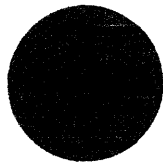


THE MIT JAPAN PROGRAM

日本プログラム

Science, Technology,
Management

科学・技術・経営



TRAINING THE GLOBAL PROFESSIONAL:
THE MIT JAPAN PROGRAM

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I consider myself most fortunate that a great deal of interest has been expressed in this thesis, and I hope to encourage the dialog initiated as a result of my research. In particular, my conversations with the MIT-Japan Program corporate sponsors and interns have been most illuminating. I want to thank especially the Program interns, who cheerfully participated in the various aspects of this study. They are an outstanding group of people who I hope will keep in touch with me and each other over the years.

I would also like to acknowledge the interest of Senator Jeff Bingaman (D-New Mexico), whose speech on US-Japan technology and trade relations at a dinner held in Cambridge was a real pep talk for me. May this thesis bear fruit in the furthering of Japan programs at MIT and other universities around the country.

I owe a great debt to those who were most instrumental in helping me to complete this work. My thesis advisor, Dr. D. Eleanor Westney, and my thesis reader, Dr. Richard J. Samuels, were the source of many insights and much encouragement throughout the entire study. Their contribution to my education on Japan is profound and deeply appreciated.

My parents, Dr. Shyam and Dr. Shannon Gurbaxani, not only encouraged me every step of the way, but gave me the motivation to combine my interest in two worlds, the technical and social sciences. I cannot thank them enough for their steadfast love and support. This work is dedicated to my wife, Sonia, for her constant faith in me and interest in things Japanese.

CHAPTER 1

INTRODUCTION

Made in America¹, the landmark 1989 study of American industry by the MIT Commission on Industrial Productivity, cites "parochialism" as one of the main factors impeding progress in American productivity today. The failure to develop the necessary linguistic and cultural skills to interact successfully with foreign markets has led to an increasingly non-competitive stance for American manufacturers. In addition to lost sales, companies have not been able to understand foreign customer's needs in order to incorporate them into new product designs. Furthermore, American firms have failed to recognize technical and process innovations from abroad, either due to lack of the language ability necessary to learn about them or the interest ("not invented here" syndrome).

Some American firms, however, are beginning to change. Global technology scanning, long employed by foreigners, has led to the adoption of international "best practices" and "competitive benchmarking" for certain firms. Forming joint ventures with "best-practice" foreign firms is increasingly common. The MIT study emphasizes that "companies are now beginning to include foreign experience as a critical part of their management development programs."² While acknowledging that the current crop of American

¹Dertouzos *et. al.* (1989) Made in America: Regaining the Productive Edge. New York: HarperCollins.

²Dertouzos *et. al.*, p. 52

executives and technical professionals with overseas experience is small, the study nevertheless emphasizes that

Ensuring that the next generation of corporate executives has a broader international background is a task that must be taken up jointly by the universities that train managers and the firms that employ them.³

In the chapter entitled "A More Productive America", one of the five recommended "Strategies for Industry" is "Learning to Live in the World Economy", consisting of the following elements:

- Understanding of foreign languages, cultures, and practices
- Shopping internationally for technologies and "best practices"
- Enhancement of global distribution and service networks
- Development of internationally conscious policies

"Insist that key employees have an adequate understanding of foreign cultures"⁴ since that is the key to competitiveness. "Summer, semester, or year-long internships abroad could be provided"⁵ in order to facilitate the development of a global awareness on the part of not only managers, but especially other key employees such as engineers and scientists.

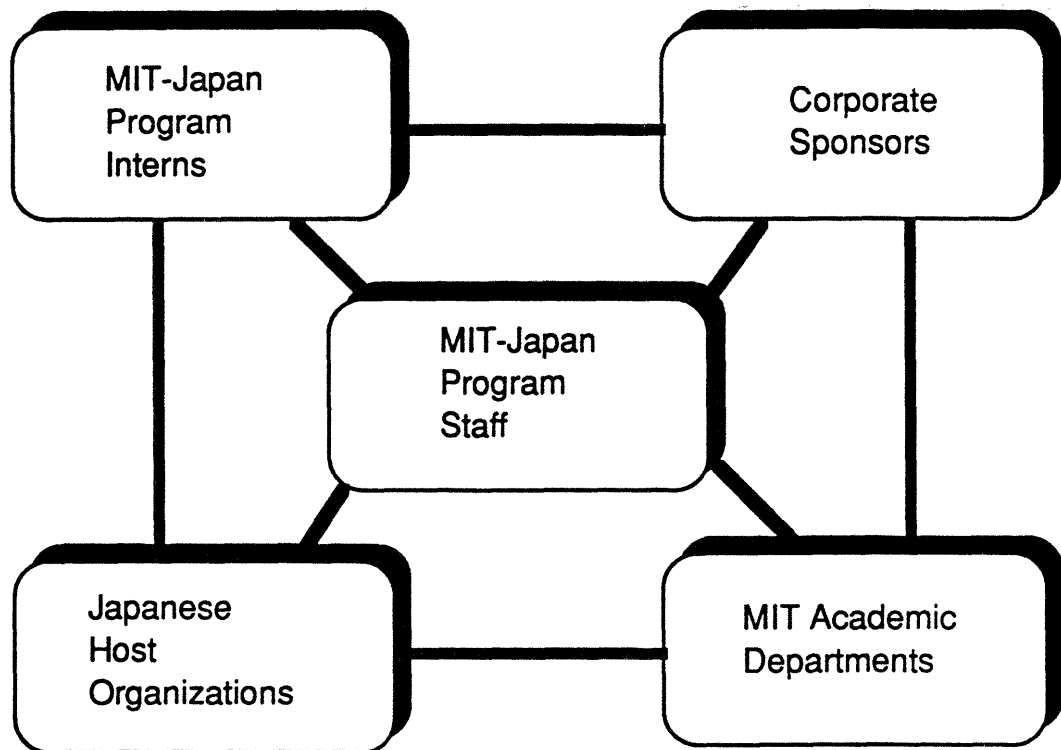
The MIT Japan Program (Figure 1.1) was established to provide just such experience. The Program's information brochure proclaims its goals as follows:

³Dertouzos *et. al.*, p. 52

⁴Dertouzos *et. al.*, p. 150

⁵Dertouzos *et. al.*, p. 161

Figure 1.1: The MIT-Japan Program



MIT-Japan Program Staff:

Professor Richard J. Samuels, Director

Professor D. Eleanor Westney, Associate Director

Patricia Gercik, Assistant Director

Kathleen R. Schaefer, Director of Corporate Liason and Training

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Japan today stands at the cutting edge of modern science and technology, and its management practices are emulated around the world. Nevertheless, too few American scientists, engineers and industrial leaders are exposed to a systematic, programmed study of Japan.

The MIT Japan Program was founded in 1981 to address this problem and to promote closer ties between scientists, engineers, and industrial managers in the United States and Japan. Today, it is the largest and most comprehensive center of applied Japanese studies in the United States. The Program pursues its goals through three sets of integrated activities: education, research, and public awareness.

In addition to conducting formal academic research on Japan (as evidenced by a growing list of working papers) and promoting informal cultural activities on campus, the centerpiece of the Program is its Japan student internship program. Specifically, the Program trains students for a one-year internship in Japan working in their chosen field of endeavor. The Program requirements are stringent: evidence of high academic achievement, two years of Japanese language training, and a one-semester seminar ("An Introduction to Japan", MIT Course No. 17.S21) on Japanese society and culture. Furthermore, interns are required to attend a two-day off-campus retreat in the January preceding their placement for intensive cultural training and group socialization. In addition, the Program provides numerous opportunities for informal cultural exposure, such as Japanese movies, lunch tables, cooking classes, crafts demonstrations, etc.

The purpose of this study is two-fold. The first issue is: during its first decade, how well has the MIT Japan Program fulfilled its mission to create a new generation of "Japan-aware" technical professionals and promote closer ties between them and their Japanese counterparts? How are interns attracted to and selected for the Program? How are they prepared for their internship in Japan, and how effective is this preparation? What is their experience in Japan like, and what long-term impact does it have on their career and personal life? What is their overall assessment of the Program? How can the Program be improved and expanded?

The second issue is: based on the cumulative experience of the Program interns of the past ten years, what have we learned from Japan? The Program interns, with their one-year exposure at the grass-roots level of Japanese industry and academia, have a wealth of knowledge with regard to Japanese technology, management, and society. How can this knowledge be made accessible to others? How much of this knowledge is transferable to an American industrial and academic setting? How well are the unique abilities of the Program interns being utilized?

This report will attempt to answer these questions, and examine the role of the MIT Japan Program in the larger context of US-Japan relations and industrial competitiveness.

CHAPTER 2

METHODOLOGY

The purpose of this study is two-fold: (1) to understand the impact and value of the MIT Japan Program in intern's careers, and (2) to understand what interns learned from Japan as a result of their time there. To date (1991), over 250 MIT students have gone to Japan through the MIT Japan Program for internships with Japanese host organizations (corporate, university, and government laboratories.) The length of intern stays in Japan has ranged from a few months to a few years, with the average stay lasting one year. Some were still undergraduates when they went to Japan for a three-month summer internship. Others had completed Ph.D.s or had previous industry work experience. This study concentrated on interns who had completed at least their undergraduate (baccalaureate) studies and spent a year or more in Japan. As many interns meeting these criteria were surveyed as could be reached, and those reached were asked to comment on their experiences at length. This study was conducted in three steps:

(1) Internship Questionnaire

A six-page questionnaire (Appendix C) was sent to interns for whom up-to-date mailing addresses were available. Of the 53 surveys sent out, 44 were completed and returned, an 83% response rate.

(Appendix B contains information on the intern respondents.) It is from these returned surveys that the statistical information in this

report is formulated. While special situations caused interns to give creative responses to certain questions, on the whole the surveys were filled out according to the standardized format provided. An example of a "special situation" is a case where an intern served in two different organizations (e.g. a university lab and a corporate lab) during their stay in Japan. In such a case, responses were separated by the organization to which they applied and assigned accordingly. While this may be said to give such an intern the weight of two interns, it was felt that the responses should not be excluded just because the intern served two different organizations. He/she in fact had "two" intern experiences from which the study may benefit. (This was in fact the case for only two interns, so the data is not unduly distorted as a result.)

Furthermore, certain interns gave multiple responses to questions for which one "best" response was implicitly requested. In such cases, it was impossible to distinguish a "best" response and thus both responses were counted. The criticism of "double counting" may be applied here as well, but again, it was deemed that the few such multiple responses contained useful information and should be part of the data.

The problem of "small numbers" occurred for several intern cross sections (e.g. only four respondents worked for government agencies in Japan.) When the number of respondents in a given cross-sectional group was less than eight, the group was either combined with a related one for statistical comparisons (e.g. as university/

government interns were considered as one entity in contrast to corporate interns) or not used on a comparative basis. It is hoped in future surveys that this problem will be reduced, given the large number of interns returning from Japan every year.

- Intern Demographics

Figure 2.1 lists basic demographic statistics on the intern survey respondents. Take note that respondents form a subset of former interns participating in the MIT Japan Program; statistics for the entire population will differ. Nevertheless, as Figure 2.1 shows, the sample is a very rich one, a diverse group representative of the MIT Japan Program and the MIT community in general. For example, less than half of the respondents (21) were American male Caucasians. "Minority" populations included women (11), non-Caucasians (10), and foreign nationals (8), the latter representing eight different foreign nations. Five interns were of Japanese-American extraction. Thirteen of the respondents are currently living abroad, including seven in Japan who either stayed after their internship, or have returned to Japan after working some time in the US.

Fourteen MIT fields of concentration ("courses") are represented, ranging from Planetary Sciences (Course 12) to Political Science (Course 17). The most popular field was (predictably) Electrical Engineering and Computer Science (Course 6) with ten (EE) and four (CS) for a combined 14 intern respondents, almost one-third of the

Figure 2.1: Intern Sample Demographics

I.	Host Organization:	26	Corporate (59%)
		15	University (34%)
		5	Government (11%)

Note: Percentages do not add up to 100% since two interns spent time in two different organizations (Univ/Govt and Corp/Univ) and are double-counted.

II.	Gender:	33	Male (75%)
		11	Female (25%)
III.	Race:	27	Caucasian American (61%)
		7	Caucasian Other ¹ (16%)
		8	Asian American ² (18%)
		1	Asian Other ³ (2%)
		1	African American (2%)

IV.	National Origin:	36	United States (82%)
		8	Foreign National (18%)

V.	Previous Industry Experience (Corporate interns only)		
		14	Yes (54%)
		12	No (46%)

VI.	MIT Field of Concentration (preceded by MIT "Course No.")	
	1. Civil Engineering	1
	2. Mechanical Engineering	7
	3. Materials Science and Engineering	5
	6. Electrical Engineering	10
	6. Computer Science	4
	8. Physics	6
	10. Chemical Engineering	3
	12. Planetary Sciences	1
	13. Ocean Engineering	1
	15. Management (Technology & Policy)	1
	16. Aeronautics and Astronautics	2
	17. Political Science	1
	18. (Applied) Mathematics	4
	20. Applied Biological Sciences	1

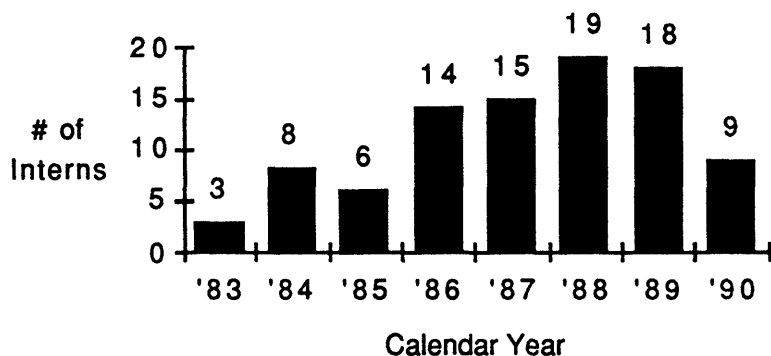
Note: Total more than 44 due to three double majors who are double-counted (two Physics/EE, one Math/Comp. Sci.).

¹One each from Canada, Venezuela, United Kingdom, France, Germany, The Netherlands, and Denmark.

²Five Japanese-American, two Chinese-American, one Korean-American

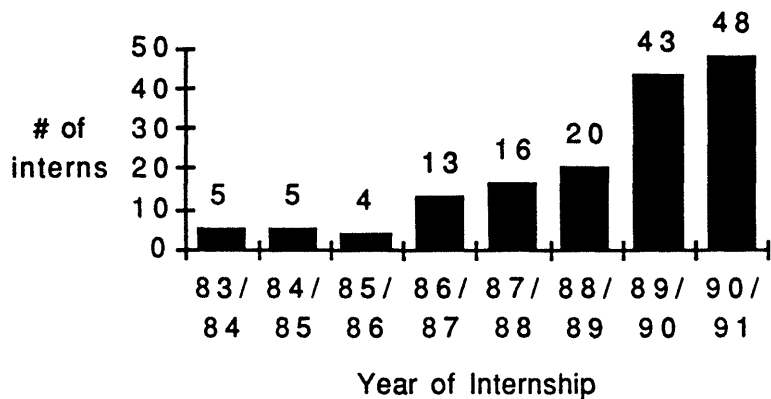
³One Malaysian

Figure 2.2: Years When Interns Surveyed Were In Japan



Source: Program Intern Survey Questionnaires

Figure 2.3: Program Interns in Japan



Source: MIT Japan Program Brochure

sample. Chronologically, interns were classified as "early" (1983-85; 9 respondents), "middle" (1986-88; 24) or "recent" (1989-90; 11). Some difficulty was encountered in contacting "recent" interns due to their mobility. As Figures 2.2 and 2.3 show, up until last year, our sample tracks the entire intern population over the history of the MIT Japan Program. (Note: numbers for Figure 2.2 represent number of respondents in Japan during the calendar year or a significant fraction thereof.)

(2) Intern/Corporate Sponsor Conference

After gathering background information on the former interns through the surveys in Part 1, the next step was to meet them face-to-face. Not only did this help us to understand more about the interns and their experiences in Japan, but it gave everyone to gain an idea of what we *could* learn from the interns. This helped us to fine-tune our expectations and the direction of the study, as well as prepare for the in-depth interviews in Part 3. A significant amount of information could be gathered through informal contact with the interns at this stage as well.

A conference entitled "Learning from the Japanese Research & Development Process" was held on October 21-22, 1990, at MIT Endicott House, Dedham, Mass. Roughly 60 people attended the conference: 25 former interns, 25 corporate sponsor personnel, and 10 MIT Japan Program staff and other (government, academia) personnel. In addition to the informal exchange of information

regarding internships, two panel discussions were held. These panel discussions were entitled:

- Project Organization and Life in the Lab
- Scientific and Technical Information Networks

A questionnaire was distributed among corporate sponsor personnel (Appendix D). The intention of this questionnaire was to aid in determining what information from the interns was of the most interest to the corporate sponsors. The results of this questionnaire were compiled and used as a guide for the in-depth interviews conducted as Part 3 of this study.

(3) In-Depth Intern Interviews

Armed with the results of the intern and corporate intern surveys, as well as some personal insight derived from personal contact with the interns, we set out to conduct in-depth interviews. These interviews were typically one-hour in length. Of the 44 intern questionnaire respondents, 28 granted interviews. Whenever possible, the interviews were conducted in person (11); otherwise they were done over the phone (17).

The interviews attempted to address the questions raised by the corporate sponsors regarding "learning from the Japanese R&D system". Interns were first thanked for participating in the study and reminded of its objectives. In the course of the interview, interns were asked to describe how they became interested in Japan, how they found out about the MIT Japan Program, and the extent of

their preparation before going to Japan (e.g., language, culture). They were asked to give exhaustive descriptions of their daily lives in Japan, including such details as living arrangements, commuting, work arrival and departure times, meals, holidays, etc. In describing a "typical day" at work, interns commented on their offices and office mates, group meetings, methods of supervision and evaluation, information flow, organizational structures, and many other topics.

Interns went on to discuss the impact of the Japan experience on their lives and careers, and the relevance to their current positions. Many interns also offered to discuss their degree of satisfaction with their experience, as well as suggestions for improvement. In addition, interns offered both praise and constructive criticism on a wide range of topics, including Japanese society, US-Japan relations, American industrial competitiveness, and the MIT Japan Program. They also offered suggestions for the corporate sponsors as to how to best tap the new resource created by the Program: the interns themselves.

All the information gathered in Parts 1, 2, and 3 were reviewed and compared for consistency. The information that follows in the rest of this report, derives from the process described. The conclusions drawn are those of the author, supported primarily by the information gathered as a result of this study. As an example of the type of interviews used to compile this report, the following three intern experiences are presented. These interns were chosen since

their experiences covered a range of research areas and environments (corporate/university/government) but nonetheless were "typical" for Program interns:

- Michael Cronk

Mike received his MSEE from MIT in 1986. His thesis concerned motion estimation in video. He spent from October 1986 to September 1988 as an image processing engineer in Toshiba's R&D Center. He worked on low bit rate video conferencing systems, realizing a compression algorithm incorporating motion estimation techniques described in his thesis. In the course of his two years in Japan, he filed six patents and wrote four papers. He even met and married his Japanese wife!

Mike simply said he "wanted to work in a foreign country" and was placed by the Program. He took one year of Japanese at Harvard, and one at MIT, and attended the seminar on Japan. He visited Japan for two weeks the summer before his internship began as part of a religious mission. He was also able to study Japanese on the job his first three months in order to master the technical vocabulary he needed for his work. This was particularly important since no one in his group spoke English or had even been to the US. These facts make his productivity in Japan even more remarkable.

He lived in an all-male company dorm 15 minutes walk from work. His dorm mates were mostly high school graduates who did not know

much English either. His rent was a paltry 1000 yen (US\$5.50) per month, and the dorm cafeteria served breakfast and dinner for only 300 yen (US\$1.67). Although most of his dorm mates did not have air conditioning, he did, in a room twice normal size. With the labor shortage in Japan and competition for graduates, all rooms are now air-conditioned.

People typically began arriving at work at eight o'clock, but no one started to work until 8:15 when a bell went off. Work proceeded without interruption until 12 noon, when another bell went off and all work stopped for lunch, which lasted exactly half an hour. This meant that everyone crowded into the company cafeteria at the same time, causing a long line to form. Waiting to get served could take up most of your lunch half-hour. At three o'clock, there was an exercise and cookie break, lasting 15 minutes. At 5:15 the bell went off to mark the official end of the work day, but unlike previous bells, work went on without a break. Only secretaries and a few professionals left at this time, with the rest working until 7:30 or 8:00 pm. Some employees were obliged to punch out at 5:15, but they went on working. Mike's boss asked him not to work as the rest of the engineers, as he was not being paid overtime. Although flextime has now been instituted, the clock was strictly followed in Mike's experience at Toshiba.

Mike belonged to a group of half a dozen engineers, but mostly worked alone. This group, which worked on picturephone hardware, had weekly meetings. It was one of three groups in a larger group of

24 engineers which also worked on videocameras and HDTV. This larger group also had regular meeting at which group heads would give news briefs from other parts of Toshiba.

Mike noted the presence of a "direct reporting structure at all times". Managers were very aware of their employees' performance and thus their input was key in the review process. There was strong sense of the need to educate employees, and as a result they were often pulled off projects to work on new ones. All the engineers had their own specialties, but were constantly exposed to new areas through annual lab reorganizations. Presentation skills were emphasized, and employees were encouraged to attend conferences and give talks. The purpose was more to practice giving a presentation than to report any research breakthrough.

Group productivity was measured in number of patents filed and number of papers published. Toshiba provided much support for patent filing, including a booklet on the patent process within Toshiba and in-house training in "how to" from experienced employees. Managers emphasized patents, and brainstorm sessions were conducted where engineers sat in a room and came up with patentable ideas off the top of their heads. Group brainstorming was effective for other tasks, such as resolving technical design issues. "Everyone learned what the others were doing, and everyone's input and ideas were heard and considered." In addition to patents and papers, Mike's group produced prototype systems for trade shows,

and had to provide sales goals for new products on a 5 to 7 year horizon in addition to technical specifications.

Mike had a two-year technical trainee visa, and asked for a one-year extension at the end of his first year. He found his second year to be more productive than the first (3 papers and 5 patents vs. 1 paper and 1 patent). He attributes this to the fact that he knew Toshiba better and his language skills had improved after one year of constant use. After his second year, he was even offered a five-year extension, but declined, desiring to return to the US to work for an American company.

He is currently a marketing manager for curve tracer products with a Tektronix/Sony 50/50 joint venture. He cites his network in Japan and ability to get more done in meetings with his Japanese partners as tangible ways his intern experience has benefitted him.

"Technology transfer is more than formulas. The essential 'tiny details' go unheeded without a knowledge of culture or language."

Although he says he originally went to Japan more for the cultural experience than to further his career, there is no doubt that his career (and American employer) have benefited.

- Anders Solem

Anders was in Japan around the same time as Mike Cronk. He received his BS in Aeronautics and Astronautics at MIT in 1986, and attended the University of Tokyo under a Monbusho fellowship from

October 1986 to March 1989. His first six months were spent as a research student, and the following two years as a master's student. He obtained his MS in Aeronautical/Astronautical Engineering from the University of Tokyo in 1989.

Anders lived in his own apartment near campus. He had two kinds of 'typical' days: those with experiments, and those without. On experiment days, he rose early in order to be in the lab ready to go by nine o'clock "or else my lab partner would be upset". Working on advanced propulsion systems for satellites, he wore work clothes and made his own equipment. While experiments were running, he ordered out for lunch and dinner. He had to leave the building by closing time at 9:30, after which he went home to do calculations.

When experiments were not running, he would show up at his leisure (usually between 8 and 9) and leave at seven o'clock. If necessary he could stay beyond 9:30, since keys to the office building were available. His activities were to attend classes and write reports, although he could typically do the latter at home. He usually worked a half day on Saturday as well.

His research group had a formal weekly meeting which featured rotating presentations among the attendees, numbering between four and 14. There was a definite hierarchy in the lab, and the professor dominated the proceedings, spending a lot of time overseeing the work of his students. This was atypical, as most other faculty were "out of touch" and overburdened with administrative work. Faculty

were called upon to advise MITI and recommend graduating students for corporate positions.

In spite of the academic atmosphere, there was little cross-pollination between groups, both inside and outside the university. "Knowledge is power," Anders observed, "and the Japanese realize it." As a result, research "secrets" are not given out at conferences. Graduate students had a propensity to hang out in their lab and identify with it. Communication with other groups or with industry was "more formal, less free than in the US."

As for the students Anders worked with, they went into industry upon completing their masters degrees. He mentioned that there was little incentive for them to pursue Ph.D.'s, since this would not help their corporate career prospects. He observed that many of the technically-trained graduates are being attracted to the financial industry (as much as one-third to one-half of them). Their skills are in high demand in the competitive labor market, and banks are able to offer higher salaries and benefits than engineering companies.

Anders now works for the US Air Force as the lead American engineering liaison with Japan on the joint development of the FSX fighter plane. With his four years of Japanese language training and a masters degree from the University of Tokyo, he is able to break into the tight network that exists in the Japanese aerospace industry. His intern experience had a "profound effect" on him, allowing him to do the job he is doing now. The value of the Program

becomes evident at his bimonthly review meetings in Japan, where a little patience is required since "the Japanese won't make a decision on the spot". It is clear that the MIT Japan Program has made a difference in Anders Solem's life, and helped him to serve his country as well.

- Margot Brereton

Margot hails from England, where she completed a BS in Mechanical Engineering at the University of Bristol in 1985. She followed that with an MS in Technology and Policy from MIT in 1987. Her internship was at a government lab, MITI's Tsukuba facility. She worked in the Mechanical Engineering Lab's Information Engineering Division from March 1988 to July 1989. Her projects included the development of an object-oriented CAD system, parallel processing, and building an expert system for jigs and fixturing.

Margot was upset that the British did not make a significant effort to learn foreign languages. She was impressed with the foreign students at MIT and decided to pursue an experience in a non-English speaking country. She chose Japan since she was interested in manufacturing and design. She relied heavily on the Program, obtaining a placement through it and participating in the Program-sponsored cultural activities. She took one year of Japanese during the 1986-87 academic year and then an intensive summer in 1987, all at Harvard. This language preparation made a noticeable

difference in Japan, as she noted that "the Japanese tense up when speaking in English. Introductions in Japanese puts them at ease."

She lived in a government-subsidized three-bedroom house which she shared with two other female foreign researchers from Sweden and Vietnam. Her commute was a 20 minute bike ride through rice fields, and she usually arrived around nine o'clock (anytime between 8:30 and 9:30 was acceptable). At 11:00 tea was served in her lab. Her office mates were quite shy and she had difficulty working with them. Like other government lab employees, they had chosen an area of specialization, to which they were to dedicate the next 10 years mastering ("feature recognition" and "tolerancing", respectively). As a result, she worked mostly on her own.

Group meetings were held every week, and consisted of two parts. The first half-hour was a debriefing on the activities throughout the rest of the lab. In the second half-hour, a group member gave a presentation on his work or presented a paper from the literature. The group benefitted from the dissemination of information, but organizationally lacked coherence. With only six researchers, a "critical mass" was not achieved in order to accomplish large tasks. Furthermore, the extreme specialization of the researchers inhibited collaboration.

There were two measures of productivity: patents and research papers in English. Japanese government labs emphasized the dissemination of information rather than creation of new products

like their corporate counterparts. Annual bonuses were distributed to employees who published and patented. Promotions were based on seniority as well as merit, and "good people did get promoted to head good research groups." There was a "technical ladder" as well.

Margot is presently pursuing a doctorate in mechanical engineering at Stanford University. Although she says she is glad she went to Japan, and even extended her stay for an extra six months, she feels that she has not made use of her internship experience since returning to the US. "The longer I don't use my Japanese, the less inclined I am to find a job using it, although I don't want to waste the experience." Part of the problem is the feeling of not fitting in. The research environment at MITI was difficult. Without much interaction, she felt her research was not very fruitful there. For instance, she had to spend time learning a new programming language from manuals written in Japanese. Also, as a single person, she "wouldn't go for a long time." A position in Japan with an American company would perhaps be more attractive.

CHAPTER 3
BEFORE INTERNSHIP

How are potential interns attracted to the MIT Japan Program? For some, their roots run very deep. A few are of Japanese descent, or have spent time in Japan while growing up. Not surprisingly, these interns often have an edge regarding Japanese language and cultural fluency, and have little problem adjusting to Japan. These cases are the exception, however.

The real value of the Program is to open what would otherwise be a closed door. The essential prerequisite for applicants is the willingness to learn about Japan. The Program represents a large investment of time and effort on the part of its interns: typically three years, counting the two years of language training. All of this work comes on top of an already demanding program in a technical field at one of the world's top universities. "Our interns work terribly hard", comments Assistant Director Patricia Gercik. Nevertheless, the hard work pays off in terms of a unique educational and life experience.

Some interns have had an interest in Japan for much of their lives. "As a kid, I used to watch Godzilla movies and practice karate", comments one former intern. For a fair number, their interest in Japan preceded finding out about the Program. The Program then helps them to realize a goal they formulated on their own--to live and work in Japan. This group is fairly proactive with regard to their

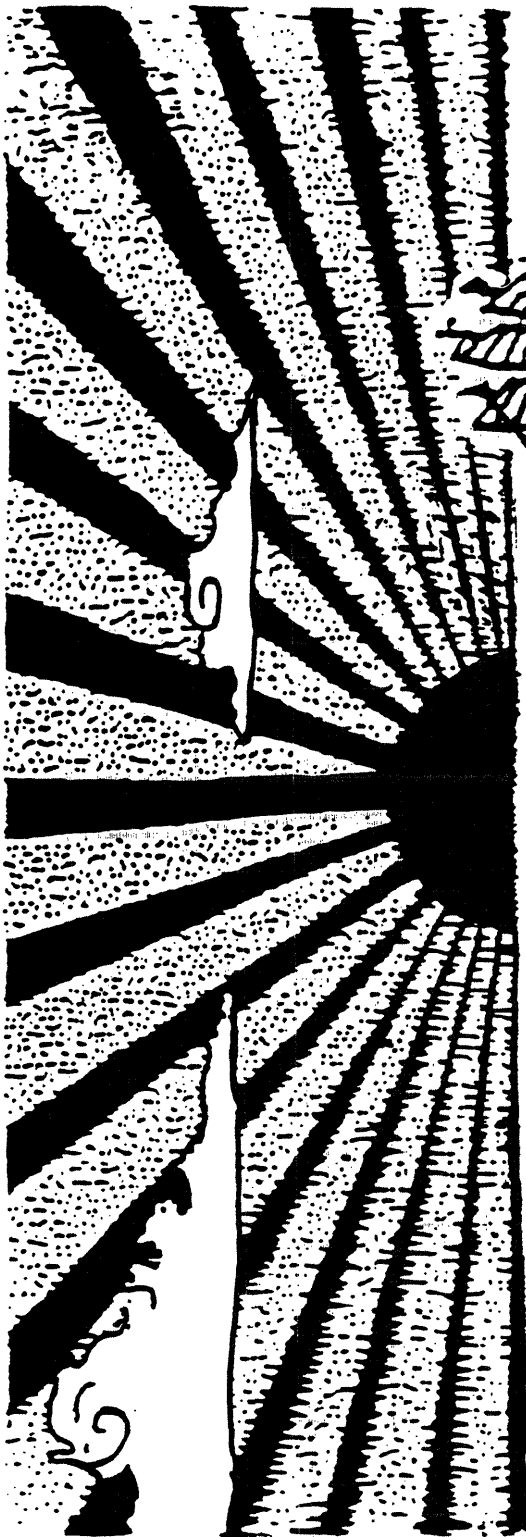
placements and may in fact use the Program as a "calling card" for approaching Japanese host organizations.

The majority of interns, however, are simply MIT students immersed in their studies who realize that Japan is influential in their field. Consequently, when they hear about the MIT Japan Program, their interest is piqued and they contact the Program office for more information. Usually they schedule an interview, during which they discuss their interest in going to Japan and gain the appropriate information to decide whether or not an internship is for them. The Program does much to publicize itself, through weekly ads in MIT's campus newspapers, informal cultural events, and ubiquitous "Go to Japan" posters around campus (Figure 3.1). Increasingly, word-of-mouth through Japanese language classes and returned interns have had an impact in attracting potential interns.

When the Program began, no Japanese language courses were offered at MIT. Interns were required to commute to Harvard in order to study Japanese. This inconvenience did not deter the first few interns, who went to Japan in the fall of 1983. MIT began offering first-year Japanese in 1984.

The rapid growth in the number of students enrolled in Japanese classes at MIT paralleled the growth of the Program throughout the 1980s. Second-year Japanese was offered in 1985, and third-year in 1989. Throughout the history of the Program, an intensive summer course in place of regular second-year Japanese has been an option

Figure 3.1: MIT-Japan Program Recruiting Poster



GO TO JAPAN:

THE MIT JAPAN PROGRAM

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for interns. Until recently, students had to attend go to another university (Harvard or Middlebury) for the summer. Beginning in the summer of 1991, intensive second-year Japanese will be offered on the MIT campus.

(Since 1988, an intensive summer course in Technical Japanese for electrical engineers and computer scientists has been offered at MIT. This course requires the equivalent of third-year Japanese and the appropriate technical background. Plans exist for offering a materials science version of Technical Japanese at MIT.)

Courses on Japanese society and politics have been offered through the MIT Political Science department for many years. Early interns could take a course on Japan (still offered) from Dr. Richard Samuels, Director of the MIT Japan Program. In 1986, Dr. Samuels formulated "An Introduction to Japan". This course is an undergraduate seminar specifically geared to the needs of Program interns for a broad exposure to various aspects of Japan: history, art, religion, literature, politics, family life, education, and industry. Several electives (e.g. "The Firm and the Business Environment in Japan", "Japanese Production Management") are available through the Sloan School of Management for the interested student.

Placement in Japan is a highly individualized process. The Program has placed interns in over 40 different industrial, university, and national laboratories (Figure 3.2). Interns indicate their technical

Figure 3.2: Japanese Host Organizations

Private Firms

Abe Software	Nissan
Bank of Tokyo	NTT
Corporate Directions	Riken
Fujitsu	Saitama Bank
Hitachi	Sanwa Bank
IBM Japan	Secom
Horiba, Ltd.	Sharp
Kao	Shimizu
KDD	Sony
Matsushita	Sumitomo Bank and Trust
Mitsubishi Chemical	Suntory, Ltd.
Mitsubishi Heavy Industry	Toray Industries
NEC	Toshiba
Nippon Steel	Yamaichi Securities

University Laboratories

Kobe University
Kyoto University
Nagoya University
Osaka University
Tokyo Institute of Technology
University of Tokyo

National Laboratories

Center for Space Research
Electrotechnical Laboratory (Ibaraki)
Hayashibara Biochemical Research Laboratory
International Superconductivity Technology Center (ISTEC)
Japan Atomic Energy Research Institute (JAERI)
Japanese National Cancer Center Research Institute
MITI Mechanical Engineering Laboratory (Tsukuba)

Source: MIT Japan Program Brochure

Figure 3.3: Sources of Support

Corporate Sponsors (date of joining program in parenthesis)

AT&T (1987)	IBM (1983)
Digital Equipment Corp. (1990)	Motorola (1985)
Dow Chemical (1988)	Proctor and Gamble (1986)
Dow Corning (1988)	Teradyne (1985)
Eastman Kodak (1986)	The Timken Company (1990)
Ford Motor Co. (1986)	3M (1989)
General Electric (1985)	United Technologies (1986)

Student Internships

Fulbright Commission
Japanese host companies
Japanese Ministry of Education
Japan-US Friendship Commission
Starr Foundation
Yaichi and Masako Ayukawa Fellowship Fund

Conference and Workshop Support

Department of Commerce
Department of State
Hitachi Foundation
Japan Foundation
Japan Productivity Center
National Science Foundation
National Technical Information Service
Office of Technology Assessment/US Congress

Source: MIT Japan Program Brochure

interests and an attempt is made to match them with a lab involved in related work. Often, others such as MIT thesis advisors or fellow students can be a valuable source of contacts. The MIT name carries great prestige in Japan, and interns rarely have trouble obtaining a suitable placement. For those interested in continued study in Japan, the Monbusho fellowships for international graduate students at Tokyo University are an attractive option, paying full tuition and a modest stipend.

Predictably, the move to Japan involves formidable logistics. The Program pays for one round-trip airfare to Japan. In addition to offering valuable moral support, the Program assists with details such as obtaining visas and housing arrangements. Most interns end up staying in some sort of company-subsidized housing. While in Japan, the program keeps in touch with the interns and periodic visits to Japan by Program staff serve as opportunities for intern get-togethers. Upon completion of their time in Japan, the Program offers assistance in job placement. The Program Corporate Sponsors (Figure 3.3), including some of the most prestigious of American corporations, are sources of job opportunities for returned interns. In addition, the growing network of Program alumni are available for assistance in job hunting.

The interns interviewed generally had good things to say about the Program and their preparation for one-year in Japan. The degree of preparation "makes one feel as if you are getting ready to go to the moon" comments one intern, but he quickly adds that "rather than

intimidating you, it makes you confident of your ability to get along in Japan." The general consensus was that interns felt about as well prepared as they could be to face a culture so very different from their own. Most had been through the "Introduction to Japan" seminar and the intern retreat, and some had gone to great lengths to immerse themselves in the Japanese culture prior to going. "The interns who didn't prepare were the ones who didn't get what they wanted out of Japan, and they only have themselves to blame."

How much difference does cultural preparation make? Several interns related the following story, with minor variations: a colleague in their lab came from overseas (North America or Europe) without extensive language or cultural preparation. This colleague was initially very stimulated by the exotic environment in Japan, but spent inordinate amounts of time performing the most rudimentary tasks (e.g., finding lab supplies). After only a few months, however, enthusiasm turned to exasperation. By this time, the colleague realized their effectiveness at work was severely hampered by their lack of Japanese language ability. Furthermore, being out of step with the culture led to dissatisfaction outside of work. Typically, the colleague became depressed and went home early.

One of the greatest values of the Program, according to interns, is that it gives you enough cultural preparation to hit the ground running in Japan. By giving some idea of the environment and culture in which they will be working, the Program provides interns a base

on which to build after they arrive. This base allows them to become productive workers in a relatively short period of time, making their experience more profitable for themselves as well as their host organization. An extra fringe benefit is that interns are better able to experience Japan outside of work, contributing further to their quality of life.

Interns were unanimous on one thing: the more Japanese language you know, the better. There can be no doubt that having two years of Japanese language training contributed significantly to making the interns' stay in Japan a success. The two years of language training was regarded alternatively as "helpful but woefully inadequate", "a bare minimum", and "sufficient. . .you learn what you need there." All agreed that a third or even fourth year of Japanese was a good idea, "but don't think it will make you fluent." There is no substitute for the "total immersion" which one gets by living in Japan, and after six months most interns felt comfortable in the language. Although most of their Japanese colleagues could speak some English, using Japanese with them "made them feel more at ease."

Several interns mentioned that they would have appreciated some training in technical Japanese in their field, as well as a chance to continue their formal Japanese studies while working in Japan. A computer scientist related the following story:

Since I was doing mostly programming by myself, I didn't get a chance to practice my Japanese much. Also, since all the programming languages and manuals were in English, I rapidly lost my ability to read Japanese. I was doing programming till 8 or 9 at night, and forgetting all the kanji I had laboriously learnt.

In addition to requiring two years of language, interns might take a focussed, intensive technical Japanese course in their field before beginning work in Japan. Ideally, this course could be taken in Japan, at their company, allowing them to "settle in" and make the large cultural adjustment before starting work. A tutor might be provided in order to permit continued formal study during the year-long internship. One creative idea employed by one intern was a language exchange with a co-worker: they met for lunch every day, one day speaking in Japanese, the next day in English.

There is just so much preparation that an intern can cram into an already busy schedule before going to Japan. One returned intern recommended, "Give enough background in order to make an intern comfortable, but not too much to make him biased in advanced." Nevertheless, there is a direct correlation between the amount of effort put into cultural and language training, and the intern's effectiveness in and enjoyment of their time in Japan.

Perhaps the best summary of the Program's evolution was given by an intern who spent a year and a half as a university intern, from 1983 to 1985:

Since 1982-83 the MIT Japan Program has matured considerably. The prerequisite two year language training is a minimum and very important, particularly for those doing general investigations of Japanese industrial activities.

The bias of the program remains tilted toward company lab experiences. For some persons--perfect. For those seeking long-term networks of contacts covering a wide range of fields, a top national university [or consortia] lab offers a better residency, that can then be used as a springboard to private or national labs.

As interns continue to return from Japan, the Program is gaining more and more experience with regard to intern preparation and placement. Future interns will undoubtedly benefit from their predecessors' experiences.

CHAPTER 4
DURING INTERNSHIP

Nothing can completely prepare you for Japan. One intern felt like he was a "man from Mars", and another was "in shock for two months" upon his arrival. "Everything was a surprise, but nothing was overwhelming." Most interns were able to find their way to their accommodations and to work without inordinate difficulty.

There was one exception. An early intern (1984) was stranded at the airport after a communication mix-up with her host family.

Fortunately, she had a friend in Tokyo who came to her rescue. As this intern suggested, "it would be nice if the Program could provide emergency contact numbers in Japan". Another early intern, who had no such difficulty but was aware of this episode, commented that "the Program has done a good job of learning from the few mistakes it has made". Even with upwards of 50 interns a year currently going to Japan, such mix-ups are a rare exception.

- Intern Life in Japan

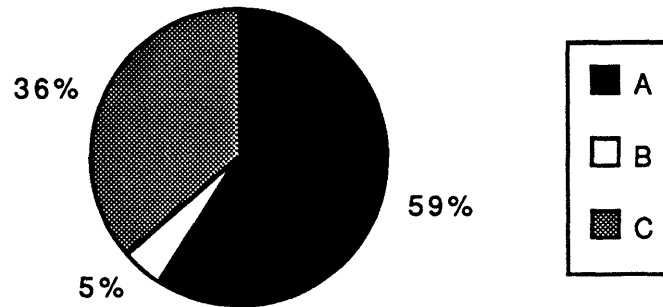
Most interns obtained housing through their host organization, either a subsidized dormitory room, a room with a host family, or a private apartment. Company interns typically lived with Japanese co-workers in a company dorm, while university interns tended to stay with other graduate students, often in a special international student dormitory. Some university interns expressed

disappointment at not having more contact with their Japanese colleagues outside of work. A fair number of interns were able to live in their own apartment, with rent usually subsidized through the company. Only a couple of female non-corporate interns had long-term home stays with Japanese families (Figure 4.1).

Since most interns are placed in large metropolitan areas (primarily Tokyo), their commutes are significant. Nevertheless, they are short by Japanese standards. Averaging 20 to 30 minutes, they involved all modes of transportation: car, bus, subway, train, bicycle, and on foot. Interns, like most Japanese workers, were reimbursed for their commuting expenses, if they were not provided by the company itself. As one intern noted, there was one morning bus from the dorm to the company, but several evening buses the other way, leaving at regular intervals well past the official quitting time. This schedule allowed workers to stay late, which they mostly did.

Meals were also subsidized by companies, with breakfast, lunch, and dinner offered at the lab or dormitory. University interns had the option of many low-cost restaurants in the immediate vicinity which catered to students. Meals were almost always an occasion for group socialization, and were often considered a part of the working day. Although dinner was offered in the early evening (between 5 and 6 pm) at the company, it wasn't offered until 9 pm at the dormitory, reported one intern. The incentive structure is obvious.

Figure 4.1: Intern Living Arrangements



Question: Where did you live during your internship?

- A: Dormitory
- B: With a Japanese family
- C: Own apartment

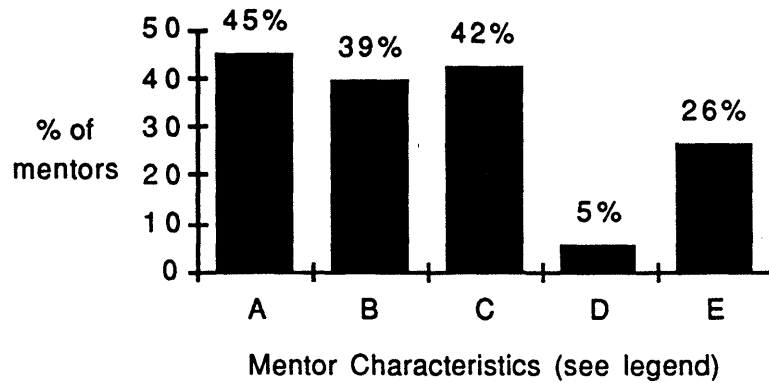
<u>Cross Section</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Total</u>
Male	22	0	11	33
Female	4	2	5	11
Corporate	16	0	10	26
Non-Corporate	10	2	6	18
Early	4	1	4	9
Recent	7	0	4	11
<u>Total</u>	<u>26</u>	<u>2</u>	<u>16</u>	<u>44</u>
	(59%)	(5%)	(36%)	(100%)

The intern worked alone mostly on a technical project selected in conjunction with his mentor. Splitting his time roughly evenly between the lab and office, the intern was in direct contact with his group members and mentor, the latter monitoring his work closely. Eighty-six percent of all interns had mentors (Figure 4.2). Corporate mentors tended to be the intern's research supervisor, and somewhat senior in age. Non-corporate mentors, on the other hand, tended to be fellow researchers about the same age as the intern. Interestingly, half of the recent interns had mentors with overseas experience, while none of the early interns reported this background. This difference may be an indication of the increasingly international exposure Japanese researchers have received in the last few years.

As foreigners, interns were not expected to work the same hours as the rest of their group members, but most did (Figure 4.3). These hours were from 8:30 am to 7 or 8 pm five days a week, and perhaps half a day on Saturday. In most cases, interns were paid for their overtime work. While 83% of non-corporate interns were expected to work the same hours or longer, this expectation applied to only 42% of corporate interns. Indeed, on average, corporate interns had longer days but shorter weeks than non-corporate interns. Women typically worked one hour a day less than men, and recent interns have on average worked a full eight hours a week more (59 hours versus 51 hours) than early interns (Figure 4.4).

Composition of the host labs were mixed. Over 60% of interns noted that their labs contained female Japanese researchers and foreign

Figure 4.2: Intern Mentors

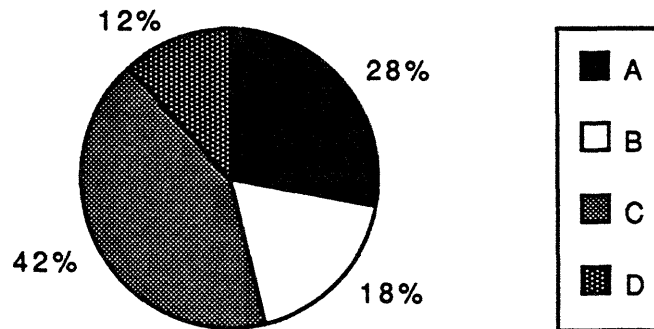


Question #10: Was someone assigned to act as a "mentor" to help you learn your way around the lab? If "yes", was that person:

- A: Your research supervisor
- B: Someone the same age as yourself
- C: Someone somewhat senior to you
- D: Someone who planned to study in the US in the future
- E: Someone who had some overseas experience

<u>Cross Section</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>Total</u>
Male (33)	13	12	13	1	7	29
Female (11)	4	3	3	1	3	9
Corporate (26)	13	6	9	2	7	24
Non-Corporate (18)	4	9	7	0	3	14
Early (9)	3	4	2	0	0	7
Recent (11)	7	2	6	1	5	10
<u>Total (44)</u>	<u>17</u>	<u>15</u>	<u>16</u>	<u>2</u>	<u>10</u>	<u>38</u>
	45%	39%	42%	5%	26%	100%

Figure 4.3: Working Hours Expectations

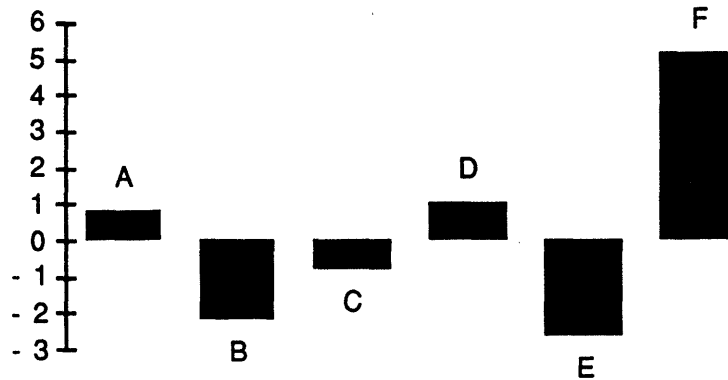


Question #18: Were you expected to work the same hours as the rest of the people in your lab?

- A: Yes, and I put in the same hours.
- B: Yes, but I did not feel it was necessary and sometimes left earlier.
- C: No, the expectations were different for one-year interns.
- D: No, I worked longer hours.

Cross Section	A	B	C	D	Totals
Male	9	7	14	2	32
Female	3	1	4	3	11
Corporate	6	2	15	3	26
Non-Corporate	6	6	3	2	17
Early	3	1	3	1	8
Recent	3	2	5	1	11
Totals	12	8	18	5	43
	28%	18%	42%	12%	100%

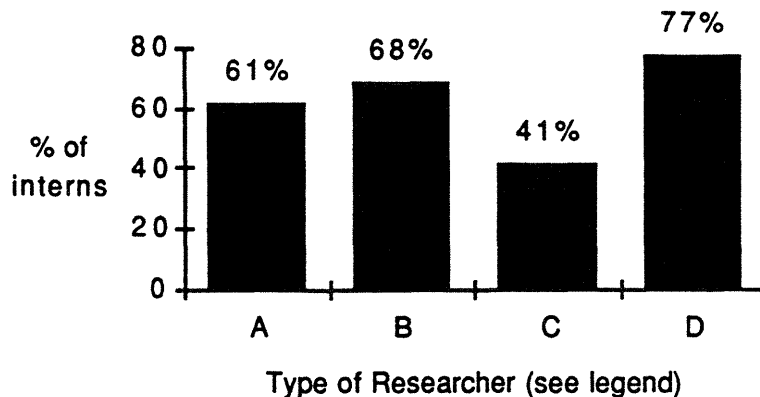
Figure 4.4: Intern Hours Worked



Question #16: What were the average working hours in your lab?

<u>Cross Section</u>	<u>Hrs/Day</u>	<u>Days/Wk</u>	<u>Hrs/Wk</u>	<u>Deviation</u>
A: Male	10.2	5.4	55.1	+0.8
B: Female	9.3	5.6	52.1	-2.2
C: Corporate	10.2	5.3	53.5	-0.8
D: Non-Corporate	9.7	5.7	55.3	+1.0
E: Early	9.4	5.5	51.7	-2.6
F: Recent	11.0	5.4	59.4	+5.1
<u>Averages</u>	<u>10.0</u>	<u>5.4</u>	<u>54.3</u>	<u>0.0</u>

Figure 4.5: Lab Composition



Questions #11, 12: In your lab, were there

- A: Japanese female researchers (not technicians)
- B: Other foreign researchers
- C: Japanese researchers with degrees from foreign universities
- D: Had your lab ever had a resident foreign researcher before?

Cross Section	A	B	C	D	Total
Male	18	23	14	26	33
Female	9	7	4	8	11
Corporate	17	16	15	18	26
Non-Corporate	10	14	3	16	18
Early	5	5	5	6	9
Recent	7	7	6	6	11
Total	27	30	18	34	44
	61%	68%	41%	77%	100%

researchers. Only 41% of the labs had Japanese researchers with foreign degrees (Figure 4.5), but 77% had had foreign researchers previous to the intern's arrival. Non-corporate labs had a higher percentage of foreign researchers (78%) than corporate labs (62%), but corporate labs had a higher percentage of Japanese researchers with foreign degrees (58% versus 17%).

Once in a while, the intern's group would go out together after work for drinks, but attendance at such events was not mandatory. More often, the intern would meet friends after work and explore the Tokyo area. Alternatively, the intern would use after work hours to study Japanese or relax back at the dormitory. Weekends were spent shopping or on group outings, quite often with colleagues from work. Over half of the interns joined a hobby or sports club while in Japan, and 81% went on a group retreat or vacation during their stay. In short, there was not much opportunity for boredom or homesickness.

- Intern Activities

Most (70%) interns worked in what they described as "basic research", although that term does not mean the same thing in Japan as it does in the US. In the US, "basic research" is research done without any strings attached; in Japan, it is research done without any specific product in mind, but can definitely be product oriented. Hence, a few (perhaps 15%) of interns did what would be called "basic research" in the US; the rest did "advanced technology development". Whereas 18% of interns did "applied development",

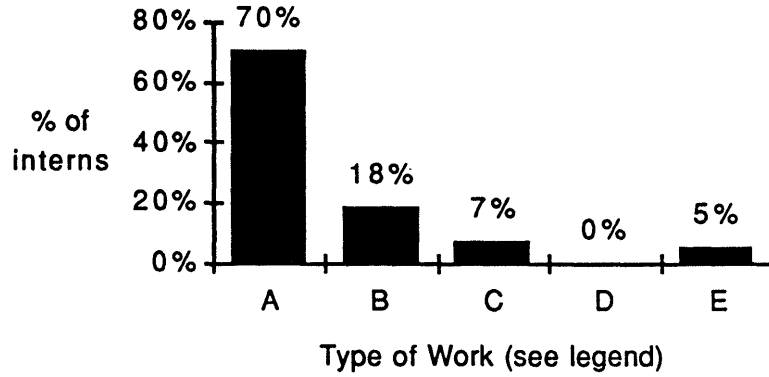
only 7% did "new product development", and none surveyed did process development. "Other" (5%) included "computer programming" and "applied technology" (Figure 4.6). Almost all women and non-corporate interns performed "basic research", while men and corporate interns also performed other types of work. Some recent interns have been able to involve themselves in areas further away from basic research, e.g. "new product development".

While internships averaged one year, among survey respondents they ranged from three months to three years. Most interns (59%) reported working on only one project during their stay in Japan, with 30% pursuing two. The remaining 9% worked on three or four projects, staying in Japan past the one-year internship to do so (Figure 4.7). Men, non-corporate interns, and recent interns tended to work on more projects, all three groups averaging over 1.6 projects during their internship.

As mentioned previously, interns tended to work on their own (61%) versus as part of a project team (39%). Quite often (45%) interns played a large role in defining their project (Figure 4.8).

Significantly, no women claimed that they played a role in defining the direction of a group project, whereas a number of men did. Of the interns who worked on their own, twice as many corporate interns worked on projects defined by the lab managers as by themselves; for non-corporate interns exactly the opposite was true. Recent interns have had much more say in project direction than early interns.

Figure 4.6: Type of Work Performed

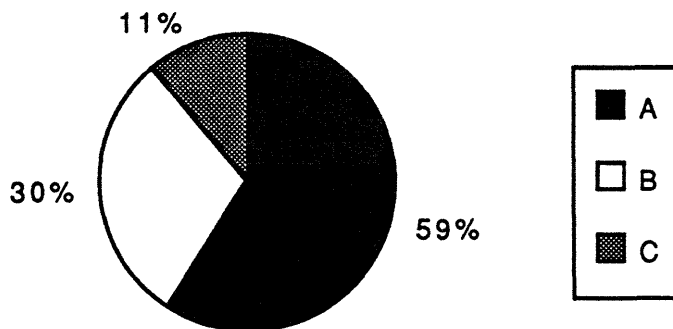


Question #5: Which of the following best describes your work in Japan?

- A: Basic research
- B: Advanced development
- C: New product development
- D: Process technology
- E: Other

Cross Section	A	B	C	D	E	Total
Male	20	7	3	0	3	33
Female	10	1	0	0	0	11
Corporate	15	7	2	0	2	26
Non-Corporate	15	1	1	0	1	18
Early	6	2	0	0	1	9
Recent	7	2	2	0	0	11
Total	30	8	3	0	3	44
	70%	18%	7%	0%	5%	100%

Figure 4.7: Number of Projects Pursued



Question #6: On how many projects did you work during your internship?

A: One (1)

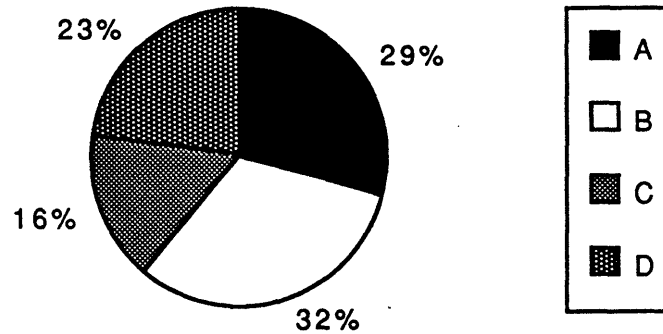
B: Two (2)

C: Three or more

D: Average number of projects worked on

Cross Section	A	B	C	Total	D
Male	19	9	5	33	1.61
Female	7	4	0	11	1.36
Corporate	17	7	2	26	1.48
Non-Corporate	9	6	3	18	1.65
Early	5	4	1	9	1.25
Recent	7	2	2	11	1.64
Total	26	13	5	44	1.55
	59%	30%	11%	100%	

Figure 4.8: Project Assignment and Execution



Question #7: Which of the following best describes your experience?

- A: I defined my own project and carried out most of the work myself.
- B: I worked largely on my own but on a project defined by the research managers at my lab.
- C: I worked as part of a project team but played a major role in defining the project's direction.
- D: I worked as part of a project team whose direction was defined by the lab.

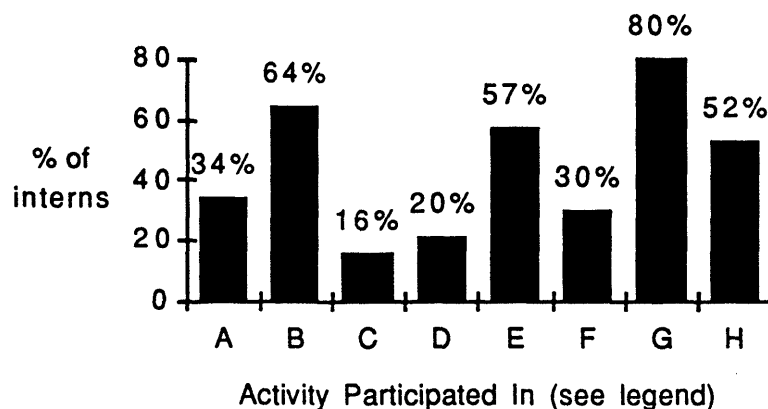
<u>Cross Section</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>Total</u>
Male	9	9	7	8	33
Female	4	5	0	2	11
Corporate	5	10	5	6	26
Non-Corporate	8	4	2	4	18
Early	3	2	0	4	9
Recent	2	5	1	3	11
<u>Total</u>	<u>13</u>	<u>14</u>	<u>7</u>	<u>10</u>	<u>44</u>
	29%	32%	16%	23%	100%

The reason given by the interns for the relative autonomy in the selecting and performing work is simple: interns often brought new skills to their labs, and were encouraged to pursue their interests within the context of the lab's stated mission. Also, coming from outside for a limited time with somewhat limited language abilities made it difficult for interns to become deeply integrated into ongoing projects. Several interns were quick to mention that they would never be placed on high-priority or critical path assignments. In spite of the overhead associated with getting interns settled in a new work environment, there can be no doubt that interns benefitted their Japanese host organizations in tangible ways.

As the relationships between the host organizations and the MIT Japan Program become solidified and fine-tuned, the list of accomplishments of the interns in Japan grows ever more impressive (Figure 4.9). The interns served their host organizations well as translators, with 57% translating technical materials from Japanese into English, and 30% translating technical materials from English to Japanese. Fully 64% presented a technical report in Japanese, and 34% contributed to a group research report using that language. Surprisingly, only 16% gave a presentation on the state of their field in the U.S.

The area of patents was particularly interesting. No women and nine men reported filing patents. All nine men were corporate interns since 1986. Also, in the area of technical translation, a higher

Figure 4.9: Intern Activities



Question #8: During your internship, which of the following experiences did you have?

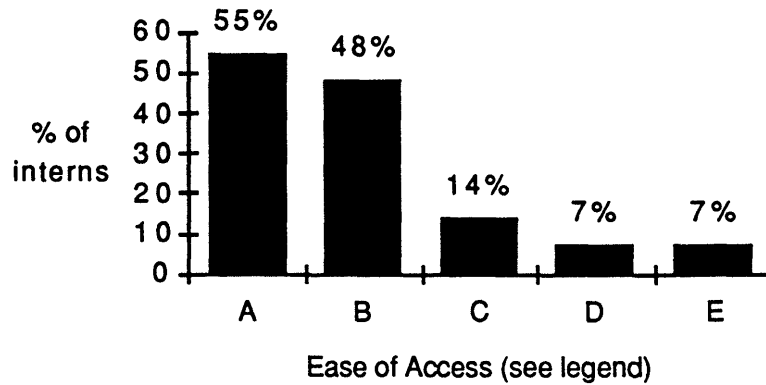
- A: Contributed to a group project report in Japanese
- B: Gave a research report in Japanese on your own work
- C: Gave a presentation on state of research in field in US
- D: Filed a patent application
- E: Helped translate Japanese technical materials into English
- F: Helped translate English technical materials into Japanese
- G: Went on a group retreat/vacation
- H: Joined a hobby or sports club

Cross Section	A	B	C	D	E	F	G	H	Total
Male	13	20	2	9	17	9	26	16	33
Female	2	8	5	0	8	4	9	7	11
Corporate	11	18	5	9	15	6	21	14	26
Non-Corporate	4	10	2	0	10	7	14	9	18
Early	4	5	1	0	5	3	8	6	9
Recent	4	7	2	4	9	2	7	4	11
Total	15	28	7	9	25	13	35	23	44
	34%	64%	16%	20%	57%	30%	80%	52%	100%

percentage of recent interns (82%) than early interns (45%) translated technical materials from Japanese to English, whereas early interns were more likely to perform the reverse (33%) than recent interns (18%). These statistics might reveal a trend toward achieving one of the MIT Japan Program's stated goals, "making what has traditionally been a one-way flow. . .into a two-way exchange of information."

In general, interns were able to visit other research projects within their host organization, but it usually required some effort. Almost half (48%) had to take the initiative in requesting contact, and for 14% it required "persistent effort". Only 7% were unable to make contact with other research groups, and the same percentage were not interested in making contacts (Figure 4.10). Some interns did mention that they were excluded from "sensitive" areas, ranging from workstation rooms to libraries to production areas. Generally, non-corporate interns found it easier to make contact with other research groups. Only 27% of corporate interns were able to contact research groups outside their company, whereas 56% of non-corporate interns were able to do so. The introduction was usually handled through a research supervisor or fellow Japanese researcher (Figure 4.11). Recent corporate interns have been the first to claim that they were "unable to make contact with other research groups", perhaps indicating that such contact is becoming more difficult.

Figure 4.10: Intern Access to Other Groups

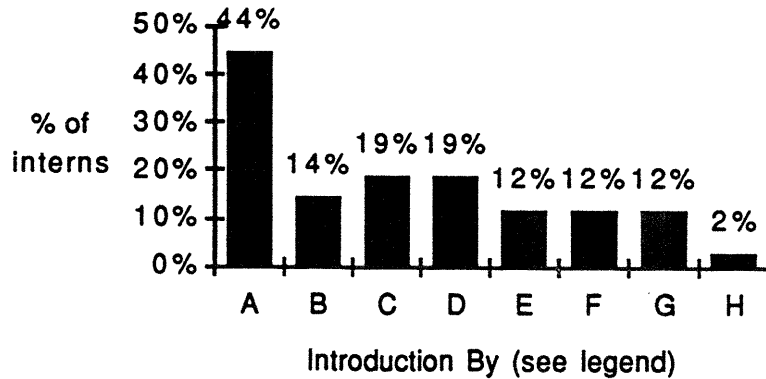


Question #9: Which of these statements accurately describes your own experience?

- A: Invited to visit other research projects at my research site.
- B: I could easily make contact with other research groups, but I had to take the initiative in requesting it.
- C: Making contact with other research groups required persistent effort on my part.
- D: I was unable to make contact with other research groups.
- E: I was not interested in making contact with other groups.

Cross Section	A	B	C	D	E
Male (33)	17	17	6	3	3
Female (11)	7	4	0	0	1
Corporate (26)	13	10	4	3	1
Non-Corporate (18)	11	11	2	0	2
Early (9)	8	5	1	0	0
Recent (11)	6	4	0	2	0
Total (44)	24	21	6	3	3
	55%	48%	14%	7%	7%

Figure 4.11: Corporate Lab Introductions



Question: Did you have opportunities to visit corporate labs? (A)
If "yes", who introduced you to the lab?

- B: Research supervisor
- C: Japanese professor
- D: Japanese researcher in your lab
- E: American friends
- F: Other Japanese friends
- G: MIT contacts
- H: Others

Cross Section	A	B	C	D	E	F	G	H
Male (33)	15	4	7	6	5	5	5	1
Female (11)	4	2	1	2	0	0	0	0
Corporate (26)	9	4	1	3	3	1	2	0
Non-Corporate (18)	10	2	7	5	2	4	3	1
Early (9)	6	1	3	2	3	1	1	1
Recent (11)	4	2	2	3	1	1	1	0
Total (44)	19	6	8	8	5	5	5	1
	44%	14%	19%	19%	12%	12%	12%	2%

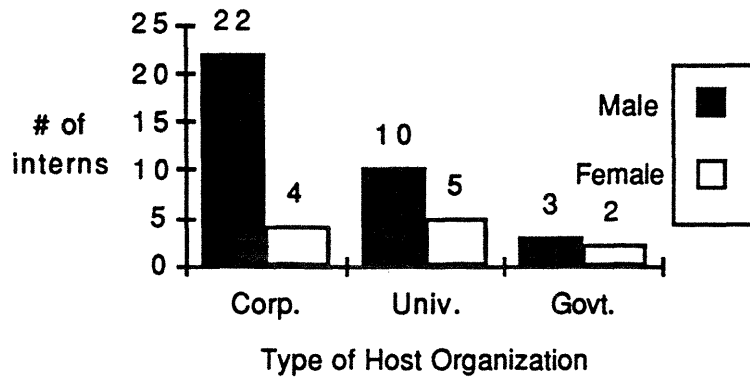
- Corporate Intern Experiences

Of the interns surveyed, 59% spent their internships working inside a Japanese corporation (26 in all). Two-thirds of the men and one-third of the women surveyed worked for corporate labs. Of the four women respondents working in corporate labs, two of them were recent interns. Also, whereas most early interns worked in university labs, the majority now work in corporate labs (Figure 4.12).

Of the 54% (14 in all) of corporate interns who had previous industry experience before going to Japan, only one was female. None of the early interns surveyed had worked in industry before, whereas more than half of the recent interns had. No women reported that they interacted with manufacturing or technical subcontractor personnel, and only a few of the men did. Most interns interacted with researchers from other labs in the company and corporate staff (Figure 4.13).

Given that much time was spent in the office, it is worthwhile to dwell on the corporate office environment briefly. In almost all cases, many groups were placed in an open room (a "basketball court" as one intern described it) with islands of steel desks tightly packed together. At the front of the room, facing the rest, were the group leaders, backs literally to the wall. There were no walls or sound-absorbing partitions. Between the office equipment and people talking, the sound level was always high and could increase "to the

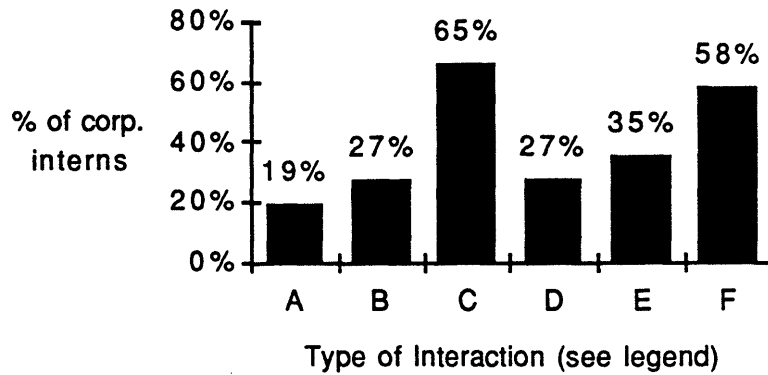
Figure 4.12: Sample Intern Placements



Cross Section	Corp.	Univ.	Govt.	Total
Male	22	10	3	33
Female	4	5	2	11
Early	3	5	1	9
Recent	9	2	1	11
Total	26	15	5	44
	59%	34%	11%	100%

Note: Individual percentages do not add to 100% since some interns spent time in two different types of organizations and are "double counted".

Figure 4.13: Corporate Intern Interactions



Question: Did you personally, in the course of your project, interact with

- A: People from manufacturing
- B: Technical people from subcontractors
- C: Researchers from other labs within the company
- D: Researchers from government labs
- E: Researchers from university labs
- F: Corporate staff

Cross Section	A	B	C	D	E	F	Total
Male	5	7	14	6	7	12	22
Female	0	0	3	1	2	3	4
Early	2	1	3	1	1	1	3
Recent	0	3	5	3	2	7	9
Total	5	7	17	7	9	15	26
	19%	27%	65%	27%	35%	58%	100%

point of ridiculousness" according to one intern. Nevertheless, the worker was always in direct verbal and visual contact with his co-workers.

The layout of the office reflected the organization: spare, efficient, and hierarchical. A strict hierarchy existed in almost all host organizations. The reason for this hierarchy was two-fold: (1) to keep track of the work, and (2) to keep track of the workers. In establishing a direct reporting relationship with their superior for every member of the organization, management was aware of all the organization's activities. No groups were permitted to "drift off" to pursue "special projects". While this may have inhibited "skunkworks" like those found in American corporations, the advantages are obvious: enhanced communications of results throughout the organization and elimination of redundant activities.

The hierarchy also allowed management to keep track of the organization's most critical resource: its workers. Supervisors kept close tabs on their subordinates' work, sometimes degenerating into micro-management. The junior level employee is hired straight out of the university and is not expected to contribute immediately to the company. Rather, the first few years on the job serve as a sort of "apprenticeship" whereby he becomes a "Toshiba man" or a "Hitachi man". Training in the company's philosophy was considered as important as obtaining job-related skills.

Such indoctrination and close scrutiny can cause young Americans to chafe, especially coming from an academic environment like MIT. It is often the case that interns are irritated at the hierarchy, but by the same token they see a reason for it. In promoting people by seniority as well as merit, there is no "fast track". You only become a senior-level manager after many years of technical work. This has two advantages: you incorporate an understanding of technology into your decisions, and have a thorough knowledge of the organization from its lowest levels. Also, by hiring and training new employees in "classes", companies create horizontal communication networks throughout the organization that serve to enhance productivity and loyalty. When one intern mentioned his age and years of education/work experience, his Japanese colleague rightly guessed that the American had skipped a grade in school. Such is the concern with the predictability of career progression in Japanese corporations.

Rotation of workers is another feature of Japanese corporations. Nearly every intern who worked in a corporate setting mentioned that every year, the organization was turned on its head and all personnel were deployed in a different position, sometimes seemingly at random. Such juggling of personnel would seem crazy for a western organization; after all, don't VLSI designers and process engineers have different skills and functions in an organization? The point of such rotation is not to shake up the hierarchy (which is in fact quite robust), but rather to provide workers with more skills, enhancing their worth to the organization.

Such flexibility in the "humanware" component of production is quite laudable and leads to sustainable competitive advantage for the company in the face of volatile markets.

A couple of notable examples: at Nissan, every employee has a direct financial incentive (cash bonus) to sell a car every year (managers have to sell two). In addition to increasing sales, this system guarantees that employees keep up with the company's products and develop an appreciation for the customer's needs. At many manufacturing based companies, the new hire is often required to work his first few months on the assembly line. While this would be a humiliation for a newly-graduated engineer or MBA in the United States, in Japan it is seen as simply another component of the overall corporate experience.

The hierarchy is not without its drawbacks. For one, it is almost exclusively patriarchal. One intern commented that her lab had a Japanese female researcher, but "she had a nervous breakdown and had to leave." Interns reported an astonishingly small percentage of women in managerial positions, and no female professors. Women in corporations functioned mainly in entry-level staff or professional positions. Many "retired" by the age 30, by which time they were married, often to a coworker. The tightness of the pyramidal hierarchy and "good-old-boy" network fostered by it, rather than the lack of qualifications on the part of women, is probably responsible for this state of affairs. The underutilization of this resource, especially when Japanese corporations are facing a labor shortage in

professional workers, might cause Japanese companies to reevaluate this situation.

With almost no female Japanese professionals, it is remarkable that American women are able to work in Japanese labs. Nevertheless, female interns mentioned that they did not sense any "female factor" that prevented them from performing their duties for their host organizations. If anything, it was their foreign origin rather than their gender that kept them from being accepted. "They treat you the same as any other (foreign) researcher," remarked one, "like a foreigner: with respect but with distance." Notwithstanding, several female interns mentioned that they were not eager to work for Japanese companies on a permanent basis, given that they had "two strikes against them."

- Non-Corporate Intern Experiences

At MIT and other leading research universities in the US, the graduate environment is characterized by a free-flowing, casual discussion of ideas and sharing of information. The organization of most graduate departments and research groups is fuzzy, if not chaotic. Not in Japan.

In Japan, graduate research groups are an academic version of the rigid corporate hierarchy. At the apex of the pyramid is the senior professor, by whose name the lab is referred to (e.g. "Saitama Lab", not "Electromagnetics Lab.") Below him are several assistants, full

professors in their own right, but nevertheless subservient to the wishes of their superior. These parties form a committee which generates ideas for new research projects and parcels out work among the students. Going down the totem pole (in order) are junior professors, post-doctoral researchers, graduate students, and undergraduate students. Even within groups there are sub-hierarchies based on "years of service" (i.e. second-year grad students are higher than first-year grad students, etc.)

Such a stratification may not seem remarkable, except for the fact that it is strictly top-down. In a fair number of cases, senior professors acted as petty dictators, and their junior professors as "wardens" of the grad students, always with a wary eye on them. (One professor was so petty as to forbid a certain convenient matrix notation from being used in articles from his lab, for reasons unknown.) Graduate students and even junior faculty were assigned research projects to perform, and had little discretion in choosing their work. This prevented the "bubbling up" of good ideas or even feedback on the work from those lower in the hierarchy. Burdened with administrative responsibilities, the senior professor had little time for casual interaction with his students.

Indeed, graduate school in Japan does not look very much like graduate school in America. In Japan, graduate students are expected to complete their degree in a fixed amount of time: two years for a masters, five years for a Ph.D. Almost all students stick to this timetable, with very little variation. Most university interns

considered the teaching uninspired and even "downright boring." The graduate students themselves were described as "earnest and colorless", with little interest in or time for outside activities. They are discouraged from having significant lives outside the lab, and generally hang out there, "since they have no place else to go and nothing else to do." The worst cases of goldbricking were observed in graduate labs. Mah-jong, manga reading, smoking, reading newspapers, drinking coffee--all were favorite pastimes. Even marriage was discouraged. Upon hearing that one of his grad students was getting married (with several years to go in his Ph.D.), his professor was extremely upset and boycotted the wedding rather than offering his congratulations.

As several interns remarked, the Japanese graduate students did not seem genuinely enthusiastic about their research. Graduate school was more a matter of marking time for them, until they went to work in industry, which most of them did. Rather than pursue risky new research, they tended to pursue "safe" projects which would allow them to graduate on time. This tendency echoes that of Japanese industry to pursue medium-term, "bang for the buck" research. Their studies consisted mostly of scanning the literature, assimilating a massive amount of knowledge in a short period of time. Groundbreaking research was almost non-existent and practically discouraged. This may be due in no small part to the poverty of most Japanese graduate research departments, an astounding and stark reality in the face of Japan's wealth and technological prowess.

Facilities in non-corporate labs were consistently rated below those of MIT. "Technical library and related support services" were rated worse by 78% of this group of interns, and "electronic networking" worse by 89%. Not a single respondent rated the facilities at their Japanese host organization "better" than at MIT, and some made a point of writing "much worse" in the margins after their response. In other categories, the Japanese hosts didn't fare much better. Although a few interns rated "equipment" as better than at MIT, the majority thought otherwise. "Technical support staff" was rated equal to or below that of MIT.

While all Japanese with ambitions of rising up in a company obtain a masters degree in a technical field, there is little incentive to continue on for a doctorate. Only those interested exclusively in academia go on for their Ph.D., because Japanese companies, even those heavily involved in "basic" research, do not place the premium on the Ph.D. degree that American firms do. Anyone who really wants the degree can obtain a "paper Ph.D." while working for a company.

As with all activities in the lab named for him, the senior professor exercises a great deal of influence in the placement of his students so carefully prepared for an industrial career. According to one intern, the professor "kind of lets the student know what his options are." The professor is in close contact with industry, from whence he obtains funding and equipment in exchange for providing new, well-trained employees. Over half (57%) of university interns

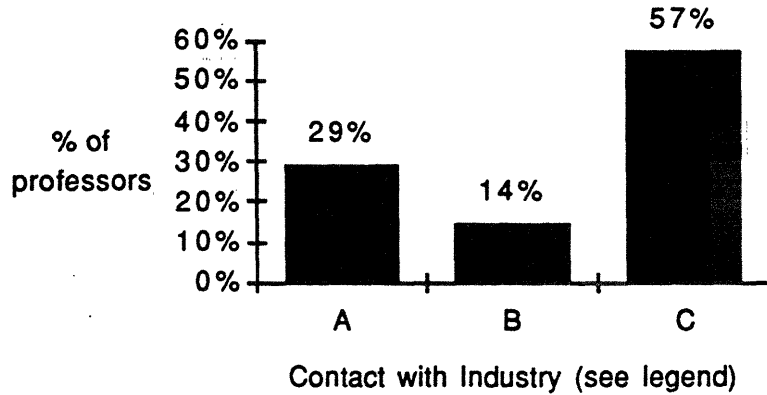
mentioned that their professors had "greater contact over recruitment" with industry than their MIT professors did (Figure 4.14). Government interns reported close ties with university professors and industry as well.

The strong hand played by the professor in placement is borne out by the following. As in the US, many highly qualified, technically trained graduates are attracted by the higher pay and perks offered by financial institutions than manufacturing concerns. (One intern estimated that due to the current seller's market for technically-skilled workers, one-third to one-half of them are choosing employment in the financial sector.) One professor convinced a student of his to turn down a lucrative offer he had accepted (without the professor's knowledge) from a bank, and instead made arrangements with a chemical company for a job for the student.

- Communication Networks

While encouraging communication *within* groups, the rigidity of the organizational hierarchy can inhibit the exchange of information *between* groups. Most university interns were struck with the lack of interaction between academic departments, or even between groups within the same department. Groups working on the same area of research in the same field interacted sparingly. Even when making presentations at technical conferences, Japanese presenters held back research results 'proprietary' to their organization, while gathering as much information as possible from others. Perhaps this

Figure 4.14: University Professor Contacts

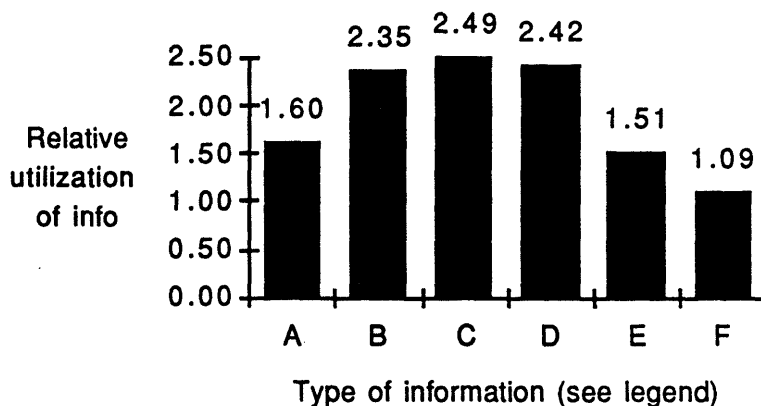


Question: How would you compare the contacts between the professor with whom you worked in Japan and industry, and industrial contacts of your MIT professors? (University interns only)

- A: Same intensity of contact
- B: Less financial linkage
- C: Greater contact over recruitment

Cross Section	A	B	C	Total
Male	3	2	6	10
Female	1	0	2	4
Early	2	1	2	5
Recent	1	0	1	2
Total	4	2	8	14
	29%	14%	57%	100%

Figure 4.15: Sources of Information



Question # 15: How extensively did the researchers in your lab make use of the following to keep abreast of technical developments in their own and related fields?

Scale: 3 = very extensively
1 = somewhat
0 = not at all

- A: International conferences
- B: Foreign-language publications
- C: Japanese publications
- D: Conferences in Japan
- E: Personal contacts at other labs in Japan
- F: Personal contacts with foreign researchers

Cross Section	A	B	C	D	E	F
Male (33)	1.79	2.30	2.30	2.44	1.39	0.73
Female (11)	0.91	2.27	2.82	2.36	1.73	1.18
Corporate (26)	1.65	2.46	2.62	2.35	1.19	0.85
Non-Corporate (18)	1.44	2.06	2.17	2.39	1.89	1.39
Early (9)	1.22	2.44	2.67	2.22	1.56	1.00
Recent (11)	1.73	2.27	2.65	2.18	1.45	1.27
Averages	1.60	2.35	2.49	2.42	1.51	1.09

explains why researchers tended to make use of Japanese and foreign *literature* and Japanese *conferences* more often than *personal contacts* for keeping up with the latest technical information (Figure 4.15).

One intern who worked in a basic research lab commented that the resources of the applied lab adjacent to hers were off limits, due to political infighting between the heads of the labs. Several interns remarked that in order to borrow equipment from another lab involved a great deal of effort, the transaction requiring approval at the lab head level. Another intern reported that design schematics were routinely burned, and when he failed to destroy a meeting schedule was reprimanded by his superior.

Crossfertilization was not as common in Japanese university labs as in US labs. Industry and academia interacted at the top administrative levels, and not the grass roots, according to interns. Accessibility to junior faculty in their own field was better than in the US, but access to faculty in a *different* field was much worse.

Facing such barriers to communication, to fellow researchers in the same field and other fields, and to 'upper management' above, it is not surprising that the graduate experience became a sort of bureaucrat-in-training process. Students are required to publish and present papers at conferences, whether they have anything new to say or not. It is the exercise that is important, not the content per

se. While there are some truly promising researchers in Japanese graduate schools, the majority are industry apprentices.

As with graduate labs, corporations are organized around technology *sectors*. Within each sector there are various research *groups* which pursue work along the line of their technology-oriented charter. Each group consisted of roughly five sub-groups, with 8-12 people per sub-groups. Even within sub-groups, there were task-oriented groups of 2 or 3 people. Hence, the lab typically consisted of several hundred researchers.

Interestingly, within a corporate setting, interns reported that coworkers were free with the flow of information. One intern ascribed this to the "job security" aspect--in the US, one is more prone to protect information to their benefit and the organization's detriment. Although what meetings there were were formal, overall there were fewer meetings than in an American corporate setting. This was ascribed to the continuous interaction of Japanese workers in their open office. Everyone knew what was going on around them, so there was less need for information-dissemination and meetings served more of an educational role. Curiously, computer networks are sparingly used by employees in Japanese organizations. Computers, rather than being PCs on the desktop, tended to be workstations in another room ("walkstations" as one Japanese student put it).

An important method of information dissemination was through patents. The filing of patent applications was encouraged and rewarded by Japanese companies to an extent not usually seen in the US. All technical professionals were schooled on the patent application process by their managers, and company publications describing patent writing and filing procedures were handy to engineers. There were lab quotas on patents, and even patent brainstorming sessions, where groups would sit in a conference room and dream up patent possibilities from their ongoing efforts. Two of the main productivity measures by which a research lab was graded were (1) number of research publications in English, and (2) number of patent applications filed. Interns contributed to this output, 21% of them filing and obtaining patents in Japan as a result of their stay there, with one intern obtaining six patents in two years alone.

CHAPTER 5

AFTER INTERNSHIP

- Short-term career impact

Generally, interns have pursued three different options following their year-long internship in Japan: return to academia, join industry, or extend their internship with their Japanese host organization. Depending on the stage in their career, those returning to academia come back as graduate students, post-doctoral fellows, or assistant professors. Those joining industry usually did so for American companies in the US, typically as entry-level technical professionals. A handful of interns extended their stay in Japan with their host organization, for an extra year or even longer.

For many interns, the Japan internship occurs at a natural break point in their academic career: between bachelors and masters degrees, between masters and doctoral degrees, or (less frequently) after completing a PhD. In this manner, the internship causes the minimum disruption in terms of completing MIT degree requirements. In fact, a year in a Japanese lab at the right stage of a graduate student's career yield a significant push toward completion of a masters or a PhD. Several interns who have returned to the US to complete advanced degrees mentioned that their on-going contact with their Japanese host has provided them with fresh theoretical approaches, lab techniques, and even materials which were of benefit to them in completing their studies. With Japanese

corporate labs having researchers and equipment on par with leading American universities, an intern sacrifices nothing in spending a year doing research there. Unfortunately, the same cannot be said of poorly-equipped Japanese university labs.

Interns who go to Japan with PhDs have more difficulty reintegrating with the academic world upon their return to the US. One such intern stated that he was "ambivalent" regarding his experience in Japan and the impact on his career. He felt that while the experience was definitely worthwhile on a personal level, professionally it set him back one year. Part of the reason was the dearth of regular PhDs at his host company, as opposed to "paper" PhDs. (In Japan, company employees with masters degrees can use work experiences as the basis of a doctoral dissertation, leading to a "paper" PhD, as opposed to one earned through on-campus research). He also cited the difficulty in searching for an academic position in the US from Japan, although he ultimately found one.

Interns heading into industry upon their return have their own set of considerations. A big plus is access to the MIT Japan Program corporate sponsors, among the most prestigious companies in American industry. Their interest in the program and the interns it generates, along with the help of the MIT Japan Program staff, lead to a number of suitable placements. Most interns express an interest in working for one of the corporate sponsors, and some end up doing just that. Others find placements with other companies through their own contacts. In no case did a returning intern end up

unemployed for an extended time (greater than three months) upon their return from Japan.

Nevertheless, some industry-bound interns expressed frustration that companies did not take more interest in their Japan experience. By and large, they went through the same recruitment cycle as their MIT classmates who did not go to Japan, and were hired primarily for their technical abilities. While their Japanese language ability and experience in Japan did not hamper their chances, these things did not seem to help significantly in obtaining the first job. This came as a letdown to some interns, who through their recruitment and placement in Japan, and the monumental effort put into their training, had been made to feel part of a special group. While they are undoubtedly special, given not only their MIT training as well as their Japan experience, the reality is that the investment in "Japan awareness" may pay large dividends in the long run, but perhaps not always in the short run. The interns may collectively be described as a "public" good for US industry, whose benefits may not be fully appropriable by any single individual or firm.

For interns who remained in Japan, there were rewards. After one year, interns felt "settled in" and more comfortable: with the language, with the society, as well as with their company and co-workers. A prime example is provided by the intern who remained an extra year wrote three papers and filed five patents his second year, versus one paper and one patent in his first year in Japan.

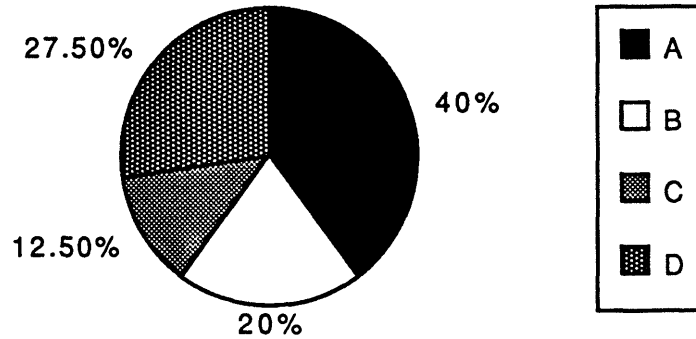
- Long-term career impact

In the long run, how does a Japan internship figure in the intern's career? Although early interns have only been in the workforce for a little over five years, some of them are already headed back to Japan for a two-to-three year stint. While all interns expressed an interest in returning to Japan, not all of them have yet found an opportunity to do so. Few were interested in long-term (greater than five year) assignments in Japan, or working full-time for a Japanese company anywhere.

When asked how much they are making use of their Japan experience in their current position, 40% responded "a great deal", 20% responded "somewhat", and 40% responded "very little" or "not at all" (Figure 5.1). The most frequent response among women was "not at all" (50%), and among men, "a great deal" (44%). Corporate interns reported that they made use of their experience slightly more often than non-corporate interns. This may partly be due to the fact that some non-corporate interns are still in academia and may not have had a chance to use their Japan experience in an industrial setting. As mentioned previously, more women respondents were in university or government settings than men.

While 50% of recent interns responded that they make use of their Japan experience "somewhat", the same percentage of early interns make use of it "a great deal". This is a positive sign that interns make use of their Japan experience more and more as their career

Figure 5.1: Current Use of Japan Experience



Question #21: Does your current position make significant use of your Japan experience?

A: Yes, a great deal

B: Somewhat

C: Very little

D: Not at all

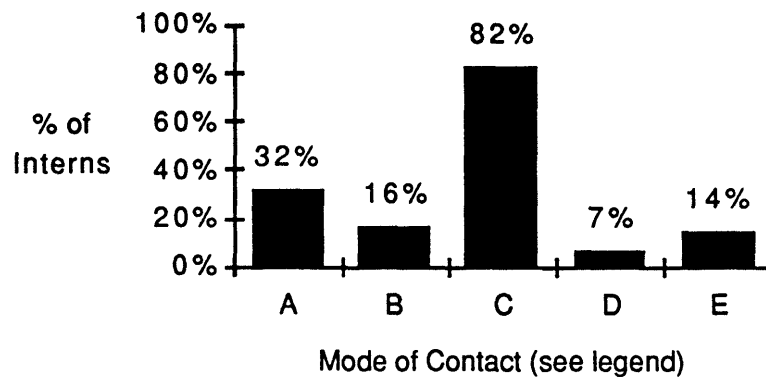
Cross Section	A	B	C	D	Total
Male	14	7	4	7	32
Female	2	1	1	4	8
Corporate	8	7	3	5	23
Non-Corporate	8	1	2	6	17
Early	4	0	1	2	7
Recent	1	4	0	3	8
Total	16	8	5	11	40
	40%	20%	13%	27%	100%

progresses. This was corroborated by the interviews, in which several early interns mentioned that patience was required in terms of looking for Japan-related assignments. Several of them (the early interns) are heading back to Japan or have plans to work with Japanese partners in the future.

While the 40% of the interns using their experience "very little" or "not at all" seems to represent the underutilization of a valuable and painstakingly developed resource, there are several caveats. Some of the interns have not yet completed their graduate studies, so that they may not have had a chance to use their Japan experience fully. Many of those that have gone into industry have only been with their companies for a few years and may not have yet had the opportunity for a Japan-related work assignment.

This is not to say that interns cannot capitalize on their Japan experience immediately in smaller ways. When asked about continuing contact with their Japanese hosts, 82% of interns mentioned a "friendly exchange of cards and letters", and only 7% reported "no contact". One-third of the interns surveyed reported "direct personal contact through travel", and one-sixth reported "continued exchange of technical materials" (Figure 5.2). Men, corporate interns, and recent interns were the most likely to be exchanging technical materials with their Japanese hosts. Nevertheless, early interns are for the most part still in touch with members of their host organization, demonstrating the permanence of the bond formed with Japanese colleagues over the years. More

Figure 5.2: Continuing Contact with Japan



Question #19: Which statement(s) describe your contacts with Japanese researchers since leaving Japan?

- A: Continued direct personal contact through travel
- B: Continued exchange of technical materials
- C: Friendly exchange of letters and cards
- D: No contact
- E: Other (e.g., "electronic mail")

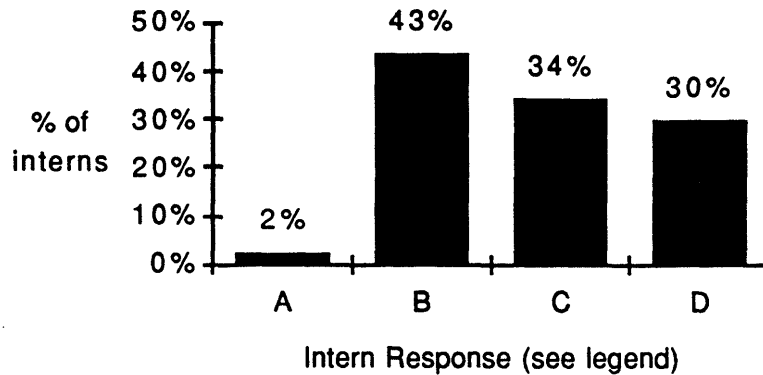
<u>Cross Section</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>Total</u>
Male	11	7	27	3	6	33
Female	3	1	9	0	1	11
Corporate	8	5	23	1	2	26
Non-Corporate	6	2	13	2	4	18
Early	3	0	7	1	0	9
Recent	2	3	10	0	1	11
<u>Total</u>	<u>14</u>	<u>7</u>	<u>36</u>	<u>3</u>	<u>6</u>	<u>44</u>
	32%	16%	82%	7%	14%	100%

than one intern mentioned a significant fringe benefit of their intern experience being ongoing networking with "the Tokyo international community", which is a growing and important source of contacts for Americans. Given the one-year investment by the interns in living in Japan, they make a point of deriving continued benefit from their experience.

A few interns do technical translation from Japanese to English, either for their work or to make money on the side. Many interns are asked to host Japanese visitors and act as translators. As one intern observed, "relationships are important in Japan", and his presence at meetings makes them go "two or three times faster", not only because of his facility with the language and culture, but because he personally knows the Japanese he is dealing with in the joint venture between his Japanese host and American employer.

Taking a step back, interns were asked to reflect on their intern experience. The overwhelming conclusion was that interns were glad they took advantage of this unique career and life experience. Only one out of 44 interns surveyed felt that the time in Japan was not worth it (Figure 5.3). This is not to say that there isn't room for improvement. While two-thirds claimed that they "gained useful technical experience and knowledge" in Japan, only 34% said it was "useful to me in finding a position upon my return". Another 30% claimed "potential employers have not put much value on the experience." Even the 43% for whom the internship was "not

Figure 5.3: Evaluation of Internship



Question #20: Which of the following statements describe your evaluation of your internship experience?

- A: In retrospect, neither the technical benefits nor the learning experience were worth the investment of time and effort.
- B: I found it personally rewarding, but not particularly useful in improving my technical abilities and technical knowledge base.
- C: I gained valuable technical experience and knowledge, and it has been useful to me in finding a position on my return.
- D: I gained useful technical experience and knowledge, but potential employers have not put much value on the experience.

Cross Section	A	B	C	D	Total
Male	1	12	15	10	33
Female	0	7	1	3	11
Corporate	1	8	10	8	26
Non-Corporate	0	11	5	5	18
Early	0	4	4	2	9
Recent	1	3	3	5	11
Total	1	19	15	13	44
	2%	43%	34%	30%	100%

particularly useful in improving my technical abilities and knowledge base" found it "personally rewarding."

Ultimately, responsibility for placement of the interns and utilization of their unique skill set lies with the interns themselves. They must be proactive in seeking employment that will make use of their Japan experience. In many cases, they are successful. Nevertheless, as with any goal, it requires persistence and patience. A few interns have been able to find "dream jobs" which allowed them to use both their technical skills and Japan experience. This is the exception rather than the rule, however.

Several interns now play leadership roles in significant US-Japan joint ventures in electronics and aerospace, to name two examples. Another intern plays a key role in adapting his company's software products for the Japanese market, where they are quite successful. More and more intern success stories will undoubtedly be told in the years to come as the number of interns returning from Japan and entering industry continues to increase.

CHAPTER 6

WHAT CAN WE LEARN FROM JAPAN?

The MIT Japan Program has seen dramatic growth in its ten years of existence, sending five interns in 1983 to Japan for the first time, and 48 last year. In all, over 250 MIT students have spent a year in Japan, working for an astonishing array of organizations and in a wide variety of technical fields (Appendix A). These interns have had an unprecedented opportunity to observe Japanese industry at the grass-roots level. What did they observe? Which things did they like the most about Japan and Japanese industry? The least? To what extent were the new things they observed in Japan "culturally based"? How tightly is Japanese productivity linked to Japanese culture? What things are not necessarily culture-based, but are just good engineering and management practice? How much of what the interns were exposed to can be transferred to an American setting? What things are not worth emulating? How can the US best benefit from a new natural resource: the MIT Japan Program interns themselves?

Sometimes learning involves "unlearning", or clarification of previously-held information which is not always correct. Much of what the interns saw in Japan fell into this category. Japan is no longer a "black box" to the interns. They have looked inside and have seen a complex system from many different angles. Therefore, their testimony will not always agree, especially with the perceptions of outsiders. Hence, some intern observations tend to question

commonly held beliefs about Japanese R&D management. Ten such observations, supported by intern responses, are presented below.

Ten Observations about Japanese R&D Management

Obs. #1: Researchers in university and government labs work just as hard or harder than those in corporate labs

Although on average corporate interns worked longer days, non-corporate interns worked more hours per week (Figure 4.4). This was mostly due to weekend work, with a full day on Saturday being normal, as opposed to at most a half day in industry. Despite the fact that the work day usually started later for non-corporate interns, they worked long into the night, well past dinner in most cases. Not only did they work longer hours, they were expected to work more than their corporate intern counterparts (Figure 4.3). Also, several corporate interns mentioned that their supervisors asked them not to work too late, and in a few cases were required before others since they could not be the last to leave. By contrast, university interns felt pressure to "hang out" in the lab with their fellow graduate students, a feeling their professors did not discourage.

Obs. #2: Industrial managers are often well versed on the state of the art of technology , whereas professors may not be

Professors, with their heavy administrative duties and their tendency to overmanage, can become distant from the cutting edge

of technology. Graduate students are not encouraged to be truly original thinkers, but rather dutiful executors of the lab's research projects, many of which involve dissemination rather than creation of information. This sort of academic environment can be stultifying indeed. (In all fairness, it should be mentioned that certain professors were called upon to advise MITI on the state-of-the-art in their technology specialization.) By contrast, corporate labs were often world leaders in their given field (e.g., NTT and KDD in optoelectronics). Corporate interns were uniformly impressed with the technical training of all managers in their companies, and the ability of even top managers to understand technical details.

Obs. #3: Japanese R&D organizations do not always encourage the free flow of technical information

While flow of information is encouraged within the immediate group, it can be viewed as a commodity to protect. Especially between different organizations (e.g. corporate/corporate linkage), or even different types of organizations (e.g. corporate/university linkage), the barriers to communication can be high. Most interns remarked about the lack of crossfertilization in Japanese R&D. Interns believed that Japanese researchers much preferred publications to personal contacts as their source of technical information (Figure 4.15). Corporate interns were twice as likely to interact with researchers from other labs within their company as with non-corporate researchers. Nevertheless, they were even less likely to interact with manufacturing employees or technical

subcontractors within their company (Figure 4.13). Only 44% of interns were able to visit other corporate labs (Figure 4.11), and for some it required persistent effort (Figure 4.10).

Obs. #4: Japanese R&D labs are not all business

While several interns commented on the "workmanlike" nature of their workplaces, there were exceptions. Non-work activities, such as planning group outings, could be important in deciding promotions of junior engineers into group leaders. One intern mentioned that she was permitted, even encouraged, to take time off from work to root for the company baseball team. Even those labs that enforced a military-style discipline had their inefficiencies (e.g. "hanging out" at university labs.) Often employees would be sent off for self-improvement courses or to present a paper at a conference, even if it didn't have direct relevance to the group's immediate task. While project deadlines were rarely if ever missed, managers had the responsibility to develop their employee's skills set as well.

Obs.#5: Japanese R&D projects are not managed by consensus

While consensus is an important part of the management process in Japanese R&D, important decisions are made at the top of a rigid pyramidal hierarchy and passed down. While most interns worked on their own, more than half worked on projects defined by their lab managers (Figure 4.8). Responsibility is given to the individual

employee for the execution of his or her given task, but influence up the hierarchy is limited.

Obs.#6: Japanese R&D organizations do not run as smoothly as a well-oiled machine

The office environment for interns was anything but orderly. At times the noise level, commotion, and crowding prevented one from thinking, much less getting useful work done. On "Safety Week", people saluted a safety flag, made up safety posters (as if in kindergarten), listened to a safety rock band, and observed a minute of silence for meditating on safety. Nevertheless, employees played "hide and seek" with unsafe equipment during safety inspections. "People act rationally within their given context," noted one intern, "and what seems like silliness at the micro level adds up to sanity at the macro level." While it is undoubtedly the case that in most ways Japanese R&D organizations are well disciplined, interns saw that the ships weren't always so tight.

Obs.#7: Communication in Japanese R&D organizations occurs both with and without the use of group meetings

The proximity of Japanese researchers to each other reduces the need for coordination meetings. As a result, meetings can be used for technical information dissemination. These meetings are typically formal presentations of research results or technical

papers. The necessity for meetings in order to get work done is less, but the value of "seminar" style meetings is more.

Obs. #8: Japanese companies, though expanding globally, are no less nationalistic nor willing to purchase quality hardware from abroad

Many interns, in addition to commenting on latent nationalistic sentiments in their Japanese host companies, noted how one-sided their procurement is. As an example, one intern attempted to buy a Sun workstation for his use. He was told to purchase a Japanese make, even though it didn't offer the features he specifically needed. After much protest, he was permitted to buy the Sun workstation he wanted, but only if it was assembled in Japan. "The 'borderless economy' is a concept that Japan uses to its advantage. Buy American," the intern admonished.

Obs. #9: Japanese graduate research universities are poor, belying an otherwise strong education system

Probably the most striking contrast encountered in this study was the one between corporate and non-corporate labs. First of all, much of employee development occurs within corporations, and graduate schools act as "feeders" into industry rather than academia. New employees are not expected to produce right away, so they justly take credit for the training and accomplishments of their staffs. By contrast, the Japanese higher education system, as experienced by

the university interns, was a disappointment. All these interns noted that the facilities at their Japanese host were worse than at MIT. More than half felt that the experience was "not particularly useful in improving my technical abilities and technical knowledge base" (Figure 5.3), and less useful in their current position than for corporate interns (Figure 5.1).

Obs. #10: Japanese society is generally hostile to foreigners, but polite to its "guests"

Interns were welcomed profusely by their host organization, which usually took care of housing accommodations for the intern. The intern's housing was usually heavily subsidized, and equal to or superior to that of his Japanese peers. Also available were subsidized meals and transportation. Interns were encouraged to participate fully with their group's activities, both in and out of work (Figure 4.9). Virtually all interns were glad they had taken advantage of the opportunity to live in work in Japan. For most it was a positive experience, and for a few, bittersweet. The general feeling was summed up by one intern who said, "I loved the people, but could do without some of the elements of the society."

Praise for Japanese R&D Management

While certain commonly-held perceptions were challenged during internships, others were confirmed. Almost all interns had good things to say about the Japanese R&D system and society in general.

Probably the most important lesson was: people matter. Much of the time and attention spent in their host organizations was oriented toward the training and productive deployment of human capital. Financial and even technological considerations were secondary to this prime objective. As one intern summarized, "there is no magic: Japanese organizations address human needs." Security, sense of belonging, meaningful work, and even recreational outlets were all provided by host organizations. This is indeed the most transferable element of the entire system--and the most valuable.

- *The Japanese workforce is well educated and well trained*

The most important raw material for industry is people. Just as any manufacturer requires high-quality, reliable inputs from a supplier, a company (or country for that matter) that wants to remain competitive requires a steady supply of well-trained, motivated workers. This is an area where Japan has been more successful than America. Perhaps it is Japan's most significant competitive advantage.

Although education is compulsory only to age 12 in Japan (versus age 16 in the US), 98% of all Japanese complete high school, as opposed to 70% of all Americans. Even among the Americans who do complete high school, there is a wide range of ability, with some already undertaking college-level coursework, and not a few functionally illiterate. Illiteracy is virtually unknown in Japan, with 99% of the population able to read and write the difficult kanji (Chinese

character) based Japanese language. Perhaps more importantly, Japanese high school graduates are math-literate as well. Production workers are able not only to read and use technical manuals, but use algebra in their jobs.

At the college level, the entering students are uniformly well prepared. Survivors of a battery of national university tests ("examination hell"), for which they have prepared virtually since birth, they rarely need remedial courses. One MIT intern who returned to teach freshman calculus at an American college with a good reputation in engineering commented, "I was shocked--my students couldn't do the math I had seen production workers do on the factory line in Japan." He was appalled at the fact that even though his college was known for its engineering graduates, many of those entering required remedial courses. Since these students could not compete with their Japanese counterparts at this level, what confidence could one have that they could compete effectively later on, when it really matters?

- *The Japanese workforce is highly motivated*

A well-trained workforce means nothing if it is not motivated to work. Fear and glory are two strong motivators, and there are many examples of both factors in American industry. Fear of being left behind in the climb up the corporate ladder at the least, and fear of being laid off at the worst, drive American workers. For the more daring, the glory of fame and riches in starting an innovative,

successful company prove irresistible for many an entrepreneur. America is the land of opportunity, providing unprecedented opportunities for individual accomplishment, recognition, and wealth. Many the world over are drawn to her shores by the allure of these opportunities. Nevertheless, the downside is increased risk--risk of personal failure and bankruptcy.

By contrast, some Japanese work for stable organizations which hire them for life, so the probability of dismissal is small. There is no "fast track" to the top--promotions are seniority-based. Movement from company to company is highly discouraged. Although it does happen, the new company is unlikely to greatly increase the individual's pay or responsibility. Even those who make it to the top of the pyramid are modestly remunerated by American executive standards. There are few opportunities for wealth and fame through entrepreneurship, given the oligarchical structure of much of Japanese industry.

So what motivates the Japanese? All interns reported an intense feeling of "pride in workmanship" from all Japanese employees they met, even those at the lowest levels. "The lady who mopped the floor at my company was always friendly and took great pride in her work," commented one intern. "The attitude of 'It's not my job' does not exist in Japan. It is a culture in which you are expected to perform, no matter what your function."

Interns reported that on average, their Japanese colleagues worked 10 hours per day and 5.5 days/week. Variation from these figures was moderate, with several interns indicating a maximum of "24 hours/day" and an average peak of 16 hours/day. As the hours worked figures indicate, interns verified the almost passe observation of Japanese workaholism. Such diligence and discipline seemed to be deeply rooted in the people, not an affected behavior. This devotion to work stemmed from two factors: pride in group affiliation, and sense of worth and duty for selfless effort on the part of the individual. As one intern noted, "education + motivated workforce = success."

- *The Japanese workplace fosters a "family feeling"*

Japan leads the industrialized world in percentage of married adults. Often married couples share their homes not only with their children, but with their parents or even other extended family. Given the typically cramped quarters of Japanese housing, it would be difficult not to develop a "family feeling" living in Japan. This feeling permeates the Japanese workplace.

All interns reported a strong sense of group feeling, not only in their immediate work group, but company-wide. This feeling was reflected in numerous ways, ranging from the singing of company songs to group ski outings. Graduate students were practically ordered by their professor to eat meals together. They would hang out in the lab together late into the night, reading the newspaper,

playing mah jong, smoking, talking, drinking coffee. On the corporate side, the exploits of salarymen in after-hours karaoke bars is the stuff of legend. All of these phenomena serve to reinforce group ties and loyalty to the larger organization. People derive a palpable sense of pride from their association with the organization--it becomes a part of them.

An anecdote illustrates the reverence for the workplace. At a biological institute, where mice were used for conducting experiments, a Shinto priest would come once a month to say a prayer for the souls of the mice who died in the service of science. All employees would gather and observe a minute of silence. Perhaps it is no coincidence that the kanji for *sha* in *kaisha* ("company") also stands for "Shinto shrine".

- *The Japanese workplace values the individual*

The corollary of pride in group affiliation is pride in self. Japanese companies make individuals at all levels feel that they are valued members of the organization. Everyone's contribution, no matter how small, is regarded as important. Not surprisingly, this attitude on the part of the company brings out the best in everyone. Companies back up their commitment to the individual, the valued "family" member, by investing time, effort, and resources in training. Such training is usually done in-house by other employees, rather than by hired consultants. Thus the individual's growth and that of the company are directly linked, with the one nurturing the other. Even

when times are bad, investments in training are maintained (sometimes increased), rather than cut as "unnecessary expenses." The flexible "humanware" component of production is redeployed into new areas rather than dismissed.

A dramatic example reported by one intern was the retaining of steel workers as computer programmers when the Japanese steel market went sour in the mid 1980s. In Japan, manual laborers can be retrained to work in a high-tech environment because (1) they have the basic education in order to learn new skills, and (2) they have the internal motivation and external expectation to do so. They consider themselves as "Nippon Steel men", not just "steel men".

- *The Japanese workforce pays attention to detail*

Japanese dedication to quality is well known. Continuous improvement (*kaizen*) is only possible with a workforce that is dedicated, educated, and detail-oriented. The Japanese language, with its thousands of detailed pictographic characters (kanji), is unwieldy but a useful tool for developing detail-orientation on the part of Japanese youth. The Japanese school system and college tests emphasize memorization of minutiae over originality and creativity.

Perhaps the single greatest contributor to Japanese productivity is the attention paid to all stages of the product development process, from conception to after-sales service. Just as one employee and his

function is no more or less important than another, no part of the process is unimportant. Even less glamorous functions, such as nuts-and-bolts assembly and shipping, are carefully and continuously scrutinized for improvement. Product development cycles are shorter in Japan largely due to the consensus management system and the fact that detailed planning is required for project approval.

- *The Japanese workplace requires technical training for top management*

In addition to being long-term company employees, top managers in Japan are almost always technically educated and experienced. They take a personal and active interest in technical matters throughout their careers, even while top managers. One intern reported an occasion where a *bucho* (division head) corrected a detailed error in a technical presentation by a staff researcher. Before advancing to upper management, employees must spend many years (10-15 on average) working on technical projects, demonstrating competence in a broad range of areas. With this preparation, managers are more attuned to important technology trends affecting their business. Investments are made with a view to a medium-term (5-10 years) horizon, the amount of time required to master a new technology.

Criticism of Japanese R&D Management

Notwithstanding, as one intern observed, "you cannot impose one system on another." Not all the advantages of the Japanese R&D can

be transferred to an American setting, nor is it even desirable to do so. "There is a lot there not worth emulating", commented one intern. Indeed, at times interns were harsh in their criticism of the Japanese R&D system, and not without reason. Much modification of certain aspects of that system would have to occur before it could be effective in a different cultural setting.

- *The Japanese maintain a nationalistic bias*

None of the interns complained about being treated rudely in Japan; on the contrary, their hosts went out of their way to make sure their stays in Japan were pleasant. One intern's supervisor not only met him at the airport when he arrived, but also met him at his apartment the first day to show him the way to work. Examples of such courtesies toward interns were common.

There was, however, one area where some interns felt slighted by their Japanese hosts. In spite of strong efforts toward *kokusaika* (internationalization), many educated Japanese remain intensely nationalistic and some seemed somewhat hostile to foreigners (*gaijin*). "They view themselves as the pinnacle of human kind, and are offensively nationalistic," commented one intern. Indeed, beneath the veneer of hospitality certain prejudices emerged on occasion. In addition to the famous examples of unique Japanese snow (for skis) and wood (for baseball bats)¹, one intern cited the

¹see Prestowitz, pp. 96-98.

following anecdote. A Japanese Ph.D. in his lab was astounded that the intern could speak, read, and write Japanese. His feeling was that only the Japanese mind was capable of comprehending the difficult language, and that westerners were genetically indisposed to it. Another Japanese Ph.D. disagreed with an intern when he suggested the use of DNA-typing to uniquely identify people (e.g. in forensics). He said that "it wouldn't work in Japan. All Japanese would look the same."

Given Japan's importance in the global economy, and its openness to foreign *ideas*, its closedness to foreign *people* was troublesome to some interns. Although almost all interns are eager to return to Japan to work for a few years, none said they wished to return to settle permanently. When asked why, they cited "lack of acceptance in the society" more often than "standard of living" or other reasons. Furthermore, not one intern said they wished to pursue a full-time career with a Japanese company, even on American soil. They felt that they would never get the recognition they deserved *simply because they weren't Japanese*. In perhaps a patriotic reaction to their Japan experience, most cited a desire to work for US-based corporations, "in order to make the US more competitive internationally."

- *The Japanese are status conscious*

To complement the *gaijin* complex toward outsiders, interns report a strong hierarchy among Japanese which belies the egalitarian

aspects of the Japanese workplace previously discussed. In addition to the strong influences of gender and age, the organization with which one is affiliated grants one status. While this is in a sense a good thing, inculcating pride in one's organization, it can get carried to extremes by western standards. As one intern who was a graduate student at Tokyo University ("Todai") said, "When it came to job placement, all that mattered was that you were from Todai." Individual skills, even if poorly developed during two years of graduate training, did not matter. Many interns were disturbed by this aspect of Japanese society. They felt it to be an elitist aspect to a culture otherwise admirable for its respect for the worth of the individual.

- *The Japanese suffer from a lack of crossfertilization of ideas*

Some of the greatest technical breakthroughs and product ideas come from the interaction of industry and academia, as well as interdisciplinary work (e.g. mechanical engineering and biotechnology). In spite of the broad training of Japanese technical professionals and their group orientation, little crossfertilization occurs in Japanese organizations. Organizational barriers created by the rigid hierarchical structure tend to inhibit fruitful collaboration between different groups. Many interns were frustrated at these barriers to doing what seemed to be interesting projects. Japanese work groups act as information hoarders, gathering and sharing as much as possible from outside, but protecting their own secrets.

- *The Japanese undervalue the potential contributions of women*

Although female interns may have been put on a pedestal by their Japanese hosts, they were unique in this treatment. The status of women in Japanese organizations lags far behind that of men. One intern was appalled at their treatment at the hands of the male-dominated hierarchy, particularly if they were career-oriented. They were expected to get married by age 30, and if they did, then to retire from the company to stay at home. Exceptions to the rule were rare. Such a policy is not only costly to the women themselves, which miss out on a significant pool of skilled labor and new ideas. This societal attitude led one female intern to label Japan as "an economic success and a social disaster."

"Battleship Japan"?

To conclude, an interesting model of Japanese industry has been proposed by one intern. Formerly a member of the US Armed Services, he noted many similarities between his host company plant and a peacetime US military base. Both were tight ships, with a disciplined, well-trained corps of troops. A rigid, male hierarchy established a chain of command for disseminating marching orders, which were followed to the letter. Security was tight on base, and sensitive information protected or destroyed. Uniforms were worn, fighting songs sung, and calisthenics performed. Esprit de corps was encouraged and strong. Housing and meals were provided for the corps at subsidized prices. Equipment passed the white glove test

and was safe to operate. The importance of the task at hand required a no-nonsense attitude--at stake was the security of the nation. The corps were often reminded of the importance of their mission in protecting the motherland through patriotic propaganda. If orders came through that required a move to another base, even one overseas or requiring separation from family, they were complied with without complaint. In short, the entire conscious effort of the corps were directed toward the accomplishment of the larger goal.

As another intern commented, "joining a Japanese company is like joining the military or a religious order--it really requires that level of commitment." Only we can decide whether it is worth adopting the Japanese model for industrial success, or retain those characteristics of our society which are at odds with that model. Of course, creative adaptation of Japanese best practices while preserving our own culture and institutions would be the most productive response.

CHAPTER 7

CONCLUSION

In a nutshell, the main findings of this study are as follows:

- The MIT Japan Program provides a valuable window on the Japanese R&D process at the grass-roots level.

As a result of the Program, interns are able to provide accurate, "you are there" observations about R&D in Japan. These observations are valuable not only because they become part of the intern's training, but also because misconceptions about Japan can be cleared up. Such direct contact with Japanese R&D personnel both confirmed suspicions and produced surprises. The existence of the MIT Japan Program is indeed justified in that it makes detailed, grass-roots level observation of the Japanese R&D process like this one possible.

- Despite the demanding nature of the Program, virtually all interns valued the experience and have benefitted from it.

In addition to improving their technical skills, interns gained valuable cultural and language skills in Japan. These skills, combined with the network of contacts made during their stay, should continue to pay dividends throughout their careers. Hence interns are a valuable resource for their employers and the nation, especially in dealing with Japan. It should be added that the

Japanese host organizations also benefitted tangibly from their intern guests.

- Although they would not like to spend their careers working *for* Japanese companies, most interns want to work *with* the Japanese.

Perhaps the most striking finding of this study is the universal rejection of Japanese companies as long-term employers of interns. To a person, interns did not want to work indefinitely for their Japanese hosts. Interns reported that they were treated well, had interesting assignments, and generally enjoyed themselves in Japan. Nevertheless, they did not see a future for themselves in a Japanese organization, having seen one up close. Reasons given for this reluctance included the difficulty of advancement for a *gaijin*, living conditions in Japan, and patriotism. Virtually all interns credited their stay in Japan as heightening their awareness of the country, and the important role it plays in the world. Consequently, most interns expressed a continuing interest in Japan-related work assignments. For this the Program is an essential training. Thus the MIT Japan Program thus plays a valuable role in the training of the interns, providing them a significant but closed-ended exposure to Japan.

We will now examine the results of this study from the perspectives of the three "stakeholders" in the MIT Japan Program: the Japanese hosts, the interns themselves, and the corporate sponsors.

(1) Japanese Host Organizations

In some ways, these organizations have changed a great deal, even within the last ten years. Labs are composed of more foreign researchers and women (Figure 4.5), and mentors have more international exposure (Figure 4.2). Whereas early interns tended to work for non-corporate entities, corporations have become the leading hosts for Japan interns (Figure 4.12). The ties that have been developed over the years with the host companies and the successes of past interns have paved the way for future cooperation.

On the other hand, some aspects of Japanese hosts are constant. Corporations do more applied work (Figure 4.6) and are more likely to assign mentors (Figure 4.2) than universities or government labs. Interns going to work for corporate labs are predominantly male (Figure 4.12), although this is changing. Research assignments still predominantly come from lab managers (Figure 4.8), although increasingly interns are having say in their projects selection and execution. Access to other groups is still limited for interns (Figures 4.10, 4.11, 4.13). Information is gathered through the literature, rather than by personal contact (Figure 4.15), placing one not fluent in reading technical Japanese at a disadvantage. The university--industry complex for personnel training and placement is very tight (Figure 4.14), reinforcing the traditional bonds and hierarchies in Japanese R&D.

(2) MIT Japan Program Interns

The interns themselves are becoming better prepared for their year in Japan, and accomplishing more as a result. Their host organizations are treating them more and more like regular Japanese hires. More interns are gravitating toward corporate labs (Figure 4.12), and living in company dorms (Figure 4.1). They are working more hours (Figure 4.4) and participating in a full range of activities available in their host organizations (Figure 4.9). In particular, an upswing in the number of patent filings and Japanese to English technical translations are a testament to the intern's increasing value to their host organizations. The MIT Japan Program has not sacrificed quality in increasing the quantity of interns sent to Japan every year.

(3) Corporate Sponsors

The value of former interns has become apparent to their employers. Early interns are now achieving positions within their companies that allow them to make full use of their Japan experience (Figure 5.1). Several interns are playing major roles in US-Japan technology joint ventures or as "Japan interfaces" for their employers (Appendix A). Furthermore, interns have maintained contact with their Japanese hosts (Figure 5.2), adding to their value as "Japan aware" professionals.

Nevertheless, corporate sponsors have been slow to capitalize on this resource increasingly available to them. They have to place more value on the intern experience (Figure 5.3), and be willing to make a long-term investment in their employees' Japan-awareness in order to truly reap the benefits of the Program.

Although the primary responsibility for making use of the Japan experience lies with the interns, the MIT Japan Program and the Corporate Sponsors must play a supporting role in helping open doors for this new national resource. In many cases, the internship in Japan has had a profound effect on interns and their career plans, making them appreciate more the need for strong American, technology and manufacturing based corporation in the global marketplace. As one intern mentioned, "I want to get into management only after I've had many years of technical experience, and I'll run my group like my group was run in Japan, so that it will be competitive with Japan."

- A Final Note

Perhaps the best testimonial to the success and promise of the MIT Japan Program was a mention in a recent issue of Fortune magazine ("Picking Japan's Research Brains", March 25, 1991):

MIT's Japan program trains undergraduate and graduate scientists and engineers in Japanese and places them in yearlong internships with Japanese companies. This year more than 50 students are participating. The more than 250

graduates since the program started in 1981 form an elite corps whose connections will bear full fruit perhaps 20 years from now, when they and the Japanese they work with today will be national leaders in business and research.

Already graduates of the program have brought back to U.S. companies both a broad knowledge of the latest in Japanese technology and an impressive list of Japanese contacts. Just one example: General Electric hired Gontran Kenwood, 30, who had worked at Hitachi. His bosses say his ability to communicate with that company and his working knowledge of its products have been highly useful.

The MIT graduates. . . represent a new generation that should become increasingly influential. . . . They have experienced the Japanese research environment firsthand and debate U.S.-Japan technology policy issues with greater sophistication than many American businessmen twice their age.

If the technology wars between the U.S. and Japan ever evolve beyond today's guarded detente into full-scale cooperation, part of the credit will go to [this] small but growing band of pioneers.¹

For many interns, the MIT Japan Program represented an opportunity to live and work abroad. "The Program is a success because it gets people to go to Japan." Many interns would not have thought of going overseas or followed through on the idea if not for the encouragement and help given by the Program. The internship was described by one intern as "one of the most satisfying years of my life", having "a profound effect" on him, which "gave me the opportunity to do the kind of work I wanted to do and am doing now." The Program offers "an entree into an otherwise closed system" and

¹Fortune, "Picking Japan's Research Brains", March 25, 1991, p.96.

gives the interns the tools they need to "do their part" in making the US competitive.

In fact, the MIT Japan Program may play its most important role as a role model of cooperation between companies and universities in Japan and the US. Many other universities in the US have contacted MIT in reference to emulating the success of the Program with one of their own. Such an outcome would undoubtedly be beneficial to the nation and all parties involved, and it is hoped that this report can in some small way contribute to such a desirable event.

APPENDIX A

RECOMMENDATIONS

- Recommendations for the MIT Japan Program

- (1) Japanese language and cultural training

Provide intensive technical Japanese in research area of interest before starting work in Japan. Provide for continuing formal study of Japanese during internship (private tutor or small classes). Provide more information on host organization and lab before going to Japan. Do not provide too much cultural information and pre-bias interns. Do not oversell Japanese language ability and work experience.

- (2) Intern placement

Work more closely with industry to place interns where they can use their unique skills for the benefit of their employer (both during and after internship). Try to place more people in product development, manufacturing, and corporate planning. Talk with interns about what they plan to do with their lives when they return from Japan.

- Recommendations for Japanese Host Organizations

Make sure that they understand how to usefully employ foreign workers. Avoid placing interns in international dormitories, cutting off outside of work contact with their Japanese co-workers. Allow interns to represent company (present research papers at conferences, etc.)

- Recommendations for Corporate Sponsors

MIT Japan Program provides "seedlings" of Japan-awareness. Corporate sponsors must invest further in the intern's language and cultural abilities to reap benefits in dealing with and accessing Japan.

Participation in Japan-related activities and assignments must be encouraged and institutionalized (e.g. Kodak's "Japan-track" for technical professionals). MIT Japan Program is "a drop in the bucket, by itself won't make US companies competitive, but can help"

- Recommendations for interns

- (1) Intern placement

While working for any company in a professional capacity can be difficult at times, working for a Japanese company can be especially trying.

Besides the language and cultural gap, interns must contend with the hard work and long hours expected of all employees in Japanese companies. It is important for interns to make sure they are going to work in an area that is of genuine interest to them, rather than as an excuse to spend a year in Japan. Having the necessary technical background and degree level for the job is also a must. It is easier to obtain a placement in research than in product development, manufacturing, or planning, so interns in those fields should be especially diligent in terms of contacting potential host organizations in Japan.

The prospective intern should try to find out as much about the company and the specific department they will be working in before going to Japan.

While the MIT Japan Program office is a good source of this information, prospective interns should not neglect to contact former interns and Japanese students at MIT who have actually worked in the organization. If at all possible, interns should try to meet with members of their Japanese host organization (preferably their supervisor) either in the US or Japan before starting work. Spending a month or two in Japan as a tourist or in language study before starting work seemed to benefit interns.

(2) Career planning

It is important for interns to know what they want to get out of a year in Japan and what role it serves in their long-term career plans. It is helpful to set personal goals and have some idea of what one wants to do with the experience once they return from Japan. In this way interns can become focussed and get the most out of their internships. Some interns recommended making contacts with potential future employers (corporate sponsors?) before going to Japan. Some interns felt that it was best to go at a career transition point (e.g. between degrees) rather than as a permanent career move. University interns questioned the value of a graduate degree in their field from a Japanese university in their field, and many went as non-degree students. Interns warned that there are many positions in US industry asking for Japanese language ability, but they may not draw upon the intern's other talents. Some interns felt it was important to insist upon continued support of their Japanese studies (e.g. language tutoring) when obtaining a permanent position with a company in the US.

APPENDIX B

MIT JAPAN PROGRAM INTERNS

APPENDIX B

The following is a list of MIT-Japan Program interns who assisted in this study:

<u>Name</u>	<u>Field</u>	<u>Japanese Host</u>	<u>Year(s)</u>	<u>Currently At</u>
Allen, John	Mech. Eng.	Nissan	1989	MIT (PhD student)
Berthier, Patrick	Materials Sci.	Toray Industries	1988/89	(working in France)
Brereton, Margot	Tech. & Policy	MITI (ME Lab)	1988/89	Stanford (PhD student)
Caine, Michael	Mech. Eng.	Toshiba	1985/86	MIT (PhD student)
Canfield, John	Elec. Eng.	Toshiba	1987/88	DEC
Cehelsky, Priscilla	Applied Math	Tokyo Univ.	1987/88	U Maryland (Researcher)
Cotter, Vincent	Elec. Eng.	Tokyo Univ.	1984-87	Adobe Systems
Cronk, Michael	Elec. Eng.	Toshiba	1986-88	Tektronix/Sony JV
Duxbury, Elizabeth	Planetary Sci.	Tokyo Univ.	1988/89	Jet Propulsion Labs
Foxman, Ethan	Physics	NEC	1989	MIT (PhD student)
Goddard, Iain	Comp. Sci.	Toshiba	1989/90	Mercury Data Systems
Green, Mark	Materials Sci.	Tokyo U./ISTEC	1988-90	Raychem
Holzbach, Mark	Media Lab	TITech	1986-88	(working in Japan)
Johnson, Mark	Elec. Eng.	Fujitsu	1989/90	MIT (PhD student)
Kenwood, Gontran	Mech. Eng.	Hitachi	1984-86	GE/Toshiba JV
Lee, Emi Hasegawa	Chem. Eng.	Tokyo Univ.	1984-86	Ortec International
Lim, Mark	Physics	Nagoya Univ.	1989-90	UC Santa Barbara (PhD)
Lucassen, John	Comp. Sci.	IBM Japan	1987-88	IBM
Marmorstein, Laura	Applied Math	Toshiba	1989	MIT (PhD student)
Martin, Paul	Physics/EE	KDD	1989-90	MIT (PhD student)
McCaffrey, Patricia	Appl. Bio. Sci.	Hayashibara Lab	1987-89	Dana Farber Cancer Institute
McGreevy, Robert	Chem. Eng.	Tokyo Univ.	1983-84	Monsanto
McNeil, Vincent	Elec. Eng.	TITech/NEC	1988	MIT (PhD student)
Mitsumata, Mike	Ocean Eng.	Shimizu	1986/87	Teradyne KK Japan

Mizumoto, Chris	Physics	Hitachi	1986/87	GE/Yokogawa Med. Sys. JV
Mortensen, Andreas	Materials Sci.	Nippon Steel	1986	MIT (Professor)
Painter, Thomas	Mech. Eng.	JAERI	1987/88	MIT (Researcher)
Petivan, James	Elec. Eng.	Fujitsu	1988-90	(working in Japan)
Phelan, Patrick	Mech. Eng.	JAERI	1986	TITech
Poler, Ariel	Math/Comp. Sci.	Shimizu	1988	(working in Venezuela)
Poole, Peter	Civil Eng.	Kyoto Univ.	1983-85	MIT (PhD student)
Roseborough, Jim	Mech. Eng.	NTT	1989/90	UC Berkeley (Researcher)
Sachs, Jeffrey	Applied Math	Tokyo Univ.	1987/88	NIST
Schindler, Peter	Comp. Sci.	IBM Japan	1987, 88	Andersen Consulting
Shukert, Douglas	Mech. Eng.	Sony	1987-90	DADC Austria
Sienko, Tanya	Physics	Tokyo Univ.	1983/84	NASDA
So, Angelina	Elec. Eng.	SECOM	1989/90	IBM
Solem, Anders	Aero/Astro Eng.	Tokyo Univ.	1986-89	USAF
Strauss, Monica	Political Sci.	Electrotech. Lab	1984	Electrotechnical Lab
Taddy, Stephanie	Chem. Eng.	TITech	1988/89	Ensr, Inc.
Van Cotthem, Jan	Aero/Astro Eng.	Mitsubishi	1986/87	Boeing
Whitney, Peter	Materials Sci.	NTT	1986-88	Lasertron
Wong, Boon	Physics/EE	Tokyo Univ.	1987	Computer Board (Malaysia)
Yokota, Shari	Materials Sci.	NEC	1984-86	UC Berkeley (MS student)

APPENDIX C

MIT JAPAN PROGRAM INTERNSHIP QUESTIONNAIRE

MIT JAPAN PROGRAM INTERNSHIP QUESTIONNAIRE

Note: If there are any questions that you feel are not relevant to your experience or that you would prefer not to answer, please leave them blank and go on to the next. All responses will be pooled and no data will be presented that will make it possible to identify the response of any individual.

1. Name: _____

2. Year of Internship: _____

3. Site of Internship: Institution _____
Lab _____

4. M.I.T. Field of Concentration: _____

5. Which of the following best describes your work in Japan:

Basic research _____ / Advanced development _____ / New product
development _____ / Process technology _____ /
Other (please explain) _____

6. On how many projects did you work during your internship? _____

7. Which of the following best describes your experience? (If you worked on several projects and more than one of the following applies, please rank order your responses with 1=describes most of my work, 2=next most frequently experienced, etc.).

I defined my own project and carried out most of the work myself. _____
I worked largely on my own but on a project defined by the research
managers at my lab. _____
I worked as part of a project team but played a major role in defining
the project's direction. _____
I worked as part of a project team whose direction was defined
by the lab. _____

8. During your internship, which of the following experiences did you have?

Contributed to a group project report in Japanese _____
Gave a research report in Japanese on your own work _____
Gave a presentation on the state of research in the field in
the United States _____
Filed a patent application _____
Helped translate Japanese technical materials into English _____
Helped translate English technical materials into Japanese _____
Went on a group retreat/vacation _____
Joined a hobby or sports club _____

9. Would you indicate which of these statements accurately describes your own experience by putting an X or a check mark in the blank space.

- I was invited to visit other research projects at my research site. _____
- I could easily make contact with other research groups, but I had to take the initiative in requesting it. _____
- Making contact with other research groups required persistent effort on my part. _____
- I was unable to make contact with other research groups. _____
- I was not interested in making contact with other groups. _____

10. Was someone assigned to act as a "mentor" to help you learn your way around the lab? Yes _____ No _____

If "yes," was that person: Your research supervisor _____ / Someone the same age as yourself _____ / Someone somewhat senior to you _____ / Someone who planned to study in the US in future _____ / Someone who had some overseas experience _____

11. In your lab, were there:

- Japanese female researchers (not technicians) Yes _____ No _____
- Other foreign researchers Yes _____ No _____
- Japanese researchers with degrees from foreign universities: Yes _____ No _____

12. Had your lab ever had a resident foreign researcher before?

Yes _____ No _____

13. Did you find it easy to keep up with the English-language technical literature in your field? Yes _____ No _____

14. Did most of the members of your lab keep up with the English-language technical literature in your field? Yes _____ No _____

15. How extensively did the researchers in your lab make use of the following to keep abreast of technical developments in their own and related fields?

	Very extensively	/ Somewhat	/Not at all
International conferences	1	2	3
Foreign-language publications	1	2	3
Japanese publications	1	2	3
International conferences	1	2	3
Conferences in Japan	1	2	3
Personal contacts at other labs in Japan	1	2	3
Personal contacts with foreign researchers	1	2	3

16. What were the average working hours in your lab?
 Hours per day _____ Days per week _____
17. Was there very great variation in hours, depending on the stage of the project?
 Yes, great variation _____ Maximum observed _____
 Some variation _____ Maximum observed _____
 Very little variation _____
18. Were you expected to work the same hours as the rest of the people in your lab?
 Yes, and I put in the same hours _____
 Yes, but I did not feel it was necessary and sometimes left earlier _____
 No, the expectations were different for a one-year intern _____
 No, I worked longer hours _____

19. Which statement(s) describe your contacts with Japanese researchers since leaving Japan?
 Continued direct personal contact through travel _____
 Continued exchange of technical materials _____
 Friendly exchange of letters and cards _____
 No contact _____
 Other (please specify) _____

20. Which of the following statements describe your evaluation of your internship experience?

In retrospect, neither the technical benefits nor the learning experience were worth the investment of time and effort. _____

I found it personally rewarding, but not particularly useful in improving my technical abilities and technical knowledge base. _____

I gained valuable technical experience and knowledge, and it has been useful to me in finding a position on my return. _____

I gained useful technical experience and knowledge, but potential employers have not put much value on the experience. _____

21. Does your current position make significant use of your Japan experience?
 Yes, A great deal _____/Somewhat _____/Very little _____/Not at all _____

22. Would you be willing to take time for an extended (one hour to one and a half hours) interview about your experiences with Andrew Gurbaxani, who will be conducting a Program-sponsored study of the internship experience? If so, would you kindly provide us with your work and home address and telephone numbers, so that Andrew can arrange a convenient time to interview you in person or by telephone.

Work Address: _____

Work Tel: _____ Fax _____ Home Tel: _____

If your internship was in a university lab, please answer the questions on this page. If it was in a government lab, please go to page 5. And if you worked in a company lab, please go to page 6.

SUPPLEMENTARY QUESTIONNAIRE FOR UNIVERSITY INTERNS

1. Where did you live during your internship?

University dorm _____/With a Japanese family _____/Own apartment _____

2. How would you rate the following, in comparison with MIT?

Superior/About the same/Not as good

Equipment	1	2	3
Technical support staff	1	2	3
Technical library and related support services	1	2	3
Electronic networking	1	2	3

3. How would you compare the contacts between the professor with whom you worked in Japan and industry, and industrial contacts of your MIT professors?

Same intensity of contact _____/Less financial linkage _____/
Greater contact over recruitment _____

4. Did you have opportunities to visit corporate labs? Yes ___ No ___

If "yes", who introduced you to the lab? Japanese professor _____/
Japanese researchers in your lab _____/American friends _____/
Other Japanese friends _____/
MIT contacts _____/Other _____

SUPPLEMENTARY QUESTIONNAIRE FOR GOVERNMENT LABS

1. Where did you live during your internship?

Dormitory_____/With a Japanese family_____/Own apartment_____

2. How would you rate the following, in comparison with MIT?

Superior/About the same/Not as good

Equipment	1	2	3
Technical support staff	1	2	3
Technical library and related support services	1	2	3
Electronic networking	1	2	3

3. From your own observation, how closely was the lab connected to the following:

Very closely/some contact/No contact

University labs	3	2	1
Company labs	3	2	1
Other government labs	3	2	1

4. Did you have opportunities to visit corporate labs? Yes___ No___

If "yes", who introduced you to the lab? Your research supervisor ___/
 Japanese researchers in your lab___/American friends___/ Other Japanese
 friends___/ MIT contacts___/Other_____

SUPPLEMENTARY QUESTIONNAIRE FOR COMPANY INTERNS

1. Where did you live during your internship?

Company dormitory_____/With a Japanese family_____/Own apartment_____

2. Did you have experience working in industry before going to Japan?

Yes____ No_____

If "yes," please specify:

Company_____

Duration_____

3. Did you personally, in the course of your project, interact with:

People from manufacturing_____
Technical people from subcontractors_____
Researchers from other labs within the company _____
Researchers from government lab _____
Researchers from university lab _____
Corporate staff_____

4. Did you have the opportunity to visit other labs within the company?

Yes____ No_____

5. Did you have the opportunity to visit other company labs?

Yes____ No_____

If "yes", who introduced you to the lab? Your research supervisor
within the company_____/Japanese professor_____/ Japanese researchers
in your lab_____/American friends_____/ Other Japanese friends_____
MIT contacts_____/Other_____

APPENDIX D

MIT JAPAN PROGRAM CORPORATE SPONSOR QUESTIONNAIRE

MIT Japan Program Corporate Sponsor Questionnaire

- A. What are the three most important pieces of quantitative information you would like to know about the returned interns? (Examples: hours worked per week, number of colleagues in lab group).

1. _____
2. _____
3. _____

- B. Do you currently employ any MIT-Japan interns in your company?

Yes _____ No _____

If so, in which of the following areas were they treated differently from other hires with similar technical credentials:

Recruiting	_____	Job Assignment	_____
Training	_____	Promotion	_____

- C. Is there a specific example of a situation where an intern's Japan experience was particularly helpful from the standpoint of:

Technology	_____	Communications	_____
Personnel	_____	Cultural barriers	_____

If so, please describe on the other side of this page.

- D. In receiving information from this study, what form would you prefer:

Aggregate numbers for all interns	_____
"Profiles" (in-depth analysis of a given intern's experience)	_____
Some of both	_____

- E. What intern cross-sections are of particular interest?

Male/Female	_____
Corporate lab/other lab	_____
By industry-MIT major	_____
Type of work (basic research/ product development)	_____
Other (please describe)	_____

If you have any other comments or suggestions as to how the study may be designed to meet your information needs, please feel free to describe them on the other side of this page.

(Quantitative) Information Most Desired by Corporate Sponsors:

1. Project related

Project selection and evaluation
Project staffing decisions
Project length (time)

2. Work Group related

Work group size (5)
Work group activities/organization at lowest level
Manager/employee ratio
Orderliness, continuity, teamwork
Frequency of group meetings, reports (and their dissemination)
General work environment: number of engineers, ages, degrees, organization structure

3. Organization related

Description of lab organization
Work organization for R&D effectiveness
Organization chart with number of employees per organization
Number of employees/human resource personnel
Average age/company experience of Japanese at various management levels
Training system for new hires: content, time frame, etc
Number of women professionals; career progression.
"Lab assistant" role: does it exist? what educational background? how recruited?

4. Inter-Organization related

Functional integration
Technology transfers from corporate R&D lab to product development to factory (2)
How product units impact corporate R&D lab projects
What practices link development to manufacturing
Movement of people from lab to other functions per year
Barriers to communication between groups, companies

5. Uses of Time related

Efficient hours at work vs. hours spent at work, per week (3)
Hours devoted to communication and assimilation of both technical and corporate info
Percent of time spent on training/education vs. assigned work

6. Productivity related

Productivity--key techniques/processes
Evaluation/incentive criteria: advancement and reward
Pay systems, bonus
Work habits, motivators
Quotas on output (patents, papers) from group
Attitude to patents and publication of results (2)
What practices make R&D efficient?
What practices make communications efficient?

7. Japan related

Strengths/weaknesses of Japanese development system
Level of cooperation between Japanese companies
Why are the Japanese as effective as they are in the global arena

8. Intern related

Time period to overcome initial culture shock
Intern proficiency in written and spoken Japanese
Number of Japanese contacts maintained 2 years after leaving program
Intern career path after internship
Intern suggestions how they may be of help to industry
Number of interns with chemistry, chemical engineering, or materials science background
Number of interns with experience in Japanese auto industry
Value of integrated total knowledge of interns
Mentoring

Note: numbers in parentheses indicate number of respondents indicating the same item.

Many other items can be listed under these headings, and the existing items can be rearranged under different headings (e.g. Training, Role of Women, Communications, etc.)

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