	7%
Married, no children	5%	4%	2%	1%	7%	9%	5%	7%	12%	10%	18%	11%	11%
Married, pre-school children	39%	32%	41%	37%	46%	38%	41%	40%	41%	39%	46%	33%	41%
Married, school age children	48%	60%	56%	54%	46%	43%	48%	42%	35%	37%	26%	50%	41%
Wife's Professional Status:													
Non-Professional	78%	77%	88%	79%	75%	74%	79%	78%	62%	66%	54%	79%	61%
Semi-Professional	15%	10%	8%	16%	18%	18%	15%	16%	24%	17%	31%	16%	26%
Full-Professional	6%	13%	4%	5%	7%	7%	6%	6%	14%	17%	15%	5%	13%
Wife's Work Status:													
Not Working	76%	73%	86%	77%	76%	79%	74%	74%	61%	63%	49%	74%	67%
Working Part Time	18%	19%	8%	21%	15%	13%	20%	18%	21%	20%	26%	16%	18%
Working Full Time	7%	8%	6%	2%	9%	8%	6%	8%	18%	17%	25%	10%	15%

*These N's are reduced by the number about whom information on any category is not available.

more likely to have had professional fathers.* As other occuptional research has shown (cf. Osipow, 1973), father's occupation is in general somewhat correlated with son's occupation.

Within each career pattern one notes further that among the alumni who are presently entrepreneurs, there is a disproportionate number of small businessmen fathers, whereas among those who are now general managers we see a disproportionate number of fathers in major business enterprises. Very few of the general managers come from blue collar homes. Staff engineers and engineering managers are less likely than other E pattern alumni to have had fathers in major businesses and more likely to have had fathers with blue collar occupations. Engineering professors do not differ markedly from the staff engineers and engineering managers in fathers' background, which further supports the assertion that their different career evolution was a function of their higher grades stimulating them toward graduate school, rather than initially different career aspirations. Science professors, in contrast, have a higher proportion of fathers in the top professions.

Part II of Table IIA2 deals with certain current occupational characteristics. It shows, first, the sector of the economy within which the alumni are presently working--private or profit making, non-profit organizations, and national or local government. As might

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* The 3x2 table of the 2 career patterns against 3 categories of father's occupation (professional, business, other) shows a highly significant association ($X^2 = 14.96$, $P<.001$). Analysis of residuals shows that the main difference occurs among sons of professionals, many more of whom than expected are in SP occupations and fewer than expected are in E occupations. The opposite tendency for sons of men in business is also significant, but not nearly as strong.

be expected, almost all of the E pattern alumni work in the private sector. In contrast, the SP pattern alumni are much less likely to work there. In the case of the professors this finding is trivial since they work in a non-profit institution by definition. But even staff scientists and science managers have a greater tendency to work in non-profit or government laboratories than, respectively, do engineering staff and managers.

This part of the table also shows the income distribution of the career patterns. Looking first at the E pattern, one notes both very high incomes--the entrepreneurs, general managers, and consultants--and very low incomes--business staff and engineering staff. Alumni in occupations in the SP pattern have generally lower incomes than the E pattern alumni, which is primarily a reflection of lower academic salaries, especially among professors of science. Engineering professors have higher salaries than science professors, but still only come even with engineering staff or managers. Staff scientists like staff engineers have very low salaries, relative to the other groups, in spite of the fact that they have a higher proportion of doctorates. Some of these differences could be due to age and career stage, but elsewhere (Bailyn and Schein, 1972) we have shown that they persist even when one controls for age.

Finally, Part III of Table IIA2 presents data on some current family characteristics of the alumni: 1) the stage at which their family is; 2) their wife's professional status (based mainly on level of education); and 3) wife's working status at the time of the survey. Not surprisingly, the managerial groups are further along in their family cycle than most other groups and professors are less far along,

a reflection of the relative ages of these groups.

Among those who are married, the E pattern alumni are more likely to have non-professional wives than the SP pattern alumni, with the exception of the science managers who closely resemble the other managerial groups. The most extreme case of this is found in the general managers, among whom 88% have non-professional wives. Professors and staff scientists, in contrast, are most likely to have professional wives. The data with respect to whether or not wives are currently working show similar results. Most of the E pattern alumni have non-working wives, with the general managers again showing this in the most extreme form, whereas SP pattern alumni, except for the science managers, are more likely to have working wives.

It might be noted that the general managers stand out on a number of characteristics. Table 2.2 showed that they were more likely to have graduated from the School of Management and more likely to have received higher grades and doctorates, relative to other E pattern alumni. They are also most likely to have had fathers in major business roles and least likely to have had fathers from lower socio-economic occupations. They have by far the highest incomes and their wives are clearly in non-working support roles. Further, Tables 2.4 and IIA4 show that successful general managers value more than any other occupational group high earnings, opportunities for leadership, contribution to the organization, and working with people. As has been suggested in a previous paper, they may well represent a group who made an early choice of management as an occupation based on a combination of socio-economic, educational, and value factors (Schein, 1972).

B: Occupational Success

Measures of career success may be based on objective or subjective criteria. Objective measures are based on such indicators as income, rank, output, etc. Such measures have certain advantages of rigor, but they also have some problems. Though their objectivity may make them preferable when studying differences in success within a homogeneous professional group, occupational differences in the distribution of such measures make them potentially meaningless if one's sample spans many diffferent occupations. In contrast, subjective measures, which are based on some form of self-rating, tend to overcome such occupational differences, since, presumably, each person is rating himself relative to his own occupational group. Obviously, this method also has problems. The match between objective and subjective measures will be greater in convergent fields--where criteria of excellence are much more specified--than in divergent ones. Further, in any given field, biases are introduced by the dependence of self-ratings on a person's degree of self-awareness and the strength of his needs and defenses.

Subjective measures, on the other hand, may have a further, more subtle advantage in allowing each person to use his own particular criteria of what success means to him. Some of the respondents mentioned that they did not consider success in their work as relevant to success in life. It seems likely that they were interpreting success in terms of objective criteria--in terms of income, possessions, etc. Subjective ratings allow these people to include other aspects of their work as well, such as the amount of satisfaction they have from it, the level of ability at which they are

working, and so on.

It is for this reason that in the analysis we used a primarily subjective measure of success. It centers on the following question in the questionnaire:

> At this point in your professional life, how successful do you think you are in your work?
>
> Unsuccessful — Very Successful
> 1 2 3 4 5

One difficulty, however, concerns the effect of career stage on answers to this question. Since there are three somewhat different age groups in the sample, and since career lines differ in different occupations, such a measure is probably not as good as one that also takes into account a person's estimate of his success at the height of his career, whenever that may be. We therefore included one further question:

> How successful do you think you will be at the height of your career?
>
> Unsuccessful — Very Successful
> 1 2 3 4 5

Occupational success, then was, measured by a combination of these questions, as presented in the following table:

Success Now	Success at Height of Career: Low	Medium	High	Total N	% stay same	% improve
Low (1-3)	120	253	74	447	27%	73%(17% to High)
Medium (4)	9	407	243	659	62%	37%
High (5)	2	21	185	208	89%	--

The table shows that essentially all of those rating themselves as very successful today do so for the height of their careers (185 out

of 208); about one third of the current Mediums feel they will move up (243 out of 659); almost three fourths of those currently rating themselves as relatively unsuccessful expect to move up (327 out of 447), though most only to the medium position.

We consider as "successful" those respondents who fall below the dotted line: who either rate themselves as very successful now, or who rate their present success as medium but expect to be very successful at the height of their career. About one third (N=451, 34%) of the male sample who answered these questions are "successful" by this measure.

Table IIA3, which presents the perceived success of the career patterns and the occupational roles that comprise them, shows that there is very little difference in perceived success between the career patterns. There is quite large variation, however, among the occupations within career patterns. Over three quarters of the general managers perceive themselves as successful--the highest "success" of all the groups. They are followed by three occupational roles in which more than half perceive themselves as successful: the science managers, the consultants, and the entrepreneurs. Next come a group of occupations in which about a third perceive themselves as successful. These are, in descending order, the engineering faculty, the functional managers, the engineering managers, business staff, science staff, and science faculty.* Finally, very much at the

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* The lower felt success of the science professors, when compared to the engineering professors, may well result from the tendency, among scientists, to evaluate their efforts by comparison with the giants in their field (Kubie, 1953, 1954).

TABLE IIA3
Perceived Success in Career Patterns
and Occupational Roles

		% who perceive themselves "successful"	RANK	Corr.***
PATTERN E:	ENGINEERING BASED	33% (N=947)*		.19
	Entrepreneurs	52% (N=80)	4 (2)**	.40
	General Managers	78% (N=50)	1 (1)	.28
	Functional Managers	34% (N=155)	6 (4)	.19
	Business Staff	29% (N=70)	8 (8)	.21
	Consultants	58% (N=59)	3 (3)	.25
	Engineering Managers	32% (N=231)	7 (7)	.16
	Engineering Staff	17% (N=302)	11(10)	.22
PATTERN SP:	SCIENTIFIC/ PROFESSIONALLY BASED	33% (N=211)		.17
	Engineering Faculty	40% (N=62)	5 (6)	.18
	Science Faculty	25% (N=69)	10(11)	.13
	Science Managers	60% (N=20)	2 (5)	.48
	Science Staff	28% (N=60)	9 (9)	.18

* Includes only those people who answered both success questions.

** Ranks in parentheses are based on the ranking of the percentage in each group whose incomes were over $30,000, with ties allocated according to the percentage in the $20-$30,000 range. In order to control for career stage, these rankings were done separately for each class and the final ranks given in this column are based on the average ranking of the 3 classes for each occupational group.

*** These are the non-parametric correlations between perceived success and income normalized within each occupational category and year of graduation.

bottom are those respondents in engineering staff positions, of whom only 17% perceive themselves as successful.

Table IIA3 also gives the ranking of the occupational groups on this subjective measure of success as well as the ranking according to the percentage of very high incomes. A comparison of these rankings shows a strong but not perfect correlation between the subjective and objective indicators (rank order correlation = .91). For example, the entrepreneurs and functional managers (in the E pattern) perceive themselves as relatively less successful than their income levels place them. In contrast, alumni in the SP pattern, particularly the science managers, tend to see themselves as more successful than their income level would indicate.

This overall relation, however, applies to groups and does not say anything about the correlation between perceived success and income for individuals within the occupational categories. The last column of Table IIA3 provides this information. Though all but one of these correlations (the one for science faculty) is statistically significantly different from 0 ($P<.05$), only for the entrepreneurs and the science managers are the correlations high enough to warrant the conclusion that perceived success is dependent on relative income.

3. Other Job Values

Table IIA4 gives the responses of the successful alumni in engineering and scientific/professionally based occupational roles for those items in question 17 of the questionnaire (Appendix A) not already shown in Table 2.4. They are presented in order of overall adherence by the total group (see Table 2.3).

TABLE IIA4

Percentage of "Successful" Respondents Rating a Given Value as "Very Important"

JOB VALUES	PATTERNS		OCCUPATIONS										
	E	SP	ENTR	GEN MGRS	FUNCT MGRS	ENG MGRS	CONS	BUS ST	ENG ST	SCI MGRS	ENG FAC	SCI FAC	SCI ST
N*	314	71	42	39	53	75	34	20	51	12	25	17	17
RECOGNITION	32	34	23	24	38	30	30	40	41	36	48	12	35
SUFFICIENT FAMILY TIME	18	13	15	14	15	15	21	10	29	17	22	12	0
LOCATION	21	16	18	27	17	17	15	20	31	0	29	12	12
FRIENDLY DEPARTMENT	15	12	13	8	11	17	21	15	20	8	22	12	0
REASONABLE WORK LOAD	18	16	18	18	17	17	21	5	22	17	14	25	12
CONTRIBUTION TO SOCIETY	16	22	22	27	9	12	21	15	14	0	44	6	24
HIGHLY REGARDED ORGANIZATION	18	17	18	22	17	17	18	15	16	17	26	12	12
WORK WITH PEOPLE	16	6	15	40	15	9	18	20	8	17	9	6	6
JOB WITH PRESTIGE	18	17	31	19	21	15	9	20	16	17	17	18	18
EFFICIENT DEPARTMENT	13	9	18	14	14	12	15	15	10	17	4	12	6
JOB SECURITY	7	16	0	3	11	7	3	0	18	0	18	29	12
SOCIAL RELEVANCE	5	9	2	3	4	4	15	5	6	8	22	0	0
FRINGE BENEFITS	6	6	5	8	8	7	3	5	6	17	9	12	0
PHYSICAL WORKING CONDITIONS	4	3	0	10	8	3	6	0	2	33	4	6	0

*These N's represent the number of people in each category who consider themselves "successful," reduced where necessary by the number not answering a given item.

Chapter III

Reactions to Work

Respondents in engineering based and scientific/professionally based careers--over 86% of the total sample--represent those M.I.T. alumni now pursuing organizational careers (Glaser, 1968). They are employed by private industry, by government, and by universities and other non-profit laboratories in a variety of occupations. Their work flows fairly directly from their technical training and from relatively homogeneous sets of early experiences. These beginnings have shaped the ensuing career paths: each of the career patterns identified in the last chapter leads to a more or less constrained set of subsequent occupational roles. Successful movement along these paths, moreover, seems to introduce or accentuate an associated group of values. At mid-career, therefore, successful engineering based careers have come to be associated with a set of values different from those of the successful scientific/ professionals. But, as already indicated, the homogeneity within each career pattern breaks down when one looks beyond group norms and values and, by shifting the analysis to individual responses, raises the question of how different people, whether successful or not, actually react to their work in the middle years.

Work Involvement in Technically Based Careers

The "leading positions" for which M.I.T. trained its graduates have, until quite recently, been viewed as among the most desirable in our society. True, they demanded high commitment of time and effort, but the rewards were great: partially by conferring status and power,

but more crucially by meeting basic needs for expressing competence, for mastery of the environment, and for continuing growth and achievement. All of our respondents, presumably, had embarked on their careers with the expectation that the work they would be doing would be intrinsically satisfying--an expectation succinctly expressed by one of them, who added to the list of important characteristics of a job one that was central for him, viz., "fun (in my work)."

But ten to twenty years later there were a number who were disappointed, whose expectations in this respect were not being met. Forces stemming from the particular turns their careers had taken as well as from changes in social values have led, in these cases, to problems similar to those confronting the "alienated" industrial worker (Blauner, 1964).

In order to understand these different reactions to work, and to isolate the occupational and personal characteristics with which they are associated, we included, in the questionnaire, many potentially relevant items. They dealt with the satisfactions derived from job, work, and career; with important job values; with self-assessments of success and other traits and skills; and with the role of work in a person's total life. Only such a large set of items, we felt, would permit one to capture the complexity of these respondents' work situations and of their reactions to them.

On the basis of an analysis of the interrelation of all of these items, one key concept emerged which we call work involvement. The exact derivation of the index of work involvement, as well as the details of attempts at explication and construct validation, may be found in the technical appendix to this chapter. Here we will only

say that the index is a composite of three elements, one of which is itself composed of responses to four separate items.[1] In its final form, this index categorizes a person as highly work involved if he has tendencies to:

1. show basic commitment to and derive satisfaction from his professional work
2. derive his life satisfactions more from his career than from his family relationships
3. place little importance on family needs when considering crucial characteristics of his job.

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1 In terms of complexity and structure, this measure resides somewhere between the extremes of single-item indicators and qualitative typologies. It therefore combines the analytic advantage of a structured instrument and a large sample, with the attempt, usually associated with more qualitative techniques, to reflect the situation from the point of view of the respondents.

A sophisticated example of the use of a single item is given by Vroom (1962). His concept of "ego-involvement" is described in terms not too different from those we use, but his measure is based on a single item with 4 levels of response:

> If a problem comes up in your work and it isn't all settled by the time you go home, how likely is it that you will find yourself thinking about it after work?

For purposes of comparison and change over time, of course, such single-item indicators are invaluable, as is obvious by the frequent reference made to the early use of this approach by Morse and Weiss (1955). Kahn (1972) gives an excellent review of such single-indicator measures.

At the other extreme we can mention Sofer (1970), whose classification of some eighty executives and technical specialists in two industrial organizations is based on responses to four open-ended questions ("Can you give me an idea of your other main activities and interests outside your job?" "What part do you feel your work plays in this overall pattern?" "If you can imagine for a moment that financially you didn't have to work, what do you think you would do?" and "If you did give up your work here, is there anything you would miss?")

For a full review of the literature on job involvement and related concepts see Rabinowitz and Hall (1977).

It is the inclusion of items that center on the relative role of career and family in a person's life, that distinguishes, perhaps more than anything, this definition from previous measures of work involvement or commitment to work. Though there is no logical incompatibility in combining or integrating a high commitment to work with a great involvement with family, in this sample, perhaps because of the particular range of occupations represented, it tended not to occur. It was primarily the managers who seemed to be able to respond with full commitment to both the demands emanating from their work and from their families. Further analysis, however, showed that far fewer of the managers' wives were involved in their own work than was true of other occupational groups (see Table IIA1). Their husbands' ability to combine these two orientations depended, apparently, on the wife playing an ancillary role to her husband's career. This is very different from what is envisioned in a "dual-career" family, a family in which the wife's role is not defined solely by what her husband does. Results of studies on the success of this pattern (Rapoport and Rapoport, 1976; Holmstrom, 1972; Bailyn, 1970) point to the need for the husband in such a family to withdraw somewhat from the fully work-committed stance traditionally expected of professional men in our society.

Respondents who score <u>high</u> on the index developed in this study are very involved with their work: they get some of their main satisfactions from it and it plays the major role in their lives--more than family or other creative, recreational, or community pursuits. Individual analysis of the questionnaires of those 25 alumni with the very highest work involvement scores, showed that they know exactly

where they are professionally and what they want to get from their jobs. They have a very active orientation to their work and if their particular jobs don't satisfy them they are making plans to change. For these highly involved respondents, intrinsic needs for the expression of competence and for mastery and achievement are being fulfilled by the work they do.

At the other extreme, those who are low on the index of work involvement approach their work more instrumentally and get their major satisfactions from their families or from other non-work related areas. The people at the low end of the index do not find their work rewarding in its own right: for them work is more a necessity than a pleasure in itself. By reading over the questionnaires of the 23 people with the very lowest scores on this index, one gets the impression that the concern with work of this group is with its financial rewards or with the fact that it gives them something to do from 9 to 5. They seem to lack self-confidence and a few are very bitter: "the myth of a 'shortage of engineers' and an unfortunate scholarship to M.I.T. seduced me from a medical or legal profession." Quite a few of them, as a matter of fact, express the desire to have been in a different profession, and yet they show no evidence of taking initiative as far as their jobs are concerned: many are still with the same organizations they have always been with and hardly any are making plans to change their working situations. They seem to have no firm professional identity and give evidence of having ill-defined, unrealistic goals in their work.

Table 3.1 presents the distribution on this index of work involvement. It shows, for each of the occupational roles that

TABLE 3.1

Work Involvement by Occupational Role

	N[b]	Work Involvement[a] % High	% Med.	% Low	mean score	D % High minus % Low
Entrepreneurs	73	33%	54%	13%	3.17	+20
General Managers	47	29%	52%	19%	3.09	+10
Functional Managers	151	24%	58%	18%	3.07	+6
Consultants	58	26%	53%	21%	3.07	+5
Engineering Managers	226	28%	47%	25%	3.02	+3
Staff Engineers	286	20%	44%	36%	2.77	-16
Business Staff	68	9%	62%	29%	2.77	-20
TOTAL (Pattern E)	909	24%	50%	26%	2.96	-2
Science Managers	19	48%	42%	10%	3.28	+38
Science Faculty	66	40%	50%	10%	3.34	+30
Engineering Faculty	57	33%	57%	10%	3.27	+23
Science Staff	56	16%	68%	16%	3.06	0
TOTAL (Pattern SP)	198	32%	56%	12%	3.24	+20

[a]On a scale from 1.0 to 5.0: HIGH --- scores $\geq$ 3.6
LOW --- scores $\leq$ 2.0
These cutting points were chosen in order to differentiate the HIGH and LOW groups clearly, and to equalize as much as possible the percentages in the two extreme groups for the sample as a whole.

[b]Number of people who answered all the questions in the work involvement index.

comprise the two major career patterns, the percentage in the group whose work involvement is High, Medium, and Low. Further, it presents the mean work involvement score for each group as well as the extent to which the group is more characterized by people with High than with Low work involvement. This latter measure (D) determines the order in which the occupations are presented within each of the career patterns.

As the table shows, the occupational roles with the highest work involvement (those in which there are many more highly involved than uninvolved respondents) are in the scientific/professional pattern: science managers and science faculty are the most involved groups followed by the engineering faculty. At the other extreme, the table shows that alumni in two occupations in the engineering pattern--engineering staff and business staff--tend, in contrast, to be relatively uninvolved in their work. In general, then, as the figures in the Total rows of the table indicate, the engineering based careers are less involving than the scientific/professionally based ones.

But, in contrast to previous discussion of these career patterns, this general statement hides some sizeable and systematic differences within each of the patterns. In particular, the staff positions in each pattern--whether business, engineering, or science--show considerably less work involvement than do any of the other positions listed. Thus it is necessary, in understanding work involvement, to classify the occupational roles not only by career pattern, but also by another dimension, which might be called organizational position. One value on this dimension is the one already specified, the staff

position. It represents those occupational roles whose organizational positions tend to be Low. The other value is somewhat more complex: it includes managerial positions, consultants and entrepreneurs, and university faculty. The common thread among these might be income, or prestige, or the extent to which the position permits autonomous functioning in the work role. For the time being we will only classify these occupational roles as High in organizational position since they are likely to be higher than the staff roles on all of these aspects.[2]

That this distinction between high and low organizational positions is meaningful is seen by the fact that it is associated with a characteristic career attitude. As Table 3.2 shows, occupants of occupational roles whose organizational positions are high are more likely to consider success at work very important and to have very high aspirations for their careers than is true for those whose organizational positions are low. Whether such success aspirations are a prerequisite for high organizational positions, or whether these positions inculcate such attiudes, we have no way of saying for sure. But, following the reasoning in the last chapter about values, we presume that both processes occur and that we are dealing with

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[2] It must be stressed that this is a probabilistic classification. It is not based on an individual analysis of each alumnus's organizational position, but rather on the assessment that positions in a particular occupational role are likely to be high or low. This distinction, therefore, applies to occupational roles and not to individuals. Our assumption is that most of the individuals in an occupational role classified as "high" will have high organizational positions, and that most of those in occupational roles classified as "low" will be in low organizational positions. We know, however, that the probability of such an association, though high, will be less than 1.

TABLE 3.2

Success Aspirations of Occupants of High and Low Organizational Positions

Organizational Position:	Success Aspirations[a] % High	% Medium	% Low
High (N=717)[b]	34%	31%	35%
Low (N=421)[b]	15%	25%	60%

[a]Measured by answers to two items in the questionnaire:

1. How important is it to you to be successful in your work?

unimportant very important
1 2 3 4 5

2. Please indicate the degree to which you NOW possess [High aspirations for your career]:

do not possess at all — possess to a great extent

0 1 2 3 4

All those who said that success at work is very important to them ("5") and also indicated that they possess high career aspirations to a great extent ("4") are considered to have HIGH success aspirations; those who met neither of these criteria are considered LOW in success aspirations.

[b]Excludes those who did not answer both of these questions.

reciprocal effects: people who elect or are selected for high organizational positions may be somewhat inclined toward high success aspirations in any case, but this stance is undoubtedly accentuated and strongly reinforced by the way these positions are experienced by their occupants.

The investigation of individual reactions to work, therefore, requires a subdivision of the occupational roles in each career pattern into two groups: those roles representing organizational positions likely to be High and those whose organizational positions are more likely to be Low. Table 3.3 presents this new grouping. It identifies the occupational roles in each of four types of technical careers: engineering based careers with High organizational positions and those with Low organizational positions; and scientific/professionally based careers with High and Low organizational positions. Value syndromes, it should be said, are primarily associated with differences in career patterns even when organizational position is controlled.[3] And success aspirations respond equally to

3 When one looks at the overall figures for each career type, one sees much greater difference in values between the successful occupants of engineering based and scientific/professionally based careers than one does between those in high or low positions. The emphasis on organizational values of advancement and earnings is almost the same in "low" engineering based careers as it is in those in high organizational positions, and "low" scientific/professional occupations emphasize professional rather than organizational values to the same extent that the faculty positions do. The only exception on the engineering based side are the staff engineers who are less inclined to support the organizational value syndrome than the other engineering groups. But even in this case, they are more likely to adhere to these values than are the staff scientists who are their equivalents among the scientific/professionals. And, on the scientific/professional side, it is only the science managers among the "high" SP careers who deviate somewhat from this pattern: they are more organizationally and less professionally inclined than the other groups in the SP Pattern. But even they are less organizationally inclined than are most of those in engineering based careers. (These conclusions are based on averaging the percentages given in Table 2.4, Chapter II, over items and, where relevant, over occupational groups. See also Bailyn 1977b, Table 2.)

TABLE 3.3

Four Career Types:
Engineering Based with High and Low Organizational Positions;
Scientific/Professionally Based with High and Low Organizational Positions

Organizational Position:	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I (E/H) Entrepreneur (N=82) General Manager (N=50) Functional Manager (N=157) Consultant (N=60) Engineering Manager (N=232) (N=581)	III (SP/H) Science Manager (N=20) Science Faculty (N=69) Engineering Faculty (N=62) (N=151)
Low	II (E/L) Staff Engineer (N=306) Business Staff (N=70) (N=376)	IV (SP/L) Staff Scientist (N=60) (N=60)

organizational position in engineering and in scientific/professional careers.[4]

Thus career patterns, independently of organizational position, are associated with certain value syndromes; and organizational position is independently related to a characteristic stance toward success and career. These differences are portrayed in Table 3.4, which also gives the work involvement in each of the career types.

It is clear from this table, that work involvement relates both to career pattern and to organizational position: scientific professionals are in general more involved than are occupants of engineering based careers; and alumni in occupational roles representing high organizational positions are more involved than those in roles whose organizational positions are more likely to be low. Thus the very highest work involvement is found in scientific/professional roles with high organizational positions, particularly (see Table 3.1) among the science managers, but also among the science faculty and, though to a somewhat lesser extent, the engineering faculty. These last are very close in work involvement to the entrepreneurs--the most involved of any group in the E/H career type. They are followed, in that career type, by the general managers, and then by the functional managers, consultants, and engineering managers.

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[4] The following figures show the percentage of each career type with high success aspirations as compared to the percentage (in parentheses) with low success aspirations:

	E	S/P
Organizational Position:		
High	36%(34%)	34%(35%)
Low	15%(61%)	17%(58%)

TABLE 3.4

Occupational Value Norms and Characteristic Career Stance of Four Career Types

(including data on work involvement)

Organizational Position:	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I (E/H) organizational value syndrome high concern with success and career Work Involvement[a] H 27% M 52% L 21% D = +6 (N=555)[b]	III (SP/H) professional value syndrome high concern with success and career Work Involvement[a] H 38% M 51% L 11% D = +27 (N=142)[b]
Low	II (E/L) organizational value syndrome low concern with success and career Work Involvement[a] H 18% M 47% L 35% D = -17 (N=354)[b]	IV (SP/L) professional value syndrome low concern with success and career Work Involvement[a] H 16% M 68% L 16% D = 0 (N=56)[b]

[a] X^2 for the 4x3 table (4 career types, 3 levels of work involvement) is obviously very high ($X = 57.3$, $P<.001$). Partitioning X^2 to locate the main source of significant differences is difficult because of the large differences in N's in the 4 career types. But analysis of residuals shows that the highest deviation (double underlining) occurs in the E/L career type, who are much more likely to have low work involvement than expected (adjusted residual = 6.09). Other significant residuals (single underlinings) occur in the SP/H group, who are more highly work involved and less uninvolved than expected (adjusted residuals = 3.88 and 3.92, respectively) and in the E/L group who are also less highly involved than expected (adjusted residual = 3.76): Haberman (1973), quoted in Reynolds (1977), p. 12.

[b] Number of people who answered all the questions in the work involvement index.

These respondents (in engineering based roles with high organizational positions) are more work involved than is true for their counterparts in low organizational positions. Those in engineering staff and business staff positions, as a group, tend to be rather uninvolved in their work. It should be noted, however, that, in contrast to business staff, there is a not insignificant number among those in engineering staff positions who are highly involved with their work.[5] On the whole, though, the work involvement of occupants of engineering based roles with low organizational positions tends to be low.

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[5] An analysis of the 23 staff engineers with the highest work involvement (those in the top decile of the total distribution, with scores on the index ≥ 4.0) showed that a significantly larger number of them than one would expect (based on the total sample) are single, or, if married, have no children ($X^2_{corrected} = 3.95$, $p<.05$). Whereas only 6% of the total male sample are single, in this group 4 (over 17%) have never been married; and 3 of the 19 who have been married (16%) have no children as compared to the equivalent figure of slightly over 8% for the sample as a whole. This group of single and childless engineers does not exhibit the attributes usually associated with high work involvement: none is very satisfied with his job; none perceives himself as successful in his work. It is almost as if in this group the high work involvement is a default involvement.

The high work involvement of the 16 engineers who do have children, in contrast, seems to represent a more basic commitment. Fully half of them perceive themselves as successful at work, in contrast to only 17% of all the staff engineers. All of these eight "successful" and highly work involved engineers consider success at work to be very important and all have very high aspirations for their careers. They exhibit, therefore, the success aspirations usually associated with high organizational roles. And though we do not know enough details about their work situations to identify facilitating factors there, we can say that all but two have a clearly technical orientation to their work. This is consistent with McKelvey and Sekaran (1977) who show that a technical orientation is significantly related to the job involvement of non-managers who were engineering majors, though not of those who were science majors. It is a point to which we will return in a later section of this chapter.

Finally, not many scientists in staff positions (Type IV) are highly involved in their work; but neither are they very low in work involvement. They fall predominantly into the middle group.

Taken jointly, Tables 3.3 and 3.4 present the following picture of these four career types:

Type I (E/H). This category contains almost half (43%) of the male respondents in the sample. It represents, therefore, the modal career type for M.I.T. graduates from the 'fifties some ten to twenty years after their graduation. It consists primarily of engineering managers and managers of other functional areas, but includes also the entrepreneurs, consultants, and general managers in the sample. As a group it is governed by organizational norms, and characterized by high career aspirations and a great premium on success at work.

Type II (E/L). In this category are alumni in engineering based roles whose organizational positions are likely to be low. This group contains more than one quarter of the male respondents (28%) and consists primarily of alumni in engineering staff as well as the small group in business staff positions. It shares the value norms of the first group, but manifests less concern with success and careers. It is also the group with the lowest work involvement in the sample.

Type III (SP/H). The third career type comprises only 11% of the total male sample. It consists primarily of faculty people plus a handful (20) of science managers. These alumni share with their counterparts in engineering a high valuation of success and career, but the value norms associated with these positions are quite different, being much more professional and much less organizational. This difference is evidenced also by the particularly high work

involvement in this group.

Type IV (SP/L). The fourth career type, which consists of the 4% of the male respondents now working as staff scientists, combines the professional values associated with the SP Pattern with the lesser concern with success and career characteristic of low organizational positions.

Table 3.5 summarizes the differences in work involvement among the four career types and also shows data on perceived success and job satisfaction. It does so by presenting the differences between the percentage of any group in the high and in the low categories. It shows clearly that occupants of engineering based careers with low organizational positions (Type II) have the most negative reactions to their work, with SP/L careers (Type IV) not far behind. In contrast, those in occupational roles representing high organizational positions tend to have a positive reaction to their work. Whether in the engineering or the scientific/professional pattern, their job satisfaction is about equally positive. But the success aspirations associated with these roles express themselves differently in engineering based than in SP careers. In the former, the expression of this orientation is in organizational terms, and comes out in the high degree of perceived success in this group. In the latter, professional values are stronger and the content of the work, expressed by work involvement, is therefore more strongly emphasized.

Let us summarize these general characteristics of the four career types. Type I alumni (E/H) are generally positively oriented to work: the concern with success by the occupants of this career type is well matched with the requirements of their occupational roles and with the

TABLE 3.5

Reactions to Work by Occupants of Four Career Types

Organizational Position:	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I (E/H) Perceived Success +18 Work Involvement +6 Job Satisfaction +12 (N=581)[a]	III (SP/H) Perceived Success +3 Work Involvement +27 Job Satisfaction +10 (N=151)[a]
Low	II (E/L) Perceived Success -30 Work Involvement -17 Job Satisfaction -31 (N=376)[a]	IV (SP/L) Perceived Success -30 Work Involvement 0 Job Satisfaction -7 (N=60)[a]

Note: The figures in the table represent the excess of positive responses over negative responses in distributions that have been trichotomized. Thus, in the E/H career type 18% more people perceive that they have high success than that they have low success; in contrast, in the E/L career type 30% less people perceive that they have high success than that they have low success. The middle categories, which are not represented in the table, remain relatively constant.

[a]Reduced where necessary by those not answering all the relevant questions.

organizational values associated with these positions. They have the highest perceived success of any of the four types, they are satisfied with their jobs and involved with their work. They contrast sharply with Type II alumni (E/L) who represent the most problematic career type. The work roles of the alumni in this type do not seem to meet their basic needs, hence their involvement is on the whole low. They are not very satisfied with their jobs, nor do they perceive themselves as very successful. Their positions do not reflect the organizational values of advancement associated with engineering based careers, and their concerns lie not with success and career but more with non-work related areas of their life. This differentiation in reactions to work within the engineering career pattern is particularly striking because these two types share common educational and early career experiences, as well as a common set of values. (It should be mentioned, though, as Table 2.4 showed, that these values are not as strong in the "low" roles as in the other engineering based occupations.)

Within the scientific/professional career pattern, distinctions also exist. Type III (SP/H) is also positively oriented to work, but in line with their greater professionalization, the emphasis is more on involvement with the work itself than on organizational success. It contrasts less with its counterpart classified as representing the low organizational positions (Type IV) than is true in the E Pattern, though differences are not eliminated altogether. Indeed, staff scientists are basically in the middle range on all these indicators of their reactions to their work.

Thus there are very general differences in reactions to work

among these four career types. But there are also differences, as already indicated, among the occupants of any of these types. In general, we assume that reactions to work depend on the fit between the values, aspirations, and skills of the alumni on the one hand, and, on the other, the requirements of the occupational roles they occupy.

In order to pursue this notion it is necessary to categorize these differences more specifically. Gordon (1977), for example, has shown that concern with the management of people and concern with the management of technical problems represent two different orientations which are differentially satisfied by different kinds of jobs. Further, we have already indicated, and previously shown (Bailyn, 1977a), that some of our respondents, particularly in certain kinds of jobs, have withdrawn from an invovlement with work altogether and are oriented, rather, to family and other non-work related areas of their lives. To pursue this notion of fit, therefore, it is necessary to categorize the orientations of the alumni <u>within</u> each career type.

In particular, we want to differentiate those work involved alumni whose primary concern is centered on working with people from those who are more oriented to technical things, since these represent very different expectations from work and seem to be best satisfied by different occupational roles. But not all M.I.T. graduates at mid-career show a well defined orientation to work. It is equally important, therefore, to distinguish this relatively univolved group from those whose orientations run along fairly specific lines. Only in this way can we pursue the notion that individual orientations and occupational requirements interact in identifiable ways with fairly predictable outcomes.

Orientations in Four Career Types

In the present section we compare the non-work oriented respondents to two specific kinds of work orientation: one which is technical and the other which is centered on people. Our goal is to compare and contrast the frequency of occurrence and the effects of these three orientations in each of the previously established four career types. The details of the derivation of the measures of the orientations are described in the technical appendix to this chapter. Generally, the low end of the index of work involvement is used to identify alumni with a non-work orientation. People orientation is gauged by each respondent's reply to a direct question about the importance he places on working with people. Indication of a technical orientation, finally, is indirect, based on items in the questionnaire that previous analysis had shown to be related to a technical orientation (Bailyn, 1977b). It should be said, however, that it was not possible to measure these orientations too precisely, since the categories evolved on the basis of the analysis of the data and hence were not available to guide its collection.

Initially, every respondent who answered the necessary items in the questionnaire was classified separately according to whether each orientation was High, Medium, or Low. With this approach it is obvious that some people can be equally high on more than one of these orientations, and others may not be high on any. Though these are interesting possibilities in their own right, and with better measures would be worthy of further analysis, the emphasis in this section is on contrasting these orientations. For this reason, the analysis is limited to those who are classified as high on one of these

orientations, and not equally as high on either of the others (see the technical appendix for details). This advantage in clarity, however, means that the sample is considerably reduced. Of the 1,264 people who could be classified on all three orientations, only 727 (58%) were unambiguously oriented in this sense.[6] They are distributed among the orientations in the following way:

Primary Technical Orientation	N=260	21% of total
Primary People Orientation	N=219	17% of total
Primary Non-Work Orientation	N=248	20% of total

Note: The total number on which these percentages are based is 1264 and excludes those who were unascertainable on any of the orientations.

If one concentrates, then, on only those respondents who clearly have a primary orientation, it is clear from Table 3.6 that each career type has a distinctive orientation associated with it: alumni in scientific/professionally based careers are predominantly technically oriented; those in engineering based careers associated with high organizational positions tend to be people oriented; and those in engineering based careers with low organizational positions are primarily non-work oriented.

These characteristic orientations of the four career types are consistent with and expand on what has already been said about these types. The main thrust of this section, however, is to try to

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[6] A further 327 (26%) were not high on any of the orientations and 210 (17%) were equally high on more than one. In this latter group it was primarily a people orientation that combined with either a technical or a non-work orientation. Only 27 respondents combined a technical and a non-work orientation, and only 20 were equally high on all three.

TABLE 3.6

Orientations in Four Career Types

Organizational Position:	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I(E/H) 22% technical 44% people 34% non-work[a] N=302 (45% ambiguous)	III(SP/H) 77% technical 13% people 10% non-work[a] N=96 (31% ambiguous)
Low	II(E/L) 27% technical 19% people 54% non-work[a] N=196 (44% ambiguous)	IV(SP/L) 81% technical 4% people 15% non-work[a] N=27 (52% ambiguous)

Note: N's represent those in each career type who are unambiguously oriented.

[a]These percentages do not match those with low work involvement in Table 3.4 because they are based only on those alumni whose orientations are not ambiguous.

discover how orientations both typical and "deviant" interact with occupational requirements from the point of view both of the organization and of the individual employees. Unfortunately the number of non-technical people in the SP/L group is so small (1 is people oriented and 4 are non-work oriented) that this group will not be able to play a significant role in this analyis.

From the organization's point of view one would like to know how effective employees with different orientations are in each of these types of jobs. The data at hand do not include this information directly but do allow one to use salary information as an indirect indicator of performance. In order to use salary for this purpose, however, it is necessary to make it comparable across different occupational and age groups. Therefore, we divided the sample into twelve occupational groups, each of which was further subdivided into three graduating classes, and then normalized the distribution of total professional income for each of the resulting 36 groups. Each respondent, thus, has a score indicating the number of standard deviations he falls above or below the mean of his occupational-class group: 15% of the respondents[7] fall at around the mean, 42% have incomes above the average of their occupational-age groups, and 43% are below average. We assume that the employees whose salaries are above the mean by this criterion are the more effective employees.

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[7]Based on an N of 1094, which excludes those who did not fit into the 12 main occupational categories as well as those who did not give salary information in their questionnaires.

TABLE 3.7

Organizational Evaluation of Employees with Different Orientations in Four Career Types

% with above average incomes

Organizational Position	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I(E/H) Technical: 37% (N=59) People: 41% (N=123) Non-Work: 26% (N=95)	III(SP/H) Technical: 46% (N=70) People: 40% (N=10) Non-Work: 20% (N=10)
Low	II(E/L) Technical: 63% (N=49) People: 29% (N=35) Non-work: 43% (N=94)	IV(SP/L) Technical: 45% (N=20) People: [N=1] Non-Work: [N=4]

Note: The percentages in the table refer to the percentage of those in each cell who are considered effective. Thus, of the 59 people in the E/H career type who are technically oriented (and for whom salary information was available), 37% fall into the above average income category.

Table 3.7 shows that in "high" engineering based positions (Type I), a people orientation not only predominates but is also most highly rewarded by the organization, though a technical orientation is not far behind. In this group it is those with a non-work orientation who are considered least effective. A similar pattern exists for the scientific/professional roles. There the technical orientation, which is the dominant one, is most rewarded. Among SP alumni in high organizational positions (Type III), the people orientation is close behind the technical one, but non-work orientations are penalized just as in their engineering counterparts. In other words, in all high organizational roles, a definite work orientation, whether technical or people oriented, is seen as more effective than a non-work orientation.

The situation in the "low" engineering based occupations (Type II) is more complex. As might be expected, high relative incomes clearly go with a technical orientation. But a non-work orientation here is <u>not</u> penalized as much as a people orientation. It is the people oriented employees who are seen as least effective in these roles, at least as judged by relative income. It is clear, therefore, that the organizational evaluation as reflected in relative income depends less on orientation per se, than it does on how congruent the fit is between orientation and career type.

In order to see how orientations and career types fit from the individual's point of view, we used the question on job satisfaction to see which combinations were more or less likely to elicit responses of great satisfaction with one's job. Table 3.8, which presents this information, shows that about one quarter to one third of the

TABLE 3.8

Individual Satisfaction with
Different Orientations in
Four Career Types

% very satisfied with their jobs

Organizational Position:	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionally Based
High	I(E/H) Technical: 53% (N=64) People: 31% (N=133) Non-Work: 19% (N=104)	III(SP/H) Technical: 31% (N=74) People: 25% (N=12) Non-Work: 30% (N=10)
Low	II(E/L) Technical: 23% (N=53) People: 10% (N=38) Non-Work: 9% (N=104)	IV(E/L) Technical: 36% (N=22) People: [N=1] Non-Work: [N=4]

Note: The percentages in the table refer to the percentage of those in each cell who are very satisfied with their jobs. Thus, of the 64 people in the E/H career type who are technically oriented (and who answered the job satisfaction question), 53% are very satisfied with their jobs.

respondents in the scientific/professional careers are very satisfied with their jobs, no matter which orientation they have. In engineering based careers, in contrast, job satisfaction is highest among technically oriented M.I.T. graduates. In fact, almost one quarter of the technically oriented alumni in "low" engineering based careers are very satisfied with their jobs. This is almost as high a level of job satisfaction as is exhibited by the people oriented alumni in "high" engineering based roles. Even in these roles (Type I), in fact, it is the technically oriented who are most likely to be very satisfied with their jobs.[8]

As a final point in the analysis of fit between orientation and occupational requirements we want to look at individual satisfaction when organizational evaluation, as indicated by relative income, is controlled. Unfortunately, this limits us to the engineering based careers, since the number of non-technically oriented alumni in the SP pattern is too small for such an analysis. Table 3.9 presents the data on which the discussion is based.

In the "high" engineering roles (Type I) very little new information emerges, except, not unexpectedly, that somewhat more of the alumni whose incomes are above average are very satisfied with their jobs than is true for the below average group. This difference exists for each orientation. Nor does the control on relative income

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[8]This is true for every engineering based occupational role except the general managers. Only in this group are the people oriented alumni (N=21 of whom 48% are very satisfied with their jobs) more satisfied than those whose orientation is technical (N=3 of whom 1 is very satisfied with his job).

TABLE 3.9

Individual Satisfaction with Different Orientations in "High" and "Low" Engineering Based Careers Controlled for Relative Income

% very satisfied with their jobs

	Relative Income: Above Average	Relative Income: Below Average
E/H Career Type (Type I)	Technical: 62% (N=21) People: 39% (N=51) Non Work: 28% (N=25)	Technical: 54% (N=26) People: 24% (N=50) Non Work: 16% (N=51)
E/L Career Type (Type II)	Technical: 13% (N=31) People: 10% (N=10) Non Work: 10% (N=40)	Technical: 31% (N=13) People: 11% (N=19) Non Work: 9% (N=44)

Note: The percentages in the table refer to the percentage in each cell who are very satisfied with their jobs. Thus, of the 21 people in the E/H career type who are technically oriented and whose relative incomes are above average, 62% are very satisfied with their jobs.

change the conclusions from Table 3.8 for the E/H career type. In both income groups--both those evaluated highly and those evaluated as below average by their organizations--technically oriented alumni are more likely to be very satisfied with their jobs than are the people oriented alumni. It is a point to which we will return in the concluding section of this chapter.

In the "low" engineering roles (Type II), in contrast, Table 3.9 presents a different picture. We have previously seen that technically oriented respondents in the E/L career type are, on the whole, very positively evaluated by their organizations--at least as judged by their having above average salaries. But these relatively well paid technically oriented employees in engineering or business staff positions are not particularly satisfied with their jobs. On the contrary, the satisfaction level of this sub-group is no higher than that of alumni in this career type with other orientations. In fact it is only among the technically oriented who are not highly evaluated by their organizations (who have below average incomes) that one finds a sizeable group very satisfied with their jobs. This is not an insignificant group for organizations since they probably do the bulk of the routine technical tasks. Their relatively high satisfaction with their jobs, therefore, is important. Much more problematic for organizational policy is the fact that the best technically oriented people in engineering based staff roles--at least those most highly rewarded--show so little satisfaction with their jobs. This would seem to indicate that engineering based staff positions are not set up to meet the needs of the most competent technically oriented employees. Despite the fact that most of the

technically oriented people in these jobs are evaluated positively by their organizations, they are not satisfied with their positions. This finding should challenge organizations to think more creatively about their technical staff roles and how they can be made more attractive to high potential people whose orientation, at mid-career, remains technical.

Reactions to Work in Four Career Types: A Summary Profile

The modal career type for M.I.T. alumni from the 1950's is Type I: it is engineering based (in terms of undergraduate major and early career experiences) and is associated with high organizational positions, primarily technical or other functional managers but including also entrepreneurs, consultants, and general managers. It represents the traditionally "successful" organizational career path for engineers. And, not suprisingly, more of the alumni who have traversed it perceive themselves as successful than is true of any other career type. Perhaps the only surprising finding about this group is that though the primary orientation of its members is a people orientation, this characteristic stance is not the one associated with the highest job satisfaction. Rather, it is the technically oriented in this cell who are most satisfied with their jobs. This is only a surprising result, however, if one assumes that high positions are geared primarily to people oriented managers. This is true in some cases--e.g. the general managers in our sample (cf. Schein, 1972)--but not for the bulk of this group. Rather, it would appear, consistent with other findings on engineers (e.g. Ritti, 1971; Thompson and Dalton, 1976), that high positions are satisfactory to

the technically oriented in this group because they give them the power to be autonomous in their technical functioning. It is the autonomy of high organizational positions that seems to be important for this group, not the prestige or status associated with the management of people. It is perhaps an indictment of organizations that this kind of autonomy is often not available to technically oriented employees without the accompanying duties of a manager.

The point is confirmed from the negative side by the second most frequent career type in the sample, Type II--engineering based careers whose occupants are still functioning, at mid-career, in staff positions. This group has the most negative reactions to work of any: they have the lowest perception of their own success, the lowest work involvement, and the lowest satisfaction with their jobs. Indeed, the modal orientation in this group is a non-work orientation. Those who are people oriented seem to be particularly mismatched with these roles. It is only among those who are technically oriented that there seems to be any fit at all. And here we are confronted with the anomaly identified in the last section that it is only the low potential technically oriented (those whose relative incomes are below average) whose satisfaction with their jobs approaches that of any of the other career types. It is this finding that would seem to corroborate the dysfunctions associated with the way technical roles are currently organized. High potential technically oriented employees, it would seem, either have to switch to managerial roles or must remain in roles that do not provide them with enough autonomy for satisfactory expression of their technical competence.

Turning now to the scientific/professional career pattern, we see

here occupational roles primarily filled by people whose early training was more professional, consisting mainly of alumni who went on to get their doctorates, and are now university professors or hold scientific staff or managerial positions. Those in roles associated with high organizational positions (Type III) seem to fit well the requirements of their jobs. They have the highest work involvement of any career type and both their perceived success and job satisfaction are high. Their orientation is primarily technical (it is of interest, too, that they have the lowest percentage with ambiguous orientations), but they seem to be equally satisfied with their jobs no matter what orientation they have. Only with regard to relative income is there a tendency for non-work oriented alumni in this career type to be at a disadvantage. And even here the difference between technically and people oriented respondents is slight.

Finally, Type IV (SP careers associated with low organizational positions) consists of those scientific/professionally trained alumni now in science staff positions. Though there is a high amount of ambiguity of orientation in this group, those who can be classified are almost exclusively technical, and these are as satisfied with their jobs as are their counterparts in high organizational positions. They are not, however, as work involved; nor do they perceive themselves as successful. But they are considerably more positive on all these indications of their reactions to work than are the alumni in engineering based careers now in equivalent organizational positions.

Most generally, it is clear from this profile of the reactions to work in each of the four career types that a satisfactory work

situation at mid-career results from a complicated interplay of conditions involving the fit between individual orientations and the structure of jobs within organizations.

Technical Appendix to Chapter III

1. Derivation of Index of Work Involvement

The index of work involvement emerged from a factor analysis of 24 variables some of which were based on single items in the questionnaire and some of which were based on scales or item combinations. The entire array was factor analyzed by means of a principal factor solution with iteration (Nie et al., SPSS Manual, 1975). Six factors with eigen values >1.0 which met the scree test (Gorsuch, 1974) were rotated by both an orthogonal (varimax) and an oblique (direct oblimin with Kaiser normalization) rotation. In each case there emerged a factor (the first one after the varimax rotation) on which items previously identified as a work commitment scale loaded simply and highly. This factor served as the basis for the index of work involvement. Since the oblique rotation presented a clearer picture of all six factors, the following results are based on it.

Six of the original 24 variables had loadings greater than .3 on this factor, and five of these loaded higher on this factor than on any other. Of these five, one had a considerably lower loading than the others (.32); it also had an almost equal loading (.28) on another factor. For this reason it was eliminated from the definition of work involvement, leaving the four variables shown in Table IIIA1 to be used in the final definition.

TABLE IIIAI

Final Variables Used in the Index of Work Involvement

Variable	Loading
Career Satisfaction	.71
Work Satisfaction	.64
Importance of Time for Family and Personal Life	-.61
Work Orientation	.56

The first variable--career satisfaction--is based on the ranking given to "career or occupation" in the following question (Q. 31):*

> Which three aspects of your life give you the most satisfaction? In the following list, place a 1 next to the item that gives you the most satisfaction in life; a 2 next to the one that gives you the next most satisfaction; and a 3 next to the third most satisfying aspect of your life.
>
> Career or occupation
> Creative or other activities not related to career or occupation
> Leisure time recreational activities
> Family relationships
> Activities directed at community, national, or international betterment.

This question was designed to ascertain each respondent's satisfaction with his career when compared to these other areas. Only family ranks anywhere near career as providing the most satisfaction in life for this sample: 45% ranked career first; 40% ranked family first. And, when one considers both the first and second choices of each respondent, one finds that 64% mention family and career as the two most important sources of satisfaction (of these, 51% put family first and 49% put career first).

The second variable listed in Table IIIA1 also deals with satisfaction. It represents the extent of agreement with the last item of Question 26(see Appendix A): "My main satisfactions in life

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*This question was adapted from similar items used by Rosenberg (1957) and Fogarty, Rapoport, and Rapoport (1971).

come from the work I do."* The mean ranking of the 5-point response

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*This item was one of a 5-item question (Q. 26 of questionnaire, see Appendix A) taken from a "commitment-alienation" scale used by Rapoport and Lohman (n.d.) in their study of physical scientists and engineers from three different technological institutions who were questioned ten years after graduation. Preliminary analysis of this question, however, showed that the first item in this scale--the extent to which a person would feel "very frustrated and unfulfilled" if he "had to change the kind of work I do"--gave consistent results for some occupations but not for others. The crucial point had to do with an ambiguity in the concept of "work." Scientists, for example, seem to see their work and their career as synonymous, and hence the items produced consistent results for them. A number of entrepreneurs, in contrast, answered all the other items in the direction of involvement, but said on this item that they would not mind changing the kind of work they did, implying, perhaps, that their concept of career is not dependent on the exact nature of their daily work or tasks. More than 10% of the entrepreneurs and of the consultants, as a matter of fact, combined a "1" response ("strongly disagree") to this item with a "5" response ("strongly agree") to an item stating that they "like to think about my work, even when off the job," and a "1" response (reverse scoring) to "my only interest in my job is to get enough money to do the things that I want to do." This compares to less than 2% of the staff scientists with such an extreme "non-scalar" response pattern. For this reason, the item on frustration at a change in work was included as a separate variable in the original array of 24. It is the fifth item eliminated from the factor for the reasons discussed in the text. The satisfaction item, the last in the original scale, was not combined with the other items because it was considered possible that it, along with the question on career satisfaction and one asking "How satisfied are you with your present job?" might comprise a "satisfaction" factor. No such cluster was found, however. As a matter of fact, the job satisfaction item turned out to be complex and loaded on three other factors besides the "work involvement" one. This result is consistent with findings from personal interviews with some of the respondents in this study. Jacobson (personal communication) reports that they can distinguish between the satisfactions derived from work--the day-to-day activities of one's occupation--and from career--the long-range occupational progression that involves changes in rank and salary, responsibility, and productivity--but that questions about one's job sometimes elicit responses dealing with work conditions of the job and at other times are answered in terms of the job's place in one's career development. This "projective" character of the job satisfaction question was capitalized on in the analysis of this chapter.

scale (from 1--"strongly disagree"--to 5--"strongly agree") was 3.0: 7% strongly agreed with the item, a further 26% responded "4." Thus about one third of the sample agreed with this statement. Somewhat less than this disagreed: 8% responded "1" and 19% answered with a "2." Neither of these first two variables, it should be said, had a loading even as high as .1 on any other factor.

The third variable in the "work involvement" factor stemmed from the question on job values described in Chapter II (Q. 17). It consists of the importance assigned to the fact that a job "leaves sufficient time for family and personal life." On a 5-point scale from 1 ("not at all important") to 5 ("very important"), the mean response was 3.5: 21% responded "5," another 29% gave a rating of "4."

Finally, the last variable included in the definition of work involvement is that of work orientation. It represents an average response to the three middle items of Question 26:

1. I like to think about my work, even when off the job
2. My only interest in my job is to get enough money to do the other things that I want to do (REVERSE SCORING)
3. I wish that I were in a completely different occupation (REVERSE SCORING).

These three items were combined and entered as one variable into the original array because they stemmed from a scale of "commitment-alienation" used in a previous study, and seemed to form a unit in the present sample as well. The mean score on this variable was 4.1 (on a range from 1.0 to 5.0), indicating once again how little the work motivation of this group of respondents centers solely on instrumental concerns. In fact, over 50% of the group strongly disagreed (response

1) with statements 2 and 3. Somewhat less (36%) were in strong agreement with the first item, but here too, as in the other two, around three fourths of the sample came out on the "committed" end (responses 4 and 5 to the first item, 1 and 2 to the second and third).

These four variables were converted into three equally weighted elements that comprise the index of work involvement:

The first element is measured by combining the two variables that stemmed from question 26--work satisfaction and work orientation--into one scale ranging from 1 to 5. In the previous study in which this question was used, all five items were part of one scale. They were entered as three separate variables into the original array only because there was some doubt whether they would scale in the present sample. This doubt was confirmed for the first item, concerning frustration at a hypothetical change in one's work. Since, however, the factor analysis showed that the last item (work satisfaction) loaded on the same factor as the middle three (work orientation), it seemed most reasonable, indeed methodologically advisable since the two parts must share a fair amount of "method" variance, to recombine them.

The second element was measured by the question on career satisfaction already described. Instead of taking, however, the ranking of "career and occupation" as the indicator, the implicit comparison of career and family was made explicit by adjusting the rank given to career according to that attributed to "family

relationships."*

Finally, the last element was measured by reversing the scoring on the degree of importance (on a five-point scale) given to time for family and personal life.

The final measure, then, consists of the average of these three five-point scales,** resulting in the following distribution (with a mean score of 3.02):

Extent of Work Involvement	Average Score on Three Five-Point Scales	Percentage in Each Group	
Very High	4.0-5.0	9%	25% High
High	3.6-3.9	16%	
High Medium	3.1-3.5	25%	52% Medium
Low Medium	2.5-3.0	27%	
Low	2.0-2.4	14%	23% Low
Very Low	1.0-1.9	9%	
		100% (N=1270)	
		(excluding those who did not answer all of the component questions)	

*The following scores were assigned:

Rank of Career	Rank of Family	Score
1 or 2	3 or less (and currently married)	5
1 or 2	3 or less (not currently married)	4
1	2	3
2	1	2
3 or less	1 or 2	1

**The elements as finally measured correlated with each other approximately equally:

	1	2
2	.368	---
3	.361	.330

Table IIIA2 shows the degree of correlation between the total index and its various components. Though the total index correlates more with the family-related items than with the commitment to work items, the fact that it has a higher correlation with the career satisfaction part of the first component than with the family satisfaction part would seem to indicate that career and family play a fairly equal role in the index. The separate items of the last component--commitment to work--yield some interesting information. We may think of the first two items (a and b) as two sides of the intrinsic-instrumental coin: agreement with item a indicates an intrinsic orientation; agreement with item b an instrumental one. In a similar vein, items c and d may be viewed as indicators of dissatisfaction with work (item c) and satisfaction with work (item d). Looked at in this way, the correlations indicate that the index is more closely related to the intrinsic, satisfaction components than to the instrumental, dissatisfaction ones.*

This index, therefore, reflects a combination of feelings and attitudes that hang together in the respondents' views of their careers and lives--a syndrome of reactions to work and to the role that one's work and career play in one's total life.

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*Cf. Wilensky (1964), who shows that the determinants of alienation from work are different from those of involvement with it, and Herzberg's (1966) two-factor theory of job satisfaction.

TABLE IIIA2

Correlations of Work Involvement Index with Components

Component		Correlation
1) Career vs. Family as Major Life Satisfaction		.81
a) rank for career	.74	
b) rank for family	-.62	
2) Importance of Time for Family as Job Characteristic		-.75
3) Commitment to Work		.68
a) think about work when off job	.51	
b) only interest in job is money	-.37	
c) wish were in different occupation	-.39	
d) satisfaction from work	.60	

A. Explication: Extreme Groups

Some of the impressionistic distinctions described in the chapter between the 25 most highly work involved and the 23 with the lowest scores on the index, are caught in the numerical differences shown in Table IIIA3. The table shows that though some of the extremely low work involvement respondents give spontaneous indication of their uncertainty about their professional identity, none of the extremely high work involvement group does so (items 1, 2, 3). This difference is further highlighted by the entirely different distribution of responses to two other items from the questionnaire. The extremely low group is biased in their distribution of responses to the question of whether they have chosen the right career toward the "no" end, while the extremely high group is biased toward the "yes" end (item 4). Further, a high proportion of the extremely low group would not be at all frustrated if they had to change their work (item 5)--indeed, they would probably welcome it. The extremely high group, on the other hand, because of the already mentioned ambiguity in this question, responds at both extremes.

The lack of precision and realism of the extremely low group in their relation to their work is illustrated in the second part of the table. They seem to want everything out of their work (item 6): almost half say that 9 or more of the 22 job characteristics mentioned in the job values question are "very important" to them; in contrast, almost half of the extremely high group give only 1 or 2 such rankings--they seem to be able to say exactly what they want from their work and, presumably, are getting it. Further signs of lack of realistic planning are shown in items 7 and 8 of the table. A number

TABLE IIIA3

Some Differentiating Characteristics Between the Extremely High and the Extremely Low Work Involvement Groups

	Work Involvement Score: Extremely High (≥4.4) (N=25)	Extremely Low (≤1.4) (N=23)
Professional Identity		
1) No Answer to question asking "What do you consider to be your profession?"	0	3
2) Spontaneous mention that they wish they were in another field	0	4
3) Spontaneous mention that professional societies are "useless," "a waste of time"	0	3
4) Rating of certainty of having chosen right career:		
("do not possess at all") (0)*	0	7
("possess to great extent") (4)*	6	0
5) Reaction if had to change kind of work done:		
not at all frustrated (1)*	6	16
very frustrated (5)*	4	0
Precision and Realism of Relation to Work		
6) Mean number of job values considered "very important" (5)*	3.8	8.1
less than 3 (out of 22)	12	
more than 8	0	10
7) Unrealistic discrepancy** between present success and success at the height of career	0	5
8) Mentions desire some day to start own business	2	6

*Numbers in parentheses refer to response categories involved.

**A realistic discrepancy is defined as one that is at most 1 point higher, on a 5-point scale, at height of career than at present.

of the extremely low group are still looking to the future--to become successful, perhaps by starting their own business--but there is no evidence that they are actively working to bring such changes about. Their hopes for the future, perhaps, rest more on dreams than on realistic plans.

B. Construct Validation

The two extreme groups, therefore, seem to be very different in their relation to their work. But, in order to get more precise validating evidence for the index of work involvement in the total sample, we turn to the question on job values, since the key conceptual issue in work involvement is whether work is viewed as merely instrumental, a means of making a living, or whether it is intrinsically satisfying and capable of fulfilling basic motives and values.

A separate factor analysis of the job values question extracted six factors, two of which are relevant to this point. One, the first one extracted, is a measure of the importance to each respondent of extrinsic job characteristics--those not dealing with the work itself but with the external conditions surrounding that work.* A second

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*The six items (see Table IIIA4) included in this scale load higher on this factor than on any other. One other item--importance of time for family--also loaded on this factor. It was excluded from the extrinsic scale because it enters into the definition of the index of work involvement. In the analysis described above, this cluster was represented by the two items, entered as separate variables, that we felt to be most relevant: importance of time for family and importance of job security. The results of that analysis did not place these two items into the same conceptual domain.

TABLE IIIA4

Work Involvement in Relation to Intrinsic and Extrinsic Job Characteristics

	Work Involvement			
	High (N=323)*	Medium (N=653)*	Low (N=294)*	D**
Importance of Intrinsic Characteristics				
(Median = 4.67)				
% Above Median	42%	40%	27%	14.5
% Below Median	36%	34%	50%	
Individual Items:				
(% who feel characteristic is very important)				
Challenging Work	72%	69%	53%	19
Freedom to be Creative and Original	56%	53%	46%	10
Work Giving Personal Sense of Accomplishment	72%	71%	65%	7
Importance of Extrinsic Characteristics				
(Median = 3.17)				
% Above Median	23%	49%	72%	-49.5
% Below Median	69%	41%	19%	

TABLE IIIA4 (Cont'd)

	High	Medium	Low	D**
Individual items:				
(% who feel characteristic is very important)				
Location	16%	17%	30%	-14
Friendly Department	11%	16%	24%	-13
Reasonable Workload	8%	16%	20%	-12
Job Security	6%	8%	17%	-11
Good Fringe Benefits	2%	4%	9%	-7
Good Physical Working Conditions	3%	4%	6%	-3
% who would be very frustrated if they had to change the kind of work they do	14%	12%	3%	11

*These N's are reduced by the number of people not answering a given item.

**For individual items, D represents the difference in the percentages of the High and the Low groups giving a certain response. Thus a D>0 indicates a positive relation between Work Involvement and the item in question, and a D<0 indicates a negative relation. The absolute value of D is a measure of the degree of association involved, constrained, of course, by the total number of people giving the particular response in question. When dealing with medians, this constraint is lifted somewhat and the Ds allow more comparison among items and scales. Since the percentage at the median of a distribution varies from group to group, the D in this case is the average of that for the "above median" and the "below median" categories.

deals with the importance of the intrinsic satisfactions that one can derive from one's work.* Clearly one would expect the first to be negatively related to work involvement and the second positively.

Combining these items into two scales--one on the importance of intrinsic characteristics (3 items); the other on extrinsic ones (6 items)--confirms, of course, the intrinsic predilection of the sample already described: the median of the intrinsic scale is 4.67, that of the extrinsic one is 3.17 (on ranges from 1.00 to 5.00); 38% of the respondents gave a rating of 5 to all three items on the intrinsic scale--only one person answered this way to the six extrinsic items, and only 23% have an average extrinsic score of 4 or more.

But these differences are not the concern here--the concern, rather, is with the direction of the relationship of each of these sets of job values with work involvement. The correlations between the index of work involvement and each of these scales are given below:

correlation of work involvement with:
importance of extrinsic job characteristics: r=-.410
(N=1229;P<.001)
importance of intrinsic job characteristics: r=+.134
(N=1263;P<.001)

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*These three items (see Table IIIA4) were entered as two variables (importance of being creative and original; importance of accomplishment and challenge--2 items) in the analysis described above because we used a more stringent requirement before combining items there (viz. that items should have near equal loadings) and the "creative and original" item, though it loaded uniquely on this factor, did so with a much smaller loading than the other two.

These correlations, though not large,* are obviously in the expected direction. The relationships are clearer when presented as differences in categories of responses as is done in Table IIIA4.

The table shows, for both intrinsic and extrinsic characteristics, the percentage of people in each work involvement group who fall above or below the median of each scale. It also shows the individual items comprising each scale and the percentage in each work involvement group considering that particular item as very important. The responses to these individual items confirm again the conclusions of Chapter II that almost everyone in the sample values the intrinsic characteristics. As a matter of fact, the extent of agreement with the importance of the intrinsic items is so great that the utility of the measure in this sample diminishes. But the differences that do exist, though small, relate to the index in the expected direction. This "validation" of the index is even greater when one looks at the extrinsic scale, which is much more normally distributed on the 1.0-5.0 range. Almost three fourths of those whose work involvement is low are above the median on these extrinsic values, compared to less than a quarter of those with high work involvement.

Clearly, then, the evidence from the question on job values confirms the interpretation of work involvement as a measure of intrinsic work orientation, with relatively little concern about extrinsic characteristics of the working situation.

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*They are reduced, of course, by the homogeneity in response to some of these measures, particularly to the items of the intrinsic scale.

Also included in Table IIIA4 is the one item of the original "commitment-alienation" scale that did not load uniquely high on the "work involvement" factor, viz.:

> If I had to change the kind of work I do, I would be very frustrated and unfulfilled.

As indicated before, we found that respondents in some occupational roles disagreed with this statement even when there were other indications of work involvement because of a different interpretation of the word "work." But even though involvement may be accompanied by disagreement with this item, one would not expect many uninvolved respondents to agree. The last line of Table IIIA4 corroborates this expectation: only 3% of those with low work involvement would be very frustrated if they had to change the kind of work they do,* as opposed to 14% of those whose involvement with their work is high.

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*Data from this small group of people (N=38) who are not involved with their work but who indicate great frustration at the prospect of having to change it, corroborate the multiplicity of meanings of "work" this item seemed to elicit. Fully 66% of this group were concerned about the security of their jobs--as compared to 35% for the total sample and 47% of those with low work involvement who would not be frustrated if they had to change their work--indicating that these people probably interpreted "work" as more to do with steadiness (and hence its contribution to job security) than with the tasks it entails.

2. Derivation of Measures of Orientations to Work

Technical Orientation. Two variables from the survey were used as indicators of technical orientation. The first is the distinction between cosmopolitan and local orientations. The concept of cosmopolitanism was first used by Merton (1949) to distinguish community leaders who are cosmopolitan from those whose orientation is local. Since then, the distinction has been found useful in many other connections. In particular, many researchers have followed the lead of Gouldner (1957a, 1957b) and have used it to differentiate the way professionals employed in industrial organizations react to the often conflicting pulls of professional as opposed to organizational values and standards (e.g. Glaser, 1964; Shepherd, 1961; Pelz and Andrews, 1966). It refers to a person's responsiveness to his professional colleagues or peer group, in contrast to a local orientation, which represents a responsiveness to the local authority of the employing organization.

In the present case, the distinction is based on the following two questions:*

--I am more concerned with how my work looks to my professional colleagues than to my boss.

--If there are conflicts between professional standards and the interests of my employer I tend to resolve them in favor of my employer.

All those who answered both questions in the professional direction ("yes" to the first, "no" to the second) are considered

*Used in Rapoport and Lohman (n.d.) as part of their professionalism scale.

Cosmopolitan; those who answered both in terms of their organization ("no" to the first, "yes" to the second) are considered Local.

The relevance of this distinction to a technical orientation is based on a previous finding (Bailyn, 1977b) that those with a cosmopolitan orientation in E/L careers are considerably more involved with their work and perceive themselves as more successful in it than do their colleagues with a local orientation.

The second variable used to indicate technical orientation is the following item from the questionnaire which was shown, by previous analysis, to differentiate between technically and managerially oriented employees:

> If I had to change the kind of work I do, I would be very frustrated and unfulfilled.
>
> strongly disagree — strongly agree
>
> 1 2 3 4 5

As indicated before, this item was originally included as part of a scale of work orientation, but analysis showed that only technologists responded to it on that basis. A number of managers, in contrast, even if highly work oriented, responded that they did not care if the content of their work was changed.

These two items were combined in the following way to yield a measure of technical orientation:

strength of agreement with change of work statement

	1	2	3	4	5	unascertainable
cosmopolitan	H	H	H	VH	VH	VH
mixed	L	L	M	H	VH	M
local	L	L	L	M	M	L
unascertainable	L	L	M	M	VH	NA

VH--very high technical orientation
H--high technical orientation
M--medium technical orientation
L--low technical orientation

NA--unascertainable

Only 18 out of the total 1,351 respondents fell into the unascertainable category. The rest distribute on this orientation as follows:

Technical Orientation

High	36%
(14% very high)	
Medium	19%
Low	45%
	100% (N=1333)

More people in the youngest class have a technical orientation than in the older ones:

1951	30% (N=525)	
1955	34% (N=365)	% with HIGH technical orientation
1959	44% (N=443)	

People Orientation. This orientation was "measured" by responses to the following item:

> Please circle the appropriate number to show how important you feel each characteristic is to you with regard to your present and future jobs.
>
> Opportunity to work with people rather than with things
>
> not at all important — very important
>
> 1 2 3 4 5

Those who answered with a "4" or "5" were considered high on this orientation (with "5" representing the very high position); those who answered "1" or "2" were considered low in their orientation to people. 21 respondents did not answer the item at all, and the rest distribute in the following way:

People Orientation		
High	38%	
(12% very high)		
Medium	32%	
Low	30%	
	100%	(N=1330)

In contrast to technical orientation, there is very little difference between the classes in people orientation:

1951	39% (N=524)	
1955	39% (N=365)	% with HIGH people orientation
1959	34% (N=441)	

Non-Work Orientation. This orientation was measured by the index of work involvement described in the first part of this appendix. All those with a score ≤2.7 on the work involvement index were considered as non-work oriented (as high on this orientation); those with scores ≤2.1 were considered as very high. Those with scores ≥3.6 were considered as low on this orientation, that is, they were considered as work oriented. (The cutting points on non-work orientation were shifted so as to make the percentage in this category similar to that in the high categories of the other two orientations.)

Altogether there were 81 people who did not answer one or more of the items that comprise this index. The rest distribute as follows:

Non-Work Orientation

Non-Work Oriented (high on this orientation) (13% very non-work oriented, very high)	34%	
Medium	41%	
Work Oriented (low)	25%	
	100%	(N=1270)

Again, and perhaps contrary to what one might expect, there is very little difference among the classes in this orientation:

1951	33%	(N=504)
1955	37%	(N=345) % NOT work oriented
1959	31%	(N=421)

As mentioned in the chapter, the final orientations were arrived at by eliminating people who were not high on any of these orientations, or who were equally high on more than one. Thus a person who is extremely high in people orientation is classified as people oriented only if he is not also extremely high on either of the other two orientations. Similarly, a person who is high, though not extremely high, on the measure of technical orientation, is classified as technically oriented only if he does not fall into the high category on either of the other measures.

Chapter IV

The Alumnae: M.I.T.'s Women Graduates

During the 1950's, when the alumni whose careers have been discussed in the last two chapters were undergraduates, less than 1% of each graduating class was female. The Institute put no official constraints on the admission of women, but there were no inducements either: there were no women's dormitories, for example. The numbers were small primarily because few asked to come.[1] Not only would a woman have to have shown exceptional ability in mathematics and science to be considered eligible for M.I.T., but she had to be comfortable in a very male environment. Many women scientists, in contrast, found that the atmosphere of a woman's college was more conducive to their intellectual development in a "masculine" field.[2] And many others felt more at ease in situations where they were not so heavily outnumbered (cf. Laws, 1975; Kanter, 1977). Further, M.I.T. at that time was much more single-minded than it now is, requiring, therefore, a stronger commitment to a specific set of fields at a relatively early age.

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[1] There were 125 female applicants for the class of 1959, compared to 3,655 applications from males. Of the 114 decisions made on women, 32 (28%) were admitted, of whom 21 registered (a yield of 66%). More of the male actions were favorable (48%: 1,654 out of 3,452) but the yield was somewhat less: 900 (or 54%) registered. A striking difference, however, is obvious when the graduation figures are considered: only about one third as many women graduated as had registered as freshmen, in contrast to a ratio of graduates to matriculants among the men of approximately 7:8.

[2] David Riesman (1970, p.53), commenting on a 1968 Smith survey on attitudes toward coeducation, reports that "girls majoring in the sciences or mathematics were most apt to have come to Smith originally because it was not co-ed, and were most apt to prefer that Smith not go co-ed now."

And yet, for the women students who came there were obvious attractions. Even the woman who ten years after graduation saw herself in the category of "people who should never have gone to M.I.T. in the first place, but who, after ten years, have finally 'found' themselves in another field" and who strongly recommends pre-entry counseling and testing of women applicants "to preclude the re-occurrence of situations like my own" admits that "the notion of being a woman student at M.I.T. is a highly seductive one--it's quite possible that no amount of counseling could have kept me away." And another alumna, who remembers her childhood as "full of bitter experiences of being denied odd jobs because I was a 'little girl,'" feels that "M.I.T. probably saved me. I might have been the first female assassin because I was very angry."

But whatever their motivation in coming to M.I.T., it is clear that these pioneering alumnae were a group of exceptionally able women, and were well educated for careers in their chosen fields. They graduated, however, into a world of the "feminine mystique"--a world in which behavior was based more on traditional sex-linked expectations than on individual capabilities and inclinations. It is of particular interest, therefore, to see what happened to them as they faced the issue of making a viable life for themselves. And though their task was different from that faced by women today, some of their experiences may well be instructive for these younger women (and men), who are also faced with issues of choice and accommodation in their lives, albeit somewhat different ones.

Career Paths

Fifteen of the twenty-two women graduates in the classes of 1951, 1955, and 1959 responded to the questionnaire. Of these, five were graduates of

the School of Science (somewhat more, proportionately, than was true of the men) and seven from the School of Engineering (a proportion somewhat less than the male alumni). Two had degrees in Architecture and Planning and one in Humanities and Social Science. There are two doctorates in the group and five masters degrees.

During the first two years after getting their BSs, thirteen of these fifteen respondents had what might be considered standard post-M.I.T. work experiences: two were full-time in graduate shcool throughout the two years; seven were employed by private profit-making companies (six as engineers, one as a scientist); two were in non-profit research institutes doing research or working as an engineer; two were with private firms as architects (one as a draftsman).[3]

The first post-BS experiences of these alumnae, then, are very similar to those of all M.I.T. alumni. But when we look ahead a few years, the various patterns of women's careers begin to emerge. Five years after graduation, only six of these fifteen alumnae are pursuing careers commensurate with the education they received. Four were not working at all and five were working, but had restricted their work in various ways in order to make for an easier accommodation to their family roles.

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[3] Of the other two, both of whom were married and had a child during this early period, one had a job as a technical editor in a private research organization but ten years later was fully immersed in a new field and the other was working part-time during this period but within a few years went back to get a graduate degree and then took a full time job teaching at a university. It is perhaps significant that these two, who started their careers in more peripheral ways, both eventually attained full careers. Perhaps not doing what M.I.T. alumni are expected to do after graduation leads to a certain amount of tension which might eventually result in fuller careers than the standard first job does.

These career styles, further, did not change very much after this five-year point. At the time of the survey, some eleven to nineteen years after graduation, only one more alumna had joined the ranks of those with full participation in a career: the one, already mentioned, who found her field a decade after graduation, and ended ten years of accommodative jobs by entering a social science Ph.D. program, full-time, and, incidentally, getting married for the second time.

Only two other changes in the level of career participation of the alumnae occurred after this five-year mark. One woman, who did not work for ten years while raising three children, subsequently reentered school to get a degree in teaching and at the time of the survey was teaching high school mathematics, thereby changing her category from "no work" to that of an "accommodative job." A reverse shift was made by the alumna who worked until her first child was born (eight years after graduation, and six years after her marriage) and then stopped working altogether.

Thus, at the time of the survey, seven of the fifteen women respondents were participating fully in careers typical of M.I.T. graduates as a whole (including the one woman referred to above who was in a full time doctoral program and one who, though currently unemployed because her family had recently moved to a different part of the country, was actively seeking employment). Four of the respondents had no careers at all, though only one of these (an army wife who had spent a great deal of time overseas) was truly satisfied with this state of affairs; the other three showed some longing for more participation in the future and two of them expected in fact to have it when their children are grown. The other four respondents pursued what we have called an accommodative career. Various strategies are available for such accommodative ways of coping: some work only part

time but in their central fields, others restrict the scope of their possibilities (as the "architectural designer" who never got her certification as a registered architect) or work in a "lesser" job than one for which they were trained (as a "crystallographer" who now works as a physics research editor whose task is to "verify facts in physical sciences").

Table 4.1 summarizes this information and shows the relation of career style to family status. It is obvious from this table that the degree of career participation of these women is directly related to their family status. All of the single women and the married ones with no more than one child participate fully in careers; none of those with three of more children do. Those with two children--the modal pattern in the sample and, perhaps, in the "ideal" society--are represented in each category, though skewed away from the end of full participation. In a previous era marriage itself was the major barrier to a woman's full participation in a career, but this is obviously not the case for this group. Rather, children are now the barrier. But it is more their number than their presence that is crucial: the dividing line seems to be between having an only child or having more. One child can evidentally be assimilated relatively easily into a woman's full career participation, two are more difficult, and three or more are almost impossible.

The timing of children, however, seems to be unrelated to future career style. Though all those alumnae who were going to get married were married within two and a half years of getting their BSs, not all had children right away. But delay in having children is not associated with greater career participation: two of the respondents with full career participation had a child within a year of marriage; the respondent whose

TABLE 4.1

Alumnae Career Style and Family Status

Family Status	Career Style: Full	Accommodative	None	Total
single	3			3
married, no children	1			1
married, 1 child	2			2
married, 2 children	1	2	2	5
married, 3 children		2	2	4
TOTAL	7	4	4	15

children were most delayed (thirteen years) had only accommodative jobs even during her childless years; and of the two respondents who waited five years before having their first child, one ended up with full career participation and the other with none.

Besides family status, these career styles are also related to these women's earliest educational and work experiences. In a way the differences were already nascent in college. All of those whose grade point averages were 4.0 or more (on a scale to 5) ended up with full career participation; not one of those who ended up without any participation in work had a GPA over 3.5. Graduate work is also related to eventual career style: none of those currently not employed attained a higher degree (though they may have taken some graduate courses); both of those with work on the doctorate level became full participants in a career. And though the initial post-BS experiences were not too different from those of the men, the fate of these alumnae's first jobs already contain the seeds of their eventual career styles.

All of the women who stayed on their first jobs for more than five years ended up with fully participative careers. Only one single and one married woman with full career participation left their first jobs earlier (whereas none of those in the other groups stayed more than two and a half years in their first jobs). Both of these left primarily because the job "did not have challenging work to do--work from which I can get a personal sense of accomplishment" and secondarily, in the case of the single alumna, because she "did not have enough freedom to adopt my own approach to the job--to be creative and original" and, in the case of the other, because she "did not have an opportunity for advancement." The two alumnae who ended up with no work participation but who were not married during the

first year after their BS form an interesting contrast: one also left her first job because it did not give her enough challenging work to do (and secondarily because it did not allow her "to make a real contribution to society")--but she left it after just a little over a year for a clearly more accommodative one (she went from being an engineer in a private company to being an administrative assistant to the chairman of an engineering department in a university), a job she in turn left a year later to get married; the other left her job as an engineer in a private company because she did not like its location, moved to another engineering job for two years during which time she got married. The other two alumnae who ended up with no work participation were already married when they started this initial work period and both left their jobs when they got pregnant. All of those who ended up adopting an accommodating strategy left their first jobs to follow their husbands to another location. It is an important question, unanswerable with these data, whether accommodation is a direct response to such an early dislocation.

In other words, the career paths of these able women, though initially established by their talents and interests, were soon modified by their work and family experiences. In fact, the eventual career style of the alumnae is seemingly strongly embedded in the experiences of the first few years after graduation. It must be remembered, however, that these women confronted expectations and opportunitites upon graduation very different from those that today's women graduates face. The implications of this finding, therefore, are not obvious. It is a point to which we will return in the concluding section of this chapter.

Mid-Life Career Patterns

In order to understand the careers of these alumnae, and their reactions to work at mid-life, it is necessary to look separately at those with full careers (both married and single), with accommodative jobs, and with no work at all.

Full Careers. Table 4.2 shows, for all employed alumnae, their career patterns and reactions to work equivalent to what was presented in the last two chapters for the men. It is clear that the occupational categories of the fully participative alumnae are not too different from those of the men, though in every case except architecture, the incomes of these women are well below the average for their occupational/class group.

A comparison of the fully participating women who are married to the single alumnae yields some interesting differences. The single women, who presumably share with the male alumni the necessity to work and to have a career even if their motivation is not very high, seem less work oriented than the married ones, whose career style is more nearly a matter of choice. Further, the married women are both more technically and more people oriented. And though the level of currently perceived success is about the same, the single alumnae feel they have reached their peak: none expects her success at work to go higher. The married women, in contrast, all expect to be more successful at the height of their careers than they now are. They seem still to be in an up cycle of their careers, and do not yet feel plateaued. And this is true even though the first three married women in the table exactly match in class (and therefore in age) the single alumnae. Both groups, further, are fairly professional: all belong to a professional society; all but one (architecture) have published. But only two have read a paper at a professional meeting, and both of these are married.

TABLE 4.2

Career Patterns and Reactions to Work of Employed Alumnae

		occupational category	career type	normalized income	work involvement	technical orientation	people orientation	job satisfaction*	perceived success** now/height
Full Involvement									
Single:	FS-1	eng. staff	E/L	-1.0	medium	LOW	LOW	2 (low)	3/3 (Low)
	FS-2	eng. staff	E/L	-1.0	HIGH	LOW	LOW	4	4/4
	FS-3	architect	---	+1.7	medium	HIGH	LOW	4	4/4
Married	FM-1	fctl. mgr.	E/H	-1.2	medium	very HIGH	very HIGH	4	4/5 (High)
	FM-2	eng. faculty	SP/H	- .8	HIGH	very HIGH	very HIGH	5 (High)	4/5 (High)
	FM-3	sci. faculty	SP/H	- .5	NA***	NA	medium	NA	3/5 (Low)
	FM-4	soc. scientist	---	NA	medium	very HIGH	HIGH	NA	2/4 (Low)
Accommodative Careers									
	A-1	research editor			medium	very HIGH	medium	4	4/4
	A-2	part time architectural designer			medium	NA	NA	5 (High)	3/3 (Low)
	A-3	high school teacher			medium	HIGH	HIGH	4	3/4 (Low)
	A-4	part time lecturer			medium	HIGH	very HIGH	5 (High)	4/5 (High)

* job satisfaction: 1-low; 5-high

** perceived success: 1-low; 5-high

*** NA: no answer

This small group of married women, therefore, (and it must be remembered that only one has two children, the others have one or none) seems to have been able to reach, at mid-life, a satisfactory integration of work and family. None moved into her present position in a linear fashion: all had "slow" periods in their careers (cf. Bailyn, 1979), and all have modified their initial career lines at least to some extent. Though they may have paid the price for these "deviations" by their lower than average salaries, their single counterparts, whose careers have been more "orderly" (Wilensky, 1961), have not done much better in this respect and arrive at mid-life less optimistic about the future of their careers.

Accommodative Careers. An accommodative career may happen by choice (primary accommodation) or be forced on one by circumstances (secondary accommodation) (cf. Bailyn, 1978). Two of the four women in this group seem to be there because they wanted to manage their lives in this way; the other two seem to have been forced into this career style by circumstance, against their hopes and expectations. The former two are the more satisfied. Both have published, though neither now belongs to a professional society. The latter two, in contrast, both belong to a professional society, though only one has published. These accommodative alumnae (all of whom have either two or three children) share with their married classmates with full careers a technical and people orientation. And though they are not as optimistic about their future careers as this group, they are more so than are the single alumnae. But their job values are different from both fully participating groups--they are more indicative of their basic accommodating strategy: "reasonable workload," "job which leaves sufficient time for family and personal life," and "location" are all uniquely important to them.

In many ways the careers of these alumnae are not comparable to those of the men in this study. But this may change. Today it is not unheard of for men, particularly those in dual career families, to want their careers to be accommodative to family needs. The somewhat greater job satisifaction and careers optimism of these alumnae as compared to the single women whose careers followed more traditional "masculine" lines, is, therefore, of some interest.

No Careers. Finally, the group without any work is pretty much as expected. Their families are their primary sources of satisfaction in life, they display no work or career orientations, and have no professional connections. Their only two positive job values are "feeling of accomplishment" and "time for personal life and family." When asked to think back to their undergraduate education, these alumnae mainly complain about the lack of practical education they had at M.I.T.: an "electrical engineer" with three children, not working currently and a not very satisfactory job record after her graduation complains that M.I.T. was "too theoretical . . . no knowledge of how to begin to solve a problem or design a circuit"; a math major with a checkered work and graduate career and now not working complains of the "lack of balance between theoretical and applied math. The math student who could not immediately attend graduate school was not properly prepared to work in industry." But none of these women feels that her education was wasted: "I think my education was worth the time and expense and have not regretted it for a minute. It is 'insurance' against any time I may have to work again, it has aided me in raising the children, . . . because of my scientific education I have been able to communicate more fully with my husband who . . . specializes in research [and] computer work . . ."

Conclusion: Future Trends?

It is obviously difficult to say anything definitive on the basis of fifteen cases, particularly when they fall into four different categories. But these women are pioneers. And though they established their life styles in a world less malleable than the one we know today, their experiences are, at least, suggestive.

First, the constraint of children. Our findings suggest that full careers along traditional lines are only a realistic option for those with no children, or at most one. It is a real question whether today's availability of child care facilities and the greater tendency for fathers to participate in child care will ease this constraint on women's careers or will rather make it more difficult for men with two or more children to traverse traditional career paths to the top.

Our data also show that length of time in the first job is an important element. The importance of the early career years has often been emphasized for traditional career paths, and those women in our sample who had to leave their first jobs in order to relocate with their husbands were unable, subsequently, to establish full careers. But rather than accepting this as a "fact" of organizational life, and trying to fit people into these traditional career lines, it may be well to consider also alternate ways to evolve successful organizational careers. In this respect, the differences between the fully participating married women and the single alumnae are particularly instructive. Organizations value, of course, involved and optimistic older employees. If they realize that the probability of such occurrence is greater after less linear or orderly careers than they seem to insist on at the beginning, the association

between career success and early career events may lessen.

Finally, the accommodative career. We have already indicated that accommodation, though sometimes a response to adverse career experiences, may also be chosen in order to pursue a particular life style. That this may be true as well for a small minority of the men in this sample has been shown elsewhere (Bailyn, 1977a). Part time work or other modes of career restriction may also make sense in an economy whose growth is slowing down. It is a career style, therefore, that may be becoming more prevalent for both men and women, particularly when two such careers can provide a family the same standard of living that one full career can.

Combined with the increasing number of dual career families that we see today, these findings imply that both men and women need more choice in career paths, more options in their work lives. Organizations, therefore, that further the belief that the orderly, linear career is the only way to succeed (whether by formal policies or by the assumptions underlying personnel procedures), may not be optimizing the effectiveness of their work force.

Chapter V

Implications and Conclusion

"At this point in my life I would gladly trade some of my professional success for more success in the rest of my activities."

systems analyst, 37 years old

This statement by a respondent is not atypical. It must be noted, however, that such comments are not randomly distributed throughout the sample, but are particularly characteristic of one type of career. Thus it is not merely chronological age, some arrival at mid-life, that produces concern about the value of one's career. Rather, it is more the particular pattern of work experiences, the way in which technical jobs in organizations are structured, that makes certain careers unsatisfactory for long periods of time. That the structuring of technical work has an impact on career outcomes and on people's feelings about the role of work in their total life is one of the main findings of this study. It is a result, moreover, that carries with it some optimism. For while one cannot stop the process of aging, one can reexamine the organizational assumptions and procedures that define career paths, and thus at least begin the process by which counter-productive policies might be changed.

Summary of Findings

Before turning to these organizational implications however, let us review the results briefly. The emphasis here is on the findings from the male alumni, the bulk of the sample. Data from the women graduates, as indicated in Chapter IV, serve as a useful counterweight

to this picture, as a clue to alternative ways of approaching technical careers, and will be referred to in the conclusion.

The analysis started with the classification of alumni's current jobs. These occupational categories clearly reflect the technical background of the sample: the jobs of over 50% are still centered on a technical core some ten to twenty years after graduation. But within this set of occupations there is considerable variety--consulting, bench level engineering, technical management, university teaching. Such technial careers can be played out in many ways and in many settings: they can involve bachelors, masters, or doctoral degrees; they can be combined with management and yet retain their technical core; and they can be primarily scientifically based or based in a more applied engineering discipline. Further, as has been seen, these technical backgrounds also lead to managerial and business careers, and, indeed, are the source of some of the highest level entrepreneurial and general management jobs in our society. In fact, of the 50 general managers in the sample, twelve were already presidents or executive vice presidents of corporations with at least 2,500 employees, and two of these (both in their early forties) had top line responsibility in corporations of 10,000 employees or more.

From this occupational classification we then moved backward in time and found that on the basis of undergraduate major, academic performance, level of degree attained, and first job, two major career patterns emerged: an engineering pattern which follows fairly directly from an undergraduate degree in engineering and leads to many kinds of occupations, some of which involve abandoning the technical core altogether; and a scientific pattern, characteristically involving a

doctorate, and pursued in technical work, technical management, or academic activities. It seems to be the level of professionalism represented by the doctorate that most clearly distinguishes the two patterns. Thus, engineering graduates whose good academic records as undergraduates propelled them to continue their education to the doctoral level, tended to become academics, and, as engineering professors, share more of the characteristics of the scientific/professional than of the engineering career pattern.

These two patterns, further, were shown to be associated with distinct sets of career values. The "organizational value syndrome" identified in the engineering pattern fits the requirements of organizations: it centers on the importance of contributing to one's organization, and on the desire for high earnings, advancement, and leadership. In contrast, the "professional value syndrome" characteristic of the scientific/professional career pattern centers on accomplishment and challenge, on the opportunity to improve one's knowledge and skills and to use them creatively.

This patterning is significant because it indicates that technical occupations are neither as homogeneous as some have suspected (scientists and engineers, for example, even in the same industrial context, are different in important ways and probably need to be managed differently) nor are they as individually distinct as others might assume.

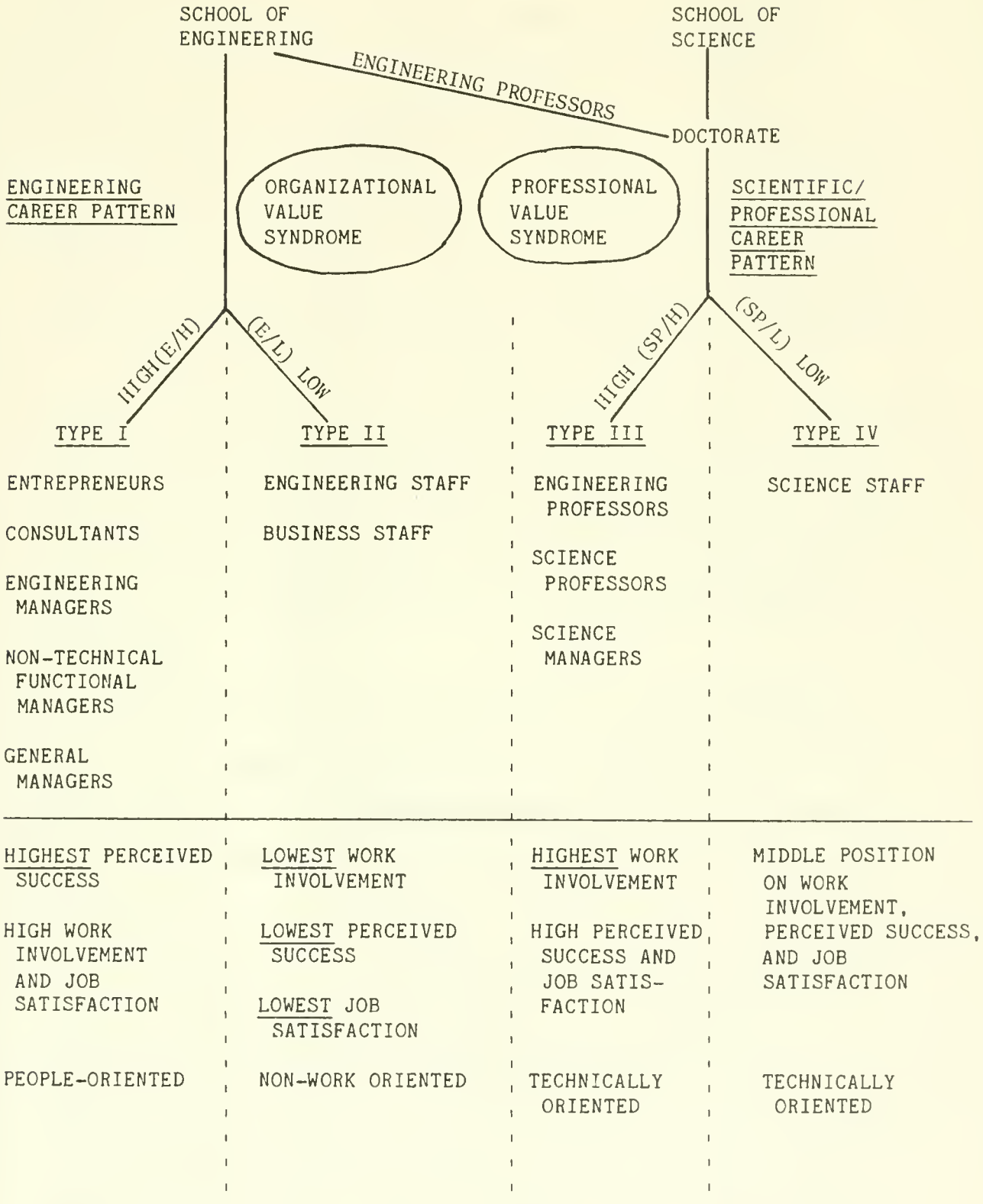
The next step in the analysis, which dealt with the reactions of the sample to their work, revealed systematic differences among the occupational categories within each career pattern. Differentiation of the occupations associated with high work involvement from those where

involvement is typically low, led to a further, independent distinction: a classification of the occupational roles according to whether the organizational positions associated with them are more likely to be high or low. That this distinction is meaningful was shown by the fact that occupants in roles classified as "low" had considerably lower success aspirations than did those in roles classified as "high." Since there was no difference between the two career patterns in such success aspirations, and no systematic difference in value syndromes between high and low organizational positions, there now were two independent ways of classifying occupational roles which could be put together to form four career types. The analysis of these career types has shown that each presents a different profile. The key elements of these profiles are summarized in Chart I, which shows the occupational roles classified in each career type and indicates the modal reactions to work associated with each.

The most problematic career type is Type II (E/L): here one finds the lowest work involvement, the lowest perceived success, and the lowest job satisfaction. The two high level types (Types I and III), in contrast, are more positive in all of these reactions. But, in line with the value syndromes associated with their career patterns, the Engineering/High group (Type I) is highest in perceived success, whereas the SP/H group (Type III) is highest in work involvement. Further, the scientific/professional groups are primarily technically oriented, whereas the engineering groups are not. Engineering orientations depend on organizational position: if it is high the primary orientation is toward people; but if the organizational position is low (Type II) the modal orientation is not directed to work

CHART I

Technically Based Careers:
A Classification of Occupational Roles



at all. By gearing an education to the production of "engineers" one implies the possibility at least of a successful life-time occupation. This research raises the question of whether such a life-long occupation either does not really exist, or is viable only if one withdraws one's life investment from one's work.

These results, as should be clear from the main chapters of this book, emerged from a series of increasingly refined analytic categorizations of the data. One final step--the step that makes the clearest link to organizational implications--must still be summarized.

It was clear that not all occupants in a given career type reacted in the modal way and one asked oneself the question of what one could learn from the "deviants"--from those whose orientation was not typical of their career type. What was learned is summarized in Chart II. The details of the analysis (which appear at the end of Chapter III) will not be repeated here, but a few conclusions are worth highlighting.

In the scientific/professional occupations, the congruence of organizational rewards, orientation, and job satisfaction is generally high. Most people are technically oriented, and this orientation was found to be rewarded by the employing organization and satisfactory to the employee.

In contrast, in the engineering based occupations some lack of congruence emerged, and such divergences tell us something about the strains in these occupations. For example, in the high level engineering based occupations it is the technically oriented alumni who are most satisfied with their careers, in spite of the fact that an orientation toward people is more consistent with the requirements of these jobs, and is the modal orientation. In the lower level

CHART II
Rewards and Satisfactions Associated with Modal and "Deviant" Orientations

Organizational Position	Career Pattern: Engineering Based	Career Pattern: Scientific/Professionaly Based
	Type I (E/H) modal orientation: P	Type III (SP/H) modal orientation: T
High	P & T most rewarded T most satisfactory	P & T most rewarded all equally satisfactory
	Type II (E/L) modal orientation: NW	Type IV (SP/H) modal orientation: T
Low	T most rewarded P least rewarded T most satisfactory but only if below average rewards	T rewarded and satisfactory [only 5 ≠ T]

LEGEND:

P: people oriented
T: technically oriented
NW: non-work oriented

engineering based occupations, job and career satisfaction are generally low, as already indicated, but the few people who do show higher satisfaction are not the ones one might expect. It is the technically oriented people with below average relative incomes who have the highest percentage of satisfaction, suggesting that these jobs are not meeting the needs of the most competent technically oriented alumni.

It is these results that allow one to extend the implications of these findings to organizational policies. Actual performance data would be necessary to anchor the suggestions firmly. In future work we hope to have such data. For now, however, let us switch from summarizing findings to suggesting implications for organizational incentives and rewards systems and merely assume that differences in performance exist.

Organizational Implications

This section extrapolates from the data and considers their implications for the management of technical personnel. In doing so, the emphasis is not primarily on the alumni who are consultants, independent professionals, or professors, but focuses instead on that larger group in staff and management positions who are employed in organizations of various sizes and subject to their managerial policies. It examines the way in which organizations could think more clearly about the various kinds of people who are playing out their careers in them with the goal of providing the possibility of career satisfaction for all kinds and thus increasing the effectiveness of the technical, professional, and managerial work force.

The starting point is the finding that people have different orientations toward their work at mid-life, even those whose technical education represents a fairly homogeneous base. Despite this homogeneity, however, the data clearly show that at mid-career some alumni are more technically oriented, some more people oriented, and some are oriented away from work altogether and are more concerned with community, family, and other non-career kinds of activities. Organizations must be aware of these differences. But it is important not to equate these different orientations with differences in overall ability and potential. The data on relative income, admittedly a crude measure of performance, support the contention that there exist high potential and what one might call "ordinary" employees in each of these orientations, and the optimal organizational response to each will depend on this evaluation of potential. A technically oriented employee who is evaluated as high potential presents a different challenge to his or her employing organization than one who is "ordinary." In the management of technical personnel in organizations, therefore, both individual orientations and evaluation of potential must be taken into account. Each combination can contribute to an organization in different ways, and each requires different organizational responses.

Chart III presents the matrix resulting from the combination of each of the three orientations with two levels of ability or potential. It indicates, in shorthand form, some of the organizational roles particularly suitable for each combination. The discussion of the issues faced in each cell draws on general knowledge of organizations as well as on the results of this research. The organizational

CHART III
Mid-Career Organizational Roles

ORIENTATION AT MID-CAREER	ORGANIZATIONAL EVALUATION OF POTENTIAL: HIGH	ORGANIZATIONAL EVALUATION OF POTENTIAL: LOW ("ordinary")
TECHNICAL	Cell 1 independent contributor policy specialist "idea innovator" "internal entrepreneur"	Cell 2 technical support expert on "formatted" tasks "master"
PEOPLE	Cell 3 top management sponsor development as policy "successful" manager	Cell 4 mentor individual development functions "coach" "effective" manager
NON-WORK	Cell 5 specialist internal consultant "variance sensor" "scanner"	Cell 6

implications discussed are informed by the data but are not proven by them. It is to future research based on actual changes in organizational procedures that one must look to find the full validation of these conclusions.

Cell 1. In cell 1 are the technically oriented alumni who are viewed as high potential by their employing organizations. This group includes technical project managers, independent contributors of various kinds, and others whose technical orientation makes them desirous of retaining a technical core to their careers. In it one would find the "idea innovators" and "internal entrepreneurs" identified by Thompson and Dalton (1976). It is this group for which the "dual ladder" was originally invented, though the application of the concept has usually been limited to a very small group of R&D specialists, or wrongly applied to certain cell 4 employees--to managers who are no longer seen as making valuable contributions to the organization.

A critical problem for the management of employees in this cell is to find a way for them to participate in the decision making of the company, particularly on technical matters which concern them most. The data have indicated that a number of people in this cell move into management because they see this as the only way to contribute to the policy decisions that affect them. Such a move is probably not an optimal solution however, at least not in the long run. Some temporary assignments of cell 1 people to cell 3, however, might be of use. Such a strategy would ensure the high-potential technically-oriented employees a central role in the organization--it would also periodically test their orientation and help them and the organization

see if it continues to be technical. It is a valuable strategy al because it provides organizational flexibility: it allows the organization easily to set up temporary project management structures, which are effective for the solution of certain complex technical problems or the implementation of major technological innovations.

In general, if this group is to be provided with viable life-long careers, and if their technical orientation remains stable, organizations will have to develop reward systems that are congruent with this orientation. One might imagine, for example, more emphasis being placed on recognition for technical accomplishments, more sharing of patent rights, more encouragement of attendance at professional meetings, more use of sabbaticals and company supported educational efforts, and other rewards that would be specifically meaningful to more technically oriented people. The most important incentive for this group is probably the continuation of challenging assignments, interesting projects to work on, professional growth, and the appropriate recognition of work well done.

A particularly dramatic, and one hopes infrequent, example of mismanagement in this cell is reported by a 40 year old chemical engineer:

> I have had to write papers and sections of books which appeared under the authorship of my supervisor three levels up, on matters he can hardly understand, much less contribute to except by proof reading for grammatical errors ... The four key people whose work he became a world-recognized success by are disposed of as follows:
>
> (1) Dead, heart attack, age 53, Ph.D. Chemical Engineering
> (2) Dead, heart attack, age 42, M.S. Chemistry
> (3) Dismissed from his job, age 49, Ph.D. Chemistry
> (4) Mental breakdown, 2 months in psychiatric hospital, age 36, Ph.D. Chemical Engineering, currently seeking other employment.

Cell 2. Cell 2 consists of those technically oriented alumni who are perceived as average by their organizations, as lacking in unusual potential. It is a group that includes the steady solid contributors to the organization, the ones who do the bulk of the day-to-day technical work. It is here that one finds the mid-life technologists who are still technically challenged by their work, even though they are probably not able to function well either as managers or as high level technical contributors. How to keep such individuals from losing the work motivation they have poses a real challenge to managers, and the key to this challenge would appear to be how to organize work so that it remains technically interesting and involving. Giving people in this group more people oriented assignments is probably not a viable solution since they are not basically people oriented, and thus may not be successful as team leaders. But they may respond very well to interesting, varied technical challenges.

The implementation of such a policy, however, runs against some accepted organizational procedures. Because many of the people in this cell may be technically less up to date than recent graduates from technical institutions, and because younger employees are less expensive, organizations tend to be biased toward assigning the new and interesting projects to the recent graduate rather than to the more experienced but less formally up-to-date employee. Though such a strategy may make short-run financial sense, it may create serious long-run problems in the management of the technical work force.

First, it is likely to reduce the work orientation of mid-career cell 2 employees and effectively move them from cell 2 into cell 6. One possible way to counteract this might be to pair employees in this cell

with those in cell 1 as a way of integrating technical skills with policy issues in attacking problems. Cell 2 people at mid-life would probably play this role better than their young counterparts who are still too involved in learning how the organization works and figuring out how to get into cell 1 or cell 3 themselves.

Second, evidence from studies of newly hired technical employees shows that their school-based knowledge is not sufficient for effective performance in a business organization (Jacobson, 1977). They must learn to integrate this knowledge with the needs and circumstances of the particular organization in which they are employed. It is the experienced cell 2 employee who could provide help here, and thus an apprenticeship-master pairing of young and "old" in this cell might well serve the needs of both.

Finally, obsolescence itself can be prevented by proper concern for work assignments. There is increasing evidence that necessary technical up-dating will be achieved by mid-career technologists if they have been given a challenging assignment that requires new knowledge or skills (Dalton and Thompson, 1971). The new assignment serves as the incentive to the individual to reduce his or her own obsolescence.

It seems, therefore, that by ignoring the needs and experience of mid-career employees in this cell, organizations are underutilizing them and may be creating a group of disaffected employees where none need exist.

Cell 3. Cell 3 consists of the people oriented alumni who are seen as high potential by the organization, and includes a large segment of managers, especially general managers, and those who play a key role as project leaders, sponsors, task force chairmen, and other

organizational roles that require both a liking for and competence in managing interpersonal and group relations. It is in this group that one is likely to find the future top executives of the company.

The incentives of high income and promotion which are typically available in organizations seem to fit well the career needs of employees in cell 3. In fact, human resource planning, reward systems, and performance appraisals are typically designed by higher level people with this group of employees in mind. There is a danger, therefore, that all middle employees in an organization will be perceived in terms of the requirements of cell 3. If one fits one will be an organizational success; if one does not fit one is perceived as lacking in ambition or as being too rigid in one's orientation. Senior managers often tend to see the employees in the other cells as not worthy of receiving much attention. The argument here, in contrast, is that employees in all of the cells contribute importantly to organizational success and must, therefore, be provided with meaningful organizational incentives and rewards.

Cell 4. In this cell are the people oriented employees who are not seen as having the potential to rise in the organization. These are employees who either never were technical or have become more people oriented in mid-career, but who do not possess the specific talents necessary to progress into top managerial jobs. It is this group that is most likely to be described as "plateaued" or "dead wood," victims, perhaps, of the Peter Principle. They are perceived as contributing neither to technical nor to managerial tasks. What should be seriously explored for this group of people are assignments that draw on their technical background and experience but which have an interpersonal

component to them.

There is some evidence, for instance, that technical careers are enhanced be mentors (Thompson and Dalton, 1976) and that being a mentor is a satisfying mid-life stance (Levinson et al., 1978). Such a relationship requires, on the part of the mentor, much greater personal involvement than is usually the case when a top executive sponsors the person seen as most likely to succeed to that top job. Mid-life employees in cell 4 would seem to be uniquely qualified to play these roles, particularly for those employees--the majority in a company--who are not moving to the top. Thus cell 4 employees could be the "effective" rather than the "successful" managers (Graves, 1978), who are critically important for the development of organizations. Further, as Rhoades et al. (1978) have recently noted, the innovation process in organizations involves a multiplicity of technical and interpersonal roles, and cell 4 people might be particularly suited to the interpersonal function (what they call "coach") of project management.

Recognition that all people in organizations need to be developed--not only those headed for the top--will create more roles suitable for cell 4. And when such employees are performing functions that are congruent with their orientations and recognized as important by their organizations, the sense of "failure" that today often accompanies positions in this cell is likely to disappear.

Cell 5. Cell 5 is the organization's major lost resource. It consists of high potential people who have lost their work orientation or who never had very high work motivation in the first place. Within this group there are both technical and people oriented individuals capable of major managerial or technical contributions, but who, for one

reason or another, are more involved with activities outside the organization such as their families, their hobbies, or their community.

Almost by definition, these are the employees who are least likely to follow the "rules of the game." The rewards and incentives associated with traditional organizational career paths are not likely to be effective here, since these tend to be rigid and unresponsive to "deviant" needs. Thus employing organizations who do not want to lose the contribution of these capable people, must be willing to be flexible on work demands and to negotiate special roles for them. One person in this cell, for example, might want to have a consultant arrangement with the company, working intensively at certain times on certain problems and then withdrawing for a while. For another, a temporary assignment to cell 3 might be possible, if paired with a sabbatical. Bennis (1976) suggests a number of roles necessary in modern organizations ("variance sensor"; "scanner") which might well be filled by people in this cell, since they are likely to have the necessary distance from the organization--to have an insider's outside perspective.

In general, the optimal utilization of cell 5 employees acknowledges their priorities and thus requires innovative arrangements between the organization and the employee based on individual negotiation. It would seem to be worthwhile, though, to give thought to this cell because it is likely that as the present "youth" generation gets to the middle years, we will find more and more people in it. Hence the proper organizational response to the needs of these people may become increasingly important.

Cell 6. Cell 6 represents a problem. Here are found employees of ordinary potential whose orientations are elsewhere than their work.

Sometimes such a non-work orientation develops from being forced into an organizational role incongruent with one's interests and capacities (cf. Gordon, 1977); at other times it evolves as a response to unfulfilled hopes of promotion. There are times, however, when such an orientation is not a reaction to adverse work experiences, but represents, rather, very basic values and commitments--a situation that may be becoming more prevalent. How an organization most usefully responds to its cell 6 employees will depend, partly, on how these non-work orientations came about. It will also depend on the organization's rate of growth, the environment in which it is operating, and its overall policy toward its employees. A rapidly expanding company in a period of general economic growth, for instance, may be able to dismiss all its employees in this cell. In contrast, a more paternalistic organization, or a regulated industry in a region with high unemployment, may find it more expedient, and less costly in the long run, to develop these employees and make the effort to find roles for them that fit their motivations and capacities.

It is important, moreover, to point out that if the other cells are handled properly, cell 6 is likely to be small. As already indicated, it is often organizational policies, not "bad" employees, that augment the size of this group. Organizations may respond to employees in cells 2 and 4 in such a way that their work orientation disappears; or they may not provide cell 5 employees with the conditions under which their potential can be expressed and thus effectively push them into cell 6. In other words, by not looking at the varying orientations of mid-career people, and by not dealing as intelligently with the many employees of ordinary potential as with their high potential employees, organizations unnecessarily increase the size of

this problematic cell.

One other point should be emphasized. The typical managerial response to this group is that they must be "remotivated," which is to apply the cell 3 managerial stereotype that low levels of work involvement are bad and must be "fixed." But the fact that involvement is low does not automatically mean that work is poor. Indeed, many tasks in organizations are pretty routine and might be best handled by less involved employees. This might be a group, also, that would respond well to opportunities for part time work, job sharing, or various other arrangements for time off (see e.g. Cohen and Cadon, 1978). Managers must recognize that efforts to "motivate" cell 6 employees may come to naught, but that high levels of work involvement are not necessary, indeed may be dysfunctional, for all members of an organization.

* * *

Finally, it must be stressed that the six cells represent six quite different kinds of psychological contracts between employers and their employees, and that all of them represent legitimate and necessary roles in an effectively functioning organization. But the organization and the individual must recognize the reality on which the psychological contract is based in each case, and must generate incentives and rewards congruent with this reality. Whether or not the person is primarily oriented to work, whether that work involvement is mainly technical or people oriented, and whether the person is of high or average potential all play a key role in this analysis.

Concluding Note

The findings of this study show that despite common educational backgrounds, despite similar early career interests and experiences, and even despite consensus on job values, work orientations at mid-career take a number of quite different forms. Living with technology is not easy, and the technically trained find many ways of responding to the dilemmas posed. Indeed, some technically trained people in mid-career concentrate their lives outside work altogether. The successful pursuit and management of technical careers, therefore, requires an appreciation of the whole range of possible orientations. It requires, also, an accurate assessment of potential: an assessment in which both the employee and the employing organization must concur. But most important, the variations in orientation and in ability necessitate flexible organizational policies and multiple organizational roles. Only if these exist can organizations maximize the contribution of their technical personnel and create the environment in which technically based careers present long-lasting satisfactions to those who pursue them.

When one adds to this conclusion the implications from the chapter on the women graduates, one begins to get a sense for emerging issues in the management of human resources. Those data confirm the possibility of satisfactory and effective careers without full involvement. They also alert one to the dangers of assuming that there is only one way successfully to traverse the early years of a career. In particular, they imply that technical careers can survive slow starts, late entrances, and mid-course changes in direction, and indeed, when viewed over the lifetime of an employee, may benefit from such unorthodoxies.

In the near future, therefore, organizations will more and more be confronted with employees seeking multiple career paths which move across and down as well as up, and which cross organizational boundaries with ease. In the issues surrounding technically based careers, therefore--as well, most likely, as in other areas (cf. Emery and Trist, 1973)--the challenge ahead will center on the management of pluralism.

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Appendix A

The Questionnaire

Massachusetts Institute of Technology

Alumni Survey

I am requesting your help in a major study of M.I.T. alumni, designed to assess the role that an M.I.T. education plays in the lives of its graduates. This study is jointly sponsored by M.I.T.'s Office of the Undergraduate Planning Professor and the Carnegie Commission on the Future of Higher Education. The information obtained from the survey will help M.I.T. reassess its goals and educational policies and will help the Carnegie Commission make recommendations pertaining to the entire system of higher education in this country.

You will note that the questionnaire is fairly detailed and covers a number of areas. This is necessary because we are trying to obtain information about the career patterns of alumni -- on how their educational experiences, their occupation, and their family life are related to each other. Also, the large numbers involved require an objective question format, even though this sometimes forces the respondent to give his answers in terms of categories that do not permit him to express the nuances of his opinion. Please feel free to elaborate your answers in the margins or in the "Comments" section.

In order for the information obtained to be valid, maximum participation in this research project is necessary. Our pretesting indicates that it takes about 30 to 45 minutes to complete the questionnaire and I very much hope that you will be willing to give that amount of time to this important project. If for any reason you cannot fill out some portions of the questionnaire, leave those blank and fill in the rest. If you cannot fill in any of it, please send the blank questionnaire back anyway. We can only check our addresses and our pattern of non-participation if we get back all questionnaires. A stamped return envelope is enclosed for your convenience. Please return the completed, partially completed, or blank questionnaire sometime within the next two weeks.

While each questionnaire has to be numbered for purposes of analysis, your answers will be kept confidential in every way. No individual questionnaire will be seen by anyone except the immediate research staff, and only group results will be reported.

I greatly appreciate your help in this effort.

Edgar H. Schein

Edgar H. Schein
Undergraduate Planning Professor

EHS:lsw

Your citizenship: _____

1. Marital status: (circle the appropriate number and give date if applicable)

   Single . . . 1 Married . . . 2 (date: _____) Other . . . 3 (please specify: _____)

2. Your present age: _____ Number of children: _____ Ages of children: _____

3. Parents' and wife's education: (circle the appropriate number in each column)

	Father	Mother	Wife
Eighth grade or less	1	1	1
Some high school	2	2	2
Graduated from high school	3	3	3
Some college	4	4	4
Received Bachelors degree (or currently working for it)	5	5	5
Received Masters degree (or currently working for it)	6	6	6
Received Doctorate or equivalent (or currently working for it)	7	7	7
Not applicable			8

4. Parents' and wife's primary occupation: (circle the appropriate number in each column)

	Father	Mother	Wife
Professional (e.g., doctor, engineer, professor)	1	1	1
Proprietor or manager (enterprise of 25 or more employees)	2	2	2
Proprietor or manager (enterprise of less than 25 employees)	3	3	3
Teacher	4	4	4
Military	5	5	5
Clerical or sales	6	6	6
Service Worker	7	7	7
Skilled worker	8	8	8
Semi- or unskilled worker	9	9	9
Housewife	10	10	10
Other (please specify) _____	11	11	11
Not applicable			12

5. Is (or was) your father in the same or related area of work as you are? (circle the appropriate number)

   Same area . . . 1 Related area . . . 2 Different area . . . 3

6. Did your mother work while you were growing up? AND, is your wife working now?

	Mother	Wife
Yes, full time in her field	1	1
Yes, full time but not in her field (or had/has no special field)	2	2
Yes, part time in her field	3	3
Yes, part time but not in her field (or had/has no special field)	4	4
No, did/does not work	5	5
Not applicable		6

7. Your undergraduate major: _____

   If you switched majors, what was your first major? _____

8. Your primary residence as an undergraduate: (circle one in each row)

   Dormitory . . . 1 Fraternity . . . 2 House or apartment . . . 3

   Alone . . . 1 With parents . . . 2 With friend(s) . . . 3 With wife . . . 4

9. What was your undergraduate grade point average (cum)? _____ Year graduated: _____

10. Did you attend graduate school? Yes . . . 1 No . . . 2

    If yes, School: _____ Field of Study: _____ Degree: _____ Date: _____

    School: _____ Field of Study: _____ Degree: _____ Date: _____

11. ASSESSMENT OF EDUCATIONAL AND JOB EXPERIENCES: Below is a list of abilities and traits that people possess to varying degrees. In a later question we will ask you to rate yourself on these traits. Here we are concerned only with the CONTRIBUTION OF YOUR EDUCATIONAL AND JOB EXPERIENCES to the development of these abilities and traits, no matter to what extent you may possess them.

For each of the items listed, please indicate in the first column, the effect of YOUR UNDERGRADUATE EDUCATION; in the second column, indicate the effect of YOUR GRADUATE OR PROFESSIONAL EDUCATION (if you did not go to graduate or professional school leave this column blank); and in the third column, the effect of YOUR POST-EDUCATION JOB EXPERIENCES.

If your educational and job experiences contributed positively to the development of these abilities and traits, circle the +2 if they contributed a great deal and the +1 if they contributed only a little. If the extent to which you possess a given factor was not dependent on or is unrelated to your educational or job experiences, circle the 0. If a given factor was decreased as a result of your educational or job experiences, circle the -1:

EFFECT OF EDUCATION OR OF JOB EXPERIENCES

Decreased ability or trait	Did not change or not relevant	Increased ability or trait	
-1	0	+1	+2
		a little	a great deal

	E F F E C T O F : undergraduate education				graduate education				post-education job experiences			
Knowledge and Abilities												
Real competence in your chosen field	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to identify problems	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to analyze and solve problems	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to do research	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to think creatively	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to continue to learn new things	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Knowledge of the requirements of your chosen profession	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Self-insight	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Attitudes and Traits												
Certainty that you have chosen the right career	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
High aspirations for your career	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Personal involvement in your field	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Positive attitude toward further education	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Overall breadth of perspective, vision	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Tolerance of other people and their points of view	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to work with other people	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to communicate your ideas to other people effectively	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Ability to induce change in others and in organizations	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Willingness to be influenced by others	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Leadership ability	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Leadership desire	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2
Overall self-confidence	-1	0	+1	+2	-1	0	+1	+2	-1	0	+1	+2

12. Please rate the contribution of your pre-college experiences, your undergraduate education, your graduate or professional education, and your post-education job experiences to the development of each of the areas listed below. Use the following scale (please insert the appropriate number in each space indicated):

0 = no contribution; 1 = some contribution; 2 = a significant contribution

	Pre-college experiences	Undergraduate education	Graduate education	Post-education job experiences
General attitudes and values				
Professional and ethical standards				
Attitudes and personal characteristics needed in your profession				

13. PRESENT JOB: What is your full title in this job? _____

Please describe your functions in this job: _____

How long have you held this job? _____ How long do you think you will remain with this organization? _____

14. Using the loose sheet marked "Lists of Job Characteristics," please describe as well as you can the following characteristics of your present job. Look over the indicated list and write the appropriate number or numbers in the space provided.

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting salary: ($/year) _____ Salary now: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

15. How satisfied are you with your present job? (circle the appropriate number in the scale)

1 2 3 4 5
very dissatisfied — very satisfied

16. OCCUPATIONAL HISTORY: One of the major purposes of this survey is to find out what kinds of patterns there are in people's jobs after college. We therefore would like some basic information about each job you have held since college or graduate school, and the length of time you held that job. If you have been in your present job since the beginning, check here _____, skip this section, and go to question 17.

A promotion within an organization does not constitute a new job, unless your function changed in some basic way along with the promotion. List only jobs which you held for six months or more, unless you consider some shorter job of special importance. Space is provided for five jobs (excluding your present one, which you have already described). If you have held more than five jobs before your present one, please describe the first five in the spaces provided and add a sheet which describes the others.

16.1 Initial job after school

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting Salary: ($/year) _____ Salary at Termination: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

Length of time job was held: _____ Reason(s) for leaving: _____
(List E)

LISTS OF JOB CHARACTERISTICS

LIST A

Type of Organization

1. Family business
2. Own professional office
3. Founder or co-founder of a business enterprise
4. Member or partner in a professional office
5. Private profit-making company or corporation
6. University research organization or affiliated institute
7. University or college: academic department or administration
8. Junior college: academic department or administration
9. Non-profit research organization or institute, NOT affiliated with a university
10. Hospital or clinic
11. Public welfare organization
12. Private welfare organization
13. Elementary or secondary school
14. Federal government
15. State government
16. Local government
17. Church or other religious organization

18. Other (please specify on questionnaire)

LIST B

Location

1. New England: (Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island)
2. Mid-Atlantic: (New York, Pennsylvania, New Jersey, Maryland, Delaware, District of Columbia)
3. South: (Virginia, North Carolina, South Carolina, Georgia, Florida, West Virginia, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Kentucky)
4. Mid-West: (Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota)
5. North Central: (Iowa, Kansas, Nebraska, Montana, North Dakota, South Dakota, Colorado, Wyoming, Missouri, Idaho, Utah, Nevada)
6. Southwest: (Texas, New Mexico, Arizona, Oklahoma)
7. West Coast: (California, Oregon, Washington, Hawaii, Alaska)
8. Outside of the United States

LIST C

Job Descriptions

From the list of job descriptions below, pick ONE OR MORE that best describe your job. For example, if you are the director of an engineering consulting group, pick 1, 7, 11.

1. Engineer
2. Scientist
3. Architect
4. Doctor
5. Lawyer
6. Social Scientist
7. Manager, director, or executive
8. Business staff (marketing, finance, production, etc.)
9. Salesman
10. Teacher
11. Consultant
12. Research
13. Social Service

14. Other (please specify on questionnaire)

(continued on other side)

LIST D

Size

1. Less than 10
2. 10 - 99
3. 100 - 499
4. 500 - 2,499
5. 2,500 - 9,999
6. 10,000 and over

LIST E

Reasons for Changing Jobs

Please read the list of possible reasons for changing jobs given below, and then choose as many as you feel are important and LIST THEM IN ORDER OF IMPORTANCE. Each reason represents both a negative reason for leaving a job and a positive one for taking a new job. For example, you may have left a job because the workload was not reasonable, or because the workload in the new job was better. In either case, you would list reason #1.

1. Did not have a reasonable workload
2. Did not have an opportunity for advancement
3. Did not have good physical working conditions
4. Did not have good fringe benefits
5. Did not have job security (steady work)
6. Did not have an opportunity for high earnings
7. Did not like the location of the job
8. Did not have an opportunity to exercise leadership
9. Did not get the recognition I deserved when doing a good job
10. Did not work for a highly regarded company
11. Did not work in an efficiently run department
12. Did not have a job that is highly regarded by others in the company -- a job with some prestige
13. Did not have a job that allowed me to make a real contribution to the success of the company
14. Did not have challenging work to do -- work from which I can get a personal sense of accomplishment
15. Did not have enough freedom to adopt my own approach to the job -- to be creative and original
16. Did not have training or educational opportunity (to improve knowledge and skills)
17. Did not have a job that allows me to make a real contribution to society
18. Did not have a job that allows me to work on crucial, relevant problems
19. Did not work in a department where the people are friendly and congenial
20. Did not have the opportunity to work with people rather than things
21. Did not have a job that leaves sufficient time for family and personal life
22. Not by my choice (e.g. was laid off, company was shut down, job or project was finished, contract not renewed, was not re-appointed, etc.)
23. Change in family circumstances (please specify on questionnaire)
24. Other (please specify on questionnaire)

16.2 Second job after school

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting Salary: ($/year) _____ Salary at Termination: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

Length of time job was held: _____ Reason(s) for leaving: _____
(List E)

16.3 Third job after school

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting Salary: ($/year) _____ Salary at Termination: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

Length of time job was held: _____ Reason(s) for leaving: _____
(List E)

16.4 Fourth job after school

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting Salary: ($/year) _____ Salary at Termination: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

Length of time job was held: _____ Reason(s) for leaving: _____
(List E)

16.5 Fifth job after school

Type of organization: (List A) _____ Location: (List B) _____ Job description(s): (List C) _____

Size of total organization: (List D) _____ Size of your department: (List D) _____ Number of people working for you: _____

Starting Salary: ($/year) _____ Salary at Termination: ($/year) _____

Professional income OTHER THAN SALARY: ($/year) _____
(e.g. consulting fees, royalties, etc.)

Length of time job was held: _____ Reason(s) for leaving: _____
(List E)

17. The list below shows a number of characteristics of a job. Please circle the appropriate number to show how important you feel each characteristic is to you with regard to your present and future jobs.

	Not at all important				Very important
Reasonable workload	1	2	3	4	5
Opportunity for advancement	1	2	3	4	5
Department where people are friendly and congenial	1	2	3	4	5
Challenging work to do	1	2	3	4	5
Work from which I could get a personal sense of accomplishment	1	2	3	4	5
Highly regarded organization	1	2	3	4	5
Recognition for doing a good job	1	2	3	4	5
Job which allows me to make a real contribution to the success of the organization	1	2	3	4	5
Good physical working conditions	1	2	3	4	5
Training or educational opportunities (to improve my knowledge or skills)	1	2	3	4	5
Efficiently run department	1	2	3	4	5
Considerable freedom to adopt my own approach to the job -- to be creative and original	1	2	3	4	5
Job regarded highly by others in the company -- a job with some prestige	1	2	3	4	5
Good fringe benefits	1	2	3	4	5
Job which leaves sufficient time for family and personal life	1	2	3	4	5
Work that is relevant to social problems	1	2	3	4	5
Job security (steady work)	1	2	3	4	5
Opportunity for high earnings	1	2	3	4	5
Location	1	2	3	4	5
Opportunity to exercise leadership	1	2	3	4	5
Job which allows me to make a contribution to society	1	2	3	4	5
Opportunity to work with people rather than with things	1	2	3	4	5
Other (please specify) _____	1	2	3	4	5

18. What kind of a job do you expect to have at the height of your career -- at the time when you are functioning most fully in your professional work? Please describe such a job by answering the following questions, referring to the lists, where indicated, as before.

Type of organization:_____ (List A)
Job Description(s):_____ (List C)
Number of people working for you:_____
Salary (today's $/year):_____

Professional income OTHER THAN SALARY (today's $/year):_____

	Unsuccessful				Very successful
19. At this point in your professional life, how successful do you think you are in your work?	1	2	3	4	5
How successful do you think you will be at the height of your career?	1	2	3	4	5

	Unimportant				Very important
20. How important is it to you to be successful in your work?	1	2	3	4	5

	Hardly anything				A great deal
21. Overall, how much has your UNDERGRADUATE education contributed to your success in your work?	1	2	3	4	5

22. YOUR PROFESSION: What do you consider to be your profession? _____

23. Which three of the following reasons for belonging to a professional society seem to you to be most important? Place a 1 next to the one you consider to be the most important reason for belonging; a 2 next to the reason you would consider to be next most important; and a 3 next to the third most important reason for belonging to a professional society.

	RANK
To get information via papers, journals, etc.	_____
To meet an expectation of one's employer.	_____
To help one identify with the profession.	_____
To attend meetings at different locations	_____
To make contacts with people professionally helpful for work.	_____
To make contacts that might be helpful should one want to change jobs	_____
To make social contacts	_____
Other (please specify) _____	_____

For the following sets of questions, please circle the appropriate number:

		Yes	No
24.1	Do you presently belong to a professional society?	1	2
24.2	Have you ever read a paper at a meeting of a professional society?	1	2
24.3	Have you ever published any professional articles, papers, or books?	1	2
25.1	I am more concerned with how my work looks to my professional colleagues than to my boss.	1	2
25.2	If there are conflicts between professional standards and the interests of my employer I tend to resolve them in favor of my employer	1	2

26. Please indicate the extent to which you agree with the following statements by circling the appropriate number.

	Strongly disagree				Strongly agree
If I had to change the kind of work I do, I would be very frustrated and unfulfilled.	1	2	3	4	5
I like to think about my work, even when off the job	1	2	3	4	5
My only interest in my job is to get enough money to do the other things that I want to do.	1	2	3	4	5
I wish I were in a completely different occupation	1	2	3	4	5
My main satisfactions in life come from the work I do.	1	2	3	4	5

27. People vary in the extent to which they are in agreement with the main trends of their profession. Please indicate where you place yourself on this dimension by circling the appropriate number on the following scale:

1	2	3	4	5
complete disagreement				complete agreement

28. All other things being equal, which of the following would suit you best? Circle the number of the one you would most prefer.

To work at the core of a well established field or profession 1

To work at the frontiers of a well established field or profession. 2

To work in an emergent, more nebulous, or rapidly changing field or profession. 3

29. SELF-ASSESSMENT: Below is the list of abilities and traits that you have already marked. This time, please indicate the degree to which you NOW possess each of the listed factors.

Rate yourself by circling the number from 0 to 4 that best describes the extent to which you now possess each ability or trait.

Knowledge and Abilities	do not possess at all				possess to a great extent
Real competence in your chosen field	0	1	2	3	4
Ability to identify problems	0	1	2	3	4
Ability to analyze and solve problems	0	1	2	3	4
Ability to do research	0	1	2	3	4
Ability to think creatively	0	1	2	3	4
Ability to continue to learn new things	0	1	2	3	4
Knowledge of the requirements of your chosen profession	0	1	2	3	4
Self-insight	0	1	2	3	4
Attitudes and Traits					
Certainty that you have chosen the right career	0	1	2	3	4
High aspirations for your career	0	1	2	3	4
Personal involvement in your field	0	1	2	3	4
Positive attitude toward further education	0	1	2	3	4
Overall breadth of perspective, vision	0	1	2	3	4
Tolerance of other people and their points of view	0	1	2	3	4
Ability to work with other people	0	1	2	3	4
Ability to communicate your ideas to other people effectively	0	1	2	3	4
Ability to induce change in others and in organizations	0	1	2	3	4
Willingness to be influenced by others	0	1	2	3	4
Leadership ability	0	1	2	3	4
Leadership desire	0	1	2	3	4
Overall self-confidence	0	1	2	3	4

30. At what point in your career were you married and was your first child born?

	Married	First child born
While an undergraduate in college	1	1
Between college and graduate school	2	2
While in graduate or professional school	3	3
During the first two years at work	4	4
After working two years or more	5	5
Other (please specify) _____	6	6
Not applicable	7	7

31. Which three aspects of your life give you the most satisfaction? In the following list, place a 1 next to the item that gives you the most satisfaction in life; a 2 next to the one that gives you the next most satisfaction; and a 3 next to the third most satisfying aspect of your life.

	RANK
Career or occupation	_____
Creative or other activities not related to career or occupation	_____
Leisure time recreational activities	_____
Family relationships	_____
Activities directed at community, national, or international betterment	_____

32. Here are six descriptions of the relationship between work and family. Please indicate (by circling):

A. Which is closest to yours now?

B. Which is the one you would ideally like to have now?

C. Which is the one you would like to have at the height of your career?

	Now	Ideally now	At height
Single person living alone (or with friends) and working	1	1	1
Married, husband works and wife is housewife	2	2	2
Married, wife works while husband runs the home	3	3	3
Married, husband and wife work at different kinds of jobs	4	4	4
Married, husband and wife work at related kinds of work but not together (e.g., two architects in different practices)	5	5	5
Married, husband and wife work together	6	6	6
Another arrangement (please specify) _____	7	7	7

33. For each of the following periods in your family life, please indicate whether YOUR WIFE worked or plans to work full-time, part-time, or not at all. (If you are not married, please answer according to what you think your wife would choose to do if you were married.)

	Full time	Part time	Not at all	Don't know
After marriage but before birth of first child	1	2	3	4
When youngest child is under 3 years old	1	2	3	4
When youngest child is 6 - 12 years old	1	2	3	4
After all children are grown	1	2	3	4

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34. In retrospect, what has been most disappointing to you about your undergraduate education at M.I.T.?

35. Knowing what you do now, what changes, if any, in your undergraduate or graduate education would have been beneficial for you?

36. What kind of continuing educational opportunities do you think M.I.T. should make available to its alumni?

COMMENTS: