

MIT's Industrial Partnerships

REPORT OF

THE AD HOC COMMITTEE

ON INDUSTRIAL PARTNERSHIP REVIEW

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

MIT's Industrial Partnerships

Report of the ad hoc Committee on Industrial Partnership Review

Appointed by the Provost, Chancellor, and the Chair of the Faculty

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E X E C U T I V E S U M M A R Y

Beginning in 1994 MIT entered into research partnerships with eight major corporations — Amgen, DuPont, Ford, Hewlett-Packard, Merck, Merrill Lynch, Microsoft and NTT. Initial commitments of support from the partner firms were for \$188 million dollars. While MIT since its founding has had close relationships with industry, nothing on this scale had previously been undertaken.

In April of 2002 this committee was designated to review the partnerships and to determine if there have been problems or risks posed by these arrangements. The committee was also to consider possible benefits of working with corporations through such partnerships and to make recommendations concerning any future agreements. This report examines the impact on MIT of the partnerships.¹

The committee determined that the partnerships have generated significant benefits for MIT. They have given MIT an alternative steady source of research funding for faculty, supplementing government funding and shorter-term industrial support. Agreements have followed existing MIT policies. Students have benefited from closer contact with corporate researchers, exposure to “real problems,” as well as from fellowship grants provided through the partnerships. The research support has permitted an effective balance between theory and relevance, with the companies supplying challenges they face and managerial needs along with funds.

The partnerships have enabled strategic moves and initiatives that would not have been possible otherwise, including research in educational technology supported by Microsoft, the creation of the Financial Engineering curriculum at the Sloan School through support from Merrill Lynch, and development of closer industrial contacts for the Biology Department.

As a result of these partnerships, more than 1000 MIT students have been supported through research projects or fellowships, including about 650 graduate students and over 350 undergraduate students. About 250 faculty and research staff members have received research support, including over 130 full professors, 45 associate professors, and about 40 assistant professors.

Additionally, the partnerships dedicated specific resources directly to MIT as gifts, such as grants from NTT towards building the Stata Center, a new professorship in biology from Amgen and graduate student fellowships.

The committee found that the benefits have covered many sectors at MIT, but have been largely focused on areas of the greatest technological advancement. Firms invest in areas of rapid change where association with MIT can help them develop programs and strategies that respond to these threats and opportunities.

The Institute is probably limited in the number of partnerships it is able to support. We estimate 10-15 as a reasonable upper limit to these company-MIT strategic partnerships, allowing them to continue to be an important part of the Institute research portfolio but not growing to dominate it. We recommend that MIT actively seek partnership opportunities to replace both completed and discontinued partnerships in order to maintain this important source of support.

¹ The charge to the committee was to examine MIT’s experience with these eight partnerships. It did not include other large corporate relationships with MIT, nor did it include the academic institutional relationships that currently include the Cambridge-MIT Institute (CMI), the Singapore-MIT Alliance (SMA), and the Malaysian University of Science and Technology (MUST). Although they were not reviewed, we did hear concerns regarding SMA. This would suggest that these relationships be reviewed independently.

The committee found few negative effects of the partnerships. The most significant was that existing research relationships might be disrupted by the new partnership if the old relationships are not reflected in the new larger agreements. The committee gave the faculty opportunities to provide feedback on the partnerships. Other than those faculty members specifically interviewed by the committee, no one offered any comments. From this the committee concluded that the concept of industrial partnerships is not an issue of high concern to the faculty.

We found no evidence of faculty being asked to undertake research they did not want to do, or of young faculty being asked to engage in work inappropriate for building a tenure case. Current methods for accounting for faculty research in these specific partnerships did not cause undesirable or unanticipated shifts of resources from teaching responsibilities.

MIT has a history of working with competitors within the same industry, such as in its many industrial consortia and through sponsored research. In keeping with MIT policy and practice, none of the partnerships excluded other companies from engaging with MIT. However, MIT leadership noted that with three corporate collaborators, existing partnerships might have given them the impression that they would not get the attention of the faculty they wanted unless they committed to the large scale funding of the corporate partners. On the other hand, the existence of a partnership between MIT and a competitor has also raised the interest of some companies in exploring and developing additional relationships with MIT.

Industrial partnerships are subject to the risks of economic change and company personnel shifts that make renewal less than certain, but similar risks are observed in other research programs. Overall the costs and risks of the partnerships were found to be small.

Study of the partnerships indicated best practice elements including:

- Adherence to standard MIT policies
- Transparent governance structure that encourages faculty proposals
- Match of interests of the sponsoring company and of faculty
- Realistic match of expectations with deliverables
- Dedicated company staff as well as significant participation by senior management
- Committed MIT faculty and staff complemented by ILP membership
- Fellowship support for graduate students and links to post doc, graduate, and undergraduate students for internships and employment.

The committee recommends that as much as possible these best practice elements be built into future partnerships.

The committee also recommends that the Faculty Policy Committee review partnerships at initiation and at renewal to ensure all institute policies are respected and to be sure existing relationships are considered in designing the new agreements.

In conclusion, the committee found that the partnerships have presented relatively few problems while providing many significant benefits to faculty, students, and staff, by supporting research, teaching advances, and fellowships.

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1 INTRODUCTION

BACKGROUND

MIT research has long been supported by industry. Working with industry provides faculty and students exposure to real-world challenges and opportunities, can provide access to materials, equipment and funding not otherwise available, and serves the economic welfare of the nation by aiding transfer of new technologies to corporations for commercialization.

Generally contracts for such research are of a relatively short term, such as a year or two, and are based around specific research projects. Between 1994 and 2000 MIT entered into eight large, longer-term partnerships or alliances with major corporations. These partnerships provided a new way for MIT to engage sponsored research support, involving a commitment of funds with particular research projects to be developed and specified later. Each relationship involved the commitment of funding to MIT of \$3 to \$7 million per year over a period of 5 to 10 years. The partnerships were as follows:

| <i>Company</i> | <i>Start Date</i> | <i>End Date</i> | <i>Total Commitment</i> |
|-----------------|-------------------|-------------------|-------------------------------|
| Amgen | 1994 | 2001 (terminated) | \$23 million total |
| DuPont | 2000 | 2005 | \$7 million/year |
| Ford | 1998 | 2003 (renewed) | \$3 million/year ² |
| Hewlett-Packard | 1999 | 2004 | \$5 million/year |
| Merck | 1997 | 2002 (concluded) | \$15 million total |
| Merrill Lynch | 1999 | 2004 | \$4 million/year |
| Microsoft | 1999 | 2004 | \$5 million/year |
| NTT | 1998 | 2003 | \$4 million/year ³ |

These relationships were begun at a time when research funding from the United States government, then more than 75% of research support at MIT including passthroughs, was expected to decrease significantly. Direct federal research monies at MIT totaled \$241 million in fiscal year 1994, \$245 million in FY 1995, and \$242 million in FY 1996. In FY 1994 the Department of Defense was the single largest sponsor of MIT research, providing approximately 18% of all funds. In the summer of 1995 the US House of Representatives and the Senate were considering a 60 percent reduction in DOD research funding from FY 1994. The impact of such cuts in funding on MIT's research program would be large. Industrial partnerships were seen as a possible alternative source of research support, augmenting the 16% of funding then provided by companies.

In FY2002 20% of MIT research funding was from industry, more than \$85 million. Of this, the partnerships provided more than \$24 million, accounting for 80% of the growth in industrial research support since FY1997. Through the partnerships, more than 1000 MIT students have been supported through research projects or fellowships, including about 650 graduate students and over 350 undergraduate students. About 250 faculty and research staff members have received research support, including over 130 full professors, 45 associate professors, and about 40 assistant professors. These

² Funding actually began in the fall of 1997 with an initial \$1 million. The partnership was renewed in 2002 for another five years at the \$3 million/year rate.

³ For a total of \$18 million; the first year was funded at the \$2 million level.

industrial partnerships represented a new way of MIT engaging industry in support of its larger core research and education mission.

CHARGE TO THE COMMITTEE

In April 2002 the Chair of the Faculty, the Provost, and the Chancellor appointed this committee to review these eight partnerships and to identify how partnering can be more effectively implemented so its benefits are spread and any problems are minimized.⁴

The committee was asked to explore the extent to which the initiatives have made progress toward MIT goals and what other results have been obtained, including unintended or negative ones. MIT goals for the industrial partnerships included:

- Increase research support for faculty
- Renew or create infrastructure to support teaching or research, including distance education
- Support curriculum development
- Support student internships and other opportunities
- Gain access to data and other resources from partner firms
- Enhance the excellence of MIT through gifts, endowments, fellowships, and other support.

The review was to include the eight industrial partnerships noted above, not all large corporate MIT alliances. The goals of the partners and how successful these arrangements were for them were not part of the charge to this committee. The charge also did not include an assessment of MIT's experience with its three non-industrial institutional partnerships, the Cambridge-MIT Institute (CMI), the Malaysian University of Science and Technology, and the Singapore-MIT Alliance (SMA).⁵

OVERVIEW OF PARTNERSHIPS⁶

Amgen

In March 1994, MIT and Amgen, a leader in biotechnology, entered into a long-term research collaboration. Engaging the biological science community at MIT, the research relationship was established principally with the Departments of Biology and of Brain and Cognitive Sciences, including MIT professors working at the Whitehead Institute. With total support projected of about \$30 million over a 10-year period, this was the first large-scale alliance between MIT and industry.

Merck

In March 1997, MIT entered into another significant alliance involving direct scientific collaboration with industry, in this case, with Merck, a leading research-driven pharmaceutical company. A long-term research and education collaboration to pursue joint initiatives in both science and engineering at MIT, Merck agreed to fund the partnership with up to \$15 million over an initial five-year period, with an option to extend the collaboration to 10 years.

⁴ See Item A, Appendix

⁵ The industrial partnerships did not specifically include developing new models of distance education or support of student exchanges, which were noted as goals in the charge to the committee; these are particular to the non-industrial academic alliances.

⁶ Drawn from <http://web.mit.edu/newsoffice/nr/2000/alliance.html>, updated August 2001

The partnerships with both Amgen and Merck supported mutually agreed-upon basic research problems at the cutting edge of modern biology and biotechnology, and encouraged intellectual synergy and sustained dialogue among company and academic scientists. In addition, they included a strong emphasis on supporting education at both the graduate and postdoctoral levels.

Ford Motor Company

In October 1997, MIT and Ford Motor Co. announced a multimillion-dollar collaboration in education and research, with special emphasis on environmental and design challenges. Funding provided by Ford was anticipated to be at least \$20 million over an initial five-year period.⁷ This agreement represented an intensified commitment to continuing collaborative efforts, built on a long history of working together. The alliance targeted research in engineering, education and the environment, and provided seed funding for a major MIT-directed multi-company multi-university consortium to better provide research input into environmental policy and legislation.

Nippon Telegraph and Telephone Corporation

In September 1998, the Nippon Telegraph and Telephone Corp. (NTT) and the Artificial Intelligence Laboratory and the Laboratory for Computer Science of MIT's School of Engineering announced a broad collaboration aimed at creating new technologies in telecommunication and computers. Focused on pre-competitive research in information technology and computer science, the five-year program was to be funded up to \$18 million by NTT.

Merrill Lynch

In March 1999, the School of Engineering, the Sloan School of Management, and the School of Architecture and Planning entered into a five-year institutional collaboration with Merrill Lynch to establish the Financial Technology Education Initiative. This strategic alliance comprised a \$15 million research initiative to fund collaborative projects across a broad range of disciplines in financial engineering, technology innovation and management and a \$5 million gift to help MIT create a new graduate minor in financial technology. Based at the Sloan School and the Department of Electrical Engineering and Computer Science, the Financial Technology Education Initiative will provide finance education for MIT graduate students.

DuPont

In September 1999, DuPont and MIT announced they had agreed to form a \$35 million alliance. The goal of the DuPont-MIT Alliance (DMA) is to advance research and education in materials from biotechnology that have a variety of applications. Begun January 1, 2000, the five-year alliance supports projects that draw upon the science, engineering and business expertise at MIT and that extend and better leverage the reach of DuPont's scientific expertise in the areas of biology, genetics, bioinformatics and catalysis. Through the alliance, DuPont also will work with MIT's Sloan School of Management to define new business models for associated emerging technologies.

Microsoft

In October 1999, Microsoft and MIT announced an alliance to enhance university education through information technology. Named "Project I-Campus," the collaboration involves cooperative projects among students, faculty and researchers at MIT and members of Microsoft Research. In addition to assigning several research staff members to this effort, Microsoft allocated \$25 million for work at

⁷ This alliance was renewed in 2002 for a second five-year term.

MIT over the project's five-year lifetime. Through an initial focus on methods and technologies that enhance education on the MIT campus, it is expected that Project I-Campus could set the pace for university education in the next five to ten years, producing materials that can be widely published and disseminated to other universities.

Hewlett-Packard

The Hewlett-Packard Company (HP) and MIT signed a memorandum of understanding on June 2, 2000 to form a \$25 million, five-year alliance to develop innovative ways to create and handle digital information. The alliance focuses on new architectures, devices, and user interfaces in information-rich environments and explores novel services for commerce, education, and personal use.

PROCESS

To address these questions, the committee undertook the following:

- The committee reviewed the formal and functional aspects of the partnerships, analyzing all partnership agreements. Similarities and differences were noted. The Principal Investigator for each partnership was interviewed, focusing on the agreement and the mechanics and details of the relationship.⁸
- Members of the committee conducted a second interview with all partnership Principal Investigators to discuss particulars of the experience, including any issues, benefits, and risks that may have come up over the course of the alliance.⁹
- To obtain feedback from Department Heads, at the committee's request President Charles M. Vest provided the opportunity for two members of the committee to attend a regular meeting of Department Heads, introduce the committee's charge and invite discussion.
- In conjunction with the Chair of the Faculty, an open meeting of the faculty was called to discuss experiences with the partnerships. No one attended. An email alerted all members of the faculty of this opportunity and solicited their direct feedback if they could not attend the meeting. No responses were received.
- At the Committee's request, Special Assistant to the Chancellor Jay Keyser introduced the topic of the industrial partnerships for discussion at each of two Random Faculty Dinners he hosted. Two members of the committee attended each dinner. A total of about sixty faculty members participated in the two dinners.
- The committee interviewed faculty who were not involved with the partnerships but who might have been impacted by them, faculty members who were critical of the partnerships or who had voiced particular misgivings, as well as senior administrators who had been involved in the formation of partnerships.

⁸ See Item B, Appendix for template used for this fact gathering and these interviews

⁹ See Item C, Appendix for interview protocol used for these interviews

2 FINDINGS

MIT EXPERIENCE WITH INDUSTRIAL PARTNERSHIPS

Origins of the Partnerships

Most partnerships began as a “top-down” initiative, with discussions between senior people from MIT and from the company. Transitions in management on both sides have led to complications in managing some of the partnerships. When a new CEO has come on board, generally the relationship has been delegated from the CEO into the ranks of the organization to senior management levels where there has been a working engagement. The transition to new leadership in the company is likely to shift the priorities and change the benefits expected from the partnership. This modification may require considerable time on the part of the involved faculty and administration to discern and, if agreeable, make needed changes, possibly including some reorientation of the research program at MIT.

Another issue with the top-down approach to building an alliance is that ultimately faculty members in the areas of focus for the sponsoring companies must be interested in participating, seeking funding for research through the partnership. Having a group of committed faculty members involved before the agreement is finalized ensures interest.

Reasons for Companies to Initiate Partnerships

HP, DuPont, Ford, and NTT had ongoing contacts and long histories of support of research at MIT prior to initiating their partnerships with MIT. For these companies, the partnership provided an overall framework for their relationships, with more coordination of activities and a broader understanding of the range of contacts, benefits, or issues. For MIT, having these relationships evolve into partnerships provided a broader base of long-term funding commitments. In every case, when a partnership started, the level of funding at MIT from the firm increased as new, often strategic areas were added to those already being investigated at MIT.

Amgen, Merck, Merrill Lynch and Microsoft entered into partnerships to build new meaningful relationships with MIT. They had had few activities with the Institute prior to this commitment.

The partnerships allowed the sponsoring firms to move into new areas of research quickly. All addressed fields on the frontiers of the areas of interest to the companies, such as biotechnology, educational technology, environmental research, financial engineering, and information technology.

Maintenance of Standard MIT Policies

Although intellectual property (IP) was handled according to MIT policy, it was a source of contention in negotiating several agreements. MIT retains IP ownership of any technology it chooses to patent. Review of papers prior to publication is handled as with other industrial research programs. In fact, in two agreements, those with HP and NTT, there is no provision of corporate review of papers prior to publication.

The more stake a company put in the possibility of important IP resulting from a partnership, the greater the issue became. Faculty PIs felt that expectations of major IP results from the partnerships were unrealistic, but that IP must be dealt with because it could happen. After partnerships started,

companies developed successful relationships with MIT when they placed other objectives higher, such as improving contact with MIT students to aid recruiting.

Support of Multi-sponsored Projects

The IP issue also surfaced in another way. Because an exclusive license generally is not possible if there are multiple sponsors of a project, some partnership companies, including Amgen and Microsoft, specified in their agreements that funds from the partnerships could not support consortia or other multi-funded projects. This sole sponsorship requirement simplified intellectual property issues.

To address MIT's concern that existing relationships would maintain funding even if they had multiple sponsors, the Ford agreement included a commitment that Ford would spend at least an additional \$1 million per year at MIT on activities not covered by the Alliance.

Terms of Partnership Agreements

On average, the partnerships are for initial periods of five years. In each instance but one, HP, the company has provided a specific sum of money, on average more than \$4 million annually, to support activities of the partnership. These funds are allocated from a particular budget within the company.

With the Microsoft partnership, \$5 million was added to the University Relations budget. With HP, the agreement is for the firm to invest up to \$5 million annually, but the money does not exist in an actual budget at the firm, making it much more difficult to obtain a grant through the partnership.

Amgen terminated its partnership with MIT in 2001, three years before it was to conclude. A new CEO with a new strategy for the company chose to discontinue the relationship. The Merck partnership was completed in 2002; discussions continue between the company and the faculty PI concerning a new agreement. The Ford Partnership was renewed in 2002 with revisions to its operations and research focus.

Levels of Faculty Supported by Partnerships

The level of the faculty members participating in a given partnership depended on its research focus. The NTT partnership has allowed new faculty members to gain a quick start on research, providing "instant" funding. In Biology, junior faculty and those starting new fields of research found funding helpful from the Amgen and Merck partnerships. On the other hand, the more applied nature of the research in educational technology supported through the Microsoft iCampus partnership made it more appropriate for senior faculty members.

ORGANIZATIONAL STRUCTURE OF THE PARTNERSHIPS

A matrix summarizing various aspects of the agreements is shown as Item D in the Appendix.

Governance and Administration

Governance for most partnerships consists of a team of collaboration managers, one each for MIT and for the firm, and/or a Joint Steering Committee, usually with three members from each party.

At MIT administrative support was allocated on a full-time or part-time basis for each of the partnerships. All of the partner companies except Amgen either were or became active members of

MIT's Industrial Liaison Program (ILP), providing them with an additional staff representative at MIT with their interests in mind who could provide broad access to all of MIT.

Two of the partnerships — Ford and Microsoft — have on-campus company representatives who are involved in helping to select and manage projects. Both NTT and HP have researchers collaborating on projects and visiting at MIT.

Determination of Research Areas and Specific Projects for Support

Through initial partnership discussions, the company and faculty team determined the areas of primary focus for each partnership. MIT faculty members propose their specific research projects to the partnership management committee for funding. Generally, the joint steering committee, if there is one, or the other designated governing body selects the projects to be funded. In each agreement there is a wind-down provision to ensure orderly phase-out of support for particular projects that have received funding but that the committee no longer wishes to maintain.

Funding from partnerships can usually be obtained by means of a simple two-page proposal. Response is generally speedy.

The process of obtaining funding and the availability of support through these partnerships is well known by some faculty members and not by others. With both the DuPont and the Microsoft partnerships, RFPs were sent to all MIT faculty members informing them of the opportunities for funding. With others, the PI's knowledge of desired research led him to encourage specific faculty members to write proposals.

BENEFITS

The committee explored the extent to which the partnerships have contributed to MIT goals. Other positive results were also noted, as well as how the partnerships functioned compared to other relationships and funding sources. Topics considered included:

- Involvement of MIT senior administration in the partnerships
- Time required to steward the partnerships compared to other funding sources
- Increase of corporate financial support, broadening the base of funding for MIT research
- Enrichment of MIT's research and educational agenda by increasing the involvement of faculty and students with industry and access to data and other resources from partner firms
- Support for new research initiatives
- Renewal or creation of infrastructure to support teaching, curriculum development, distance education and research; gifts, endowments, fellowships, and other support
- Availability of student internships and other opportunities.

Involvement of MIT Senior Administration in Partnerships

With most of the partnerships, senior administration at both MIT and the companies initiated the discussions that led to the agreements. Starting the partnerships at this rank ensured high-level commitment of the two organizations to the relationship. Faculty members then worked with executives at the firms to develop the focus for research within the partnership.

The faculty PIs of both the Ford Alliance and the DuPont partnership commented that the involvement of senior administration has been a particular strength of the partnerships.

Stewardship Required Compared to Other Funding Sources

The time to steward most of the partnerships has not been seen as excessive by the PIs involved. Examples of the types of interactions with company personnel have included:

- Annual trips to the company by a group of faculty members
- Reports on research results, in one case every six months via updates on a dedicated Web site, with another, annually
- Meetings at MIT with researchers and students
- Visiting researchers in MIT labs for six months at a time
- Informal, not-for-job interviews for undergraduates
- Symposia featuring industrial speakers.

While there are restraints on how the money is used and reporting requirements, these are no more burdensome than for government awards. In some cases, they are more liberal. Several PIs noted that their time invested in stewardship for these partnerships was less than that needed for grants from government agencies. However, some PIs said that they had to put in considerable time in discussions to get and keep the alliances on track during changes in top management at partner companies.

Increase of Corporate Financial Support, Broadening the Base of Funding for MIT Research

The partnerships have diversified MIT's funding and research support. In FY2002 20% of MIT research funding was from industry, more than \$85 million. Of this, the partnerships provided more than \$24 million, accounting for 80% of the growth in industrial research support since FY1997.

Because each partnership is for a minimum of five years, the funding received through them is more stable than the typical industrial research grant. It was also seen by some PIs as being as stable as government grants. Other specific benefits included:

- Important industrial contacts — For the Department of Biology, prior to involvement with the Amgen and Merck partnerships, corporate support of research was rare; nearly all research in this area had been funded by government agencies.
- Increased diversity of funding — NTT was the first large corporate supporter in the AI Lab. Because of the success of this relationship, other collaborations have been received well by faculty and staff. These represent additional funding sources beyond DARPA, previously the major government supporter of AI Lab research.

Enrichment of MIT's Research and Educational Agenda by Increasing the Involvement of Faculty and Students with Industry and Access to Data and Other Resources from Partner Firms

Several of the partnerships brought a significant increase in contacts with industry. These included:

- Amgen and Merck Partnerships — Increasing corporate contacts in Biology was an objective of the Department Head in working with Amgen and Merck through their partnerships with MIT. Over the past few decades the number of graduates from the department who go into the biotechnology and pharmaceutical industries has grown. MIT must have contacts with these communities for credibility and to provide students and faculty exposure to the people and challenges there. Through the partnerships, in addition to interactions with representatives from the companies in conjunction with research reviews and updates, informal, not-for-job interviews were held for undergraduates with people from Merck. Symposia featuring industrial speakers were held for all of MIT.
- Ford Alliance — Ford's insights, senior management efforts and presentations to faculty have helped MIT develop modules, courses and research programs in statistical and robustness techniques in engineering design. This knowledge has influenced hiring of new faculty to bring this important aspect of design into MIT's engineering curriculum. In addition, the

Alliance has emphasized collaborative research, with active involvement of both MIT and Ford personnel in projects supported.

- Merrill Lynch partnership — Through the Merrill Lynch partnership the Sloan School developed a new track in Financial Technology in conjunction with the School of Engineering. Sloan also developed short courses for industry along with new approaches for distance education delivered at company locations, enriching MIT's educational agenda.
- NTT Partnership — As noted earlier, NTT was the first large industrial sponsor of the AI Lab. NTT has been involved with the Lab in two ways: supporting research projects at a rate of \$3 million per year and sending researchers to MIT for 6-month stays to work in the Lab. Building on this experience, other collaborations also have been received well by faculty and staff.

Sharing of challenges, data and equipment has enriched educational opportunities for students and enriched faculty exposure to industry. A few examples are:

- NTT researchers visit MIT regularly and participate in research projects on campus, staying for 6-month periods. The visitors are technically excellent and mesh well with the MIT environment. The day-to-day sharing of expertise and knowledge has been productive for both parties.
- The DuPont Graduate Student Fellows have benefited by visiting DuPont and having access to equipment and the company's intellectual expertise.
- The Ford Alliance has provided MIT faculty and staff with experience with virtual teams, access to data, real world applications and equipment, as well as to vehicles and parts of vehicles.

Support for New Research Initiatives

The partnerships have provided the sponsors opportunities to gain contacts, experience, and expertise in new areas they have identified as critical to the futures of the firms. In addition, they have also provided funds for MIT and for individual faculty members to initiate new activities, such as:

- Through the Hewlett-Packard partnership the Wireless Research Center was initiated with support of \$700,000 annually.
- The Ford Alliance support of \$1 million to the Alliance for Global Sustainability and the melding of the Ford Environmental Consortium into this program were instrumental to its development.
- The Merrill Lynch partnership enabled the Sloan School of Management to develop with the School of Engineering a new curriculum in Financial Engineering.
- With the Microsoft iCampus alliance research in educational technology has been given major support. Researchers funded by iCampus share an interest in this area and now meet on a weekly basis, resulting in cross-disciplinary exchanges of ideas. The results will be expanded beyond MIT.
- The NTT partnership provides "quick start research funding" for new faculty members for the first cycle of their research. This nearly instant support is a great benefit to them and to the Labs, making MIT more competitive in attracting new faculty members in the area.
- The Amgen partnership enabled a faculty member who had switched fields to ramp up from small grants from the NSF and NIH. When it was necessary to apply results on a large scale, the NIH provided a grant of \$500,000 and Amgen paid the rest that was necessary— more than \$1 million. It was unusual to need a large amount of money for a short-term large-scale trial; the Amgen support was critical to the success of this research.
- The DuPont-MIT Alliance was seen by one of the PIs as a necessary component to bring together Biology and Engineering at MIT.

From the company perspective, an interesting occurrence happened with the DMA. DuPont considered establishing target areas for research proposals, but they were convinced by the Principal Investigators to entertain proposals from the faculty through a “bottom-up” approach. As a result, they now feel they have received better research ideas from MIT than they would have achieved using a “top-down” approach.

Renewal or Creation of Infrastructure to Support Teaching, Curriculum Development, Distance Education and Research; Gifts, Endowments, Fellowships, and Other Support

There have been several significant examples of infrastructure development through the partnerships:

- Perhaps the most significant contribution to MIT’s teaching infrastructure has been the Microsoft iCampus emphasis on educational technology. Through this support, MIT has substantially enlarged efforts in this area and intends to extend this work to share with other universities. Over ninety faculty members are involved in subjects for which educational technology has been developed through iCampus; so far, three to four thousand students have enrolled in these subjects. As an example, the physics subject 8.02 was reworked employing technology-enabled active learning (TEAL). This allowed students to learn better and faster.
- The Ford Alliance included \$450,000 for the construction of a new virtual classroom for distance education in Building 9.
- The Financial Technology track at Sloan was developed through the support of the Merrill Lynch partnership.
- The HP partnership has supported the Dspace project. This began as a digital archive and is becoming a valuable dynamic research tool.
- The NTT partnership provides \$200,000 per year to the new Stata Center as well as \$400,000 support for administration and ILP membership.
- Amgen provided additional institutional funding to support a faculty chair.

Graduate student support, especially for first year graduate students, has been significant from the partnerships. This makes MIT more competitive, helping the Institute attract the best students. Examples include:

- Through the DMA, DuPont supports between 15 - 20 first year graduate students.
- HP committed to spend \$2.5 million over the five years of the partnership to fellowships. Because of business conditions, that has not yet been paid.
- Merck supported about eight graduate students per year in four departments.
- NTT annually provides \$400,000 for Presidential Fellowships that allow MIT to offer fellowships to all first year PhD students in LCS and AI.

Availability of Student Internships and Other Opportunities

Nearly all of the partnerships have resulted in increased hiring of MIT graduates by the companies. Through the partnerships, more than 1000 MIT students have been supported through research projects or fellowships, including about 650 graduate students and over 350 undergraduate students. In addition, there are several unique opportunities that have been created:

- The Microsoft iCampus alliance has included separate funding for student projects. 80 undergraduates and 57 graduate students have received funding for their work so far. There have also been over 100 student interns at Microsoft during the first two years of the partnership.
- Building on their partnerships, both Amgen and Merck have established labs in the New England area, increasing job opportunities for students and contributing to the Boston area’s reputation as a center for biotech.

- As the HP-MIT Alliance this year becomes affiliated with the Hewlett Packard Labs in Cambridge, the company intends to involve more students by having them work there.
- Ford sponsors eight to twelve Systems Design and Management Program students annually, typically has and/or sponsors several Leaders for Manufacturing interns, and has broadened summer opportunities for MIT students at Ford.
- The DuPont Graduate Fellows have been offered the opportunity to visit DuPont as a group during the Presidents' Weekend each February. Both the students and the company have been pleased with this program.

Summary of Benefits

The committee determined that the partnerships have generated significant benefits for MIT. They have given MIT an alternative steady source of research funding for faculty, supplementing government funding and other industrial support. Agreements have followed existing MIT policies. Students have benefited from closer contact with corporate researchers, exposure to "real problems," as well as from fellowship grants provided through the partnerships.

The partnerships have enabled strategic moves and initiatives that would not have been possible otherwise, including research in educational technology supported by Microsoft, the creation of the Financial Engineering curriculum at the Sloan School through support from Merrill Lynch, and development of closer industrial contacts for the Biology Department.

Additionally, the partnerships dedicated specific resources directly to MIT as gifts, such as grants from NTT towards building the Stata Center and a new professorship in biology from Amgen.

The committee found that the benefits have covered many sectors at MIT, but have been largely focused on areas of the greatest technological advancement. Firms invest in areas of rapid change where association with MIT can help them develop programs and strategies that respond to these threats and opportunities.

COSTS AND RISKS

Concerns have been expressed that the partnerships may have undesirable aspects or effects such as:

- Pressure on MIT to modify policies
- Pressure on faculty to participate or to engage in undesirable research
- Diversion of faculty from teaching
- Elimination of funds and contacts from pre-existing programs
- Increased demands for space for projects provided large grants
- Mismatch of interests of MIT faculty and corporate representatives
- Mismatch of expectations versus deliverables
- Perception by companies of being denied opportunity to engage with MIT because of existing partnerships
- Excessive time spent in cultivation, management and stewardship of partner/MIT relationship
- Possible misuse of MIT's name in advertising or other publicity.

The committee attempted to determine whether any of these or other negative consequences had occurred through the partnerships.

Pressure on MIT to Modify Policies

In general, standard MIT policy was followed in the partnership agreements. We did find one case where the wording was not typical. In this instance, the Committee on Copyrights and Patents reviewed the terms and passed a resolution reaffirming standard MIT licensing practice.

Pressure on Faculty to Participate or to Engage in Undesirable Research

While the caution was stated that top-down initiation of partnerships could result in programs dedicated to topics that were not of interest to individual researchers and pressure on faculty members to participate, this was not found to be the case.

Usually where the President was involved, faculty members worked out the agenda for the collaboration directly with their peers at the company, ensuring interested parties on both sides. With all the partnerships, faculty chose to apply for support for research projects that they themselves proposed. They were not pressured to participate in partnerships or to undertake research that they did not initiate.

As an example, the Merrill Lynch partnership was intended to support research in financial technology in the Department of Electrical Engineering and Computer Science, the Sloan School, and the Media Lab. In general, EECS faculty members did not propose projects. There was no pressure exerted for them to do so. Instead, a grant went to EECS from the partnership to cover overviews of research of interest to groups of personnel from Merrill Lynch.

Diversification of Faculty from Teaching

The committee learned of only one case, with one of nearly forty projects supported thus far by the Ford Alliance, where faculty teaching time was decreased. In that situation, as with all funding awards in the Ford Alliance, the administrator alerted the Department Head of this need and received approval, consistent with established practice. For all other projects funded by the partnerships, teaching responsibility was not affected; faculty members' commitments are part of their research activities, typically separate from their teaching loads.¹⁰

Elimination of Funds and Contacts from Pre-existing Programs

In most cases, partnerships built on and expanded previous relationships between MIT faculty members and company personnel. With all, the amount of funding provided to MIT increased significantly. However, although Ford committed to spend an additional \$1 million per year beyond the Alliance to ensure that pre-existing relationships would have funding available, this still did not guarantee continued funding for one MIT program that had multiple sponsors. The Ford contact referred the MIT PI to the Ford Alliance for their funds; the Alliance could not grant them under the requirements of the partnership agreement because the focus of the Alliance was individual research projects rather than consortia. The decision not to renew funding of the MIT center was carefully considered at a high level at Ford because of the senior management relationships between MIT and Ford.

One lab director felt that personal contacts with a few sponsor firms had suffered as key people communicated more with MIT senior administration about the partnership rather than with him. Funding to the lab also decreased from these firms.

¹⁰ Several times in the course of interviews with faculty members they raised concerns about the academic alliances — in particular, the Cambridge-MIT Institute (CMI) and the Singapore-MIT Alliance (SMA) — and the pressure that they have caused among the faculty as these commitments are added.

Increased Need for Space for Projects Given Large Amounts of Support

While a faculty member cited the large support from a partnership to one project as causing additional laboratory space to be committed and then reconfigured after support dropped, the researcher heading that project and the PI of the partnership both refuted that this was a significant problem. The partnership funding allowed the researcher to do temporary large-scale work that was necessary at that stage of the project.

Mismatch of Interests of MIT Faculty and Corporate Representatives

In order to transfer know-how developed at MIT efficiently to the sponsor firms, some of the agreements specified that a corporate contact be identified for each project proposed by the faculty and supported by the partnership. With two partnerships, this has posed challenges:

- Merrill Lynch does not have a research department; they are more interested in a broad overview of technologies that will impact the future of their industry, such as that provided through the Industrial Liaison Program. On occasion people from Merrill Lynch also have proposed support of MIT activities beyond the stated focus of the partnership, which is financial technology.
- At first with the Microsoft iCampus program, educational technology was not a topic that interested researchers at Microsoft Research. It was hard to engage Microsoft people in the partnership and in developing an effective relationship with MIT. Since the first cycle in working with the company, however, there is now a group of people at Microsoft Research looking at learning technology and they are interested in the MIT work.

Mismatch of Expectations Versus Deliverables

Companies have multiple, often complex objectives for entering into long-term relationships with MIT. These commonly include making specific advances in areas of interest or developing technologies that may contribute to new products for the firm in addition to gaining greater access to MIT students and researchers to enhance recruiting and technology transfer. As relationships develop, the latter can be seen as more important.

Similarly, at the initiation of the partnership agreements, the sponsors frequently valued most highly research project “deliverables.” As the relationships matured, many companies valued more highly the positive effect they were seeing on recruiting. The partnership PIs anticipate that some agreements will be adjusted to reflect new expectations if they are renewed.

While it was beyond the charter of the committee to interview the companies, based on conversations with MIT faculty and staff the consensus was that the sponsors have been satisfied with the results of their partnerships — including those that terminated early (Amgen) or have not yet renewed (Merck). The Ford partnership was renewed for a second five-year term.

Perception by Companies of Being Denied Opportunity to Engage with MIT because of Existing Partnerships

MIT has a history of working with competitors within the same industry, such as in its many industrial consortia and through sponsored research. In keeping with MIT policy and practice, none of the partnerships excluded other companies from engaging with MIT. However, MIT leadership noted that with three corporate collaborators, existing partnerships might have given them the impression that they would not get the attention of the faculty they wanted unless they committed to the large scale funding of the corporate partners. On the other hand, the existence of a partnership between MIT and

a competitor has also raised the interest of some companies in exploring and developing additional relationships with MIT.

Excessive Time Spent in Cultivation, Management and Stewardship of Partner/MIT Relationship

Both the President and the Provost cited the considerable time commitment that is required for cultivation and stewardship efforts. They noted that significant efforts of others in the senior administration, the Office of Corporate Relations and the Industrial Liaison Program (ILP) were required as well.

The time involved on the part of the faculty to manage the partnerships has varied with the partnership. The Merrill Lynch relationship has required more direct involvement by the faculty PI in the management of the partnership than others. All the PIs have invested time with their corporate counterparts. The PI of the Amgen and Merck relationships saw this as their main drawback: for the Principal Investigator (not the faculty receiving funding) “the work level for these relationships is ten times that of NIH funding, in terms of stewardship.”

Possible Misuse of MIT’s Name in Advertising or Other Publicity

While MIT needs to be watchful in this area, there has not been a problem of inappropriate use of MIT’s name to date. As is standard policy, any use of the MIT name requires MIT approval.

Summary of Costs and Risks

The committee found few negative effects of the partnerships. The most significant was that existing research relationships might be disrupted by the new partnership if the old relationships are not reflected in the new larger agreements.

We found no evidence of faculty being asked to undertake research they did not want to do, or of young faculty being asked to engage in work inappropriate for building a tenure case. Current methods for accounting for faculty research in these specific partnerships did not cause undesirable or unanticipated shifts of resources from teaching responsibilities.

MIT has a history of working with competitors within the same industry, such as in industrial consortia and through sponsored research. The partnerships do not exclude other companies from engaging with MIT and may even encourage firms to consider such an engagement.

Industrial partnerships are subject to the risks of economic change and company personnel shifts that make renewal less than certain, but similar risks are observed in other research programs.

The requirements of the partnerships are no more onerous than those of other sponsors. As faculty members noted, all sponsors, including the government, have some requirements.

Overall the costs and risks of the partnerships were found to be small.

BEST PRACTICE

Based on our interviews with the faculty Principal Investigators, with others involved with the partnerships, and on our study of MIT’s experiences with the partnerships, the committee identified best practice elements including:

- Adherence to standard MIT policies
- Transparent governance structure
- Match of interests of the sponsoring company and of faculty
- Realistic match of expectations with deliverables
- Dedicated company staff as well as significant participation by senior management
- Committed MIT faculty and staff complemented by ILP membership
- Pre-existing relationship with a key MIT faculty member who supports the concept of the partnership
- Addition of the partnership funds to a designated company budget
- Separate corporate funding for activities beyond the partnership
- Fellowship support for graduate students and links to post doc, graduate, and undergraduate students for internships and employment
- Project funding decisions made by a designated governing body.

Adherence to Standard MIT Policies

Standard MIT policies such as ownership of intellectual property and freedom of publication should be maintained.

When a partnership is the sole sponsor of a project, in contrast to mixed support that includes other funding sources, intellectual property issues have been simplified.

Consistency with standard policies has facilitated faculty participation in partnership-sponsored research projects that have institutional significance to MIT; the faculty have many sponsorship opportunities to choose among.

Transparent Governance Structure

The committee discovered that many faculty members were unaware of the partnerships and of the mechanics of how to apply for funding from them. The DuPont and Microsoft Alliances have been broadly publicized. Information about the partnerships, the research areas supported, and how to apply for funds should be easily available and will likely result in broader participation by the faculty.

Match of Interests of the Sponsoring Company and of Faculty

Development of a collaborative, open, mutually supportive set of personal relations is a key to the success of the partnerships. While MIT has actively sought only a few other partnerships beyond these eight, when the interests of the parties involved did not mesh well, agreements were not reached.

In the process employed to develop most of the partnerships, the President of MIT and the CEO of the potential partner firm explored their common strategic interests. When they appeared to match, teams of researchers at MIT and at the firm came together to define thematic areas for the partnership.

If the partnership is to include collaborative work, the research cultures of the two organizations must also mesh well. Many companies do not appreciate the influence of the academic calendar on MIT research activities, nor do they fully understand that the research undertaken at MIT tends to be on the leading edge rather than producing results that can be turned into products quickly. Companies that can work with this make better research partners. When there is a good match of research cultures, collaborative work between company researchers and MIT faculty members at the firms or at MIT can enrich the relationship for both parties.

Realistic Match of Expectations with Deliverables

Major benefits of a partnership for a sponsor derive from transfer of know-how and knowledge and from developing close contacts with students, staff, and faculty members that can enhance recruiting efforts, rather than from the creation of intellectual property. If these are shared expectations, a partnership agreement can be more readily established.

Dedicated Company Staff as well as Significant Participation by Senior Management

A company representative resident at MIT can be instrumental in developing a closer relationship between the partners. The contacts from Ford and Microsoft were both cited as contributing to the success of those partnerships.

The Microsoft iCampus contact also noted that he found it very helpful to meet with the Ford representative at MIT when he began his stay at MIT.

The involvement of senior corporate management in the partnership can help to keep participation in the partnership strategically important to the company.

Committed MIT Faculty and Staff Complemented by ILP membership

Administration and management of the partnerships requires dedicated personnel. PIs need assistance maintaining the research program and providing the stewardship activities. Generally, more administrative support was needed than was originally anticipated. In particular, those partnerships that spanned a number of MIT departments needed more staff support.

The Industrial Liaison Program has emerged as a highly valued asset in supporting elements of the relationships. Partner firms often are interested in research and other activities taking place at MIT beyond the focus of the partnership. The customized broad access to MIT provided by the company's MIT Liaison Officer has been an important adjunct to the partnership activities. The Officer has also been helpful as alliances have branched out to new areas.

Pre-existing Relationship with a Key MIT Faculty Member who Supports the Concept of the Partnership

With the DuPont, Ford, HP and NTT partnerships, MIT faculty members already had well-developed contacts with the companies before the broader relationship was established. This contributed to better communication and more realistic expectations.

Addition of the Partnership Funds to a Designated Company Budget

The financial arrangement that appears to work best is that "new" money to fund the partnership commitments is added to a particular corporate budget, such as R&D. If funds are not added, other ongoing company research may need to be eliminated.

With the HP partnership, obtaining funds has been the most difficult because no monies have been designated and no one budget is responsible.

Separate Corporate Funding for Activities beyond the Partnership

If the firm has supported activities at MIT prior to engaging in the partnership, these might not fit within the focus or meet the guidelines for grants from the partnership. To ensure the possibility of continued funding, supplementary monies may be required.

In addition, other support can bolster the relationship. The Microsoft contact was able to have a supply of Microsoft Xboxes provided as prizes for the MIT \$50K Competition. The Hewlett-Packard representative was instrumental in having a large number of HP notebook computers donated to MIT. Over the past four years, the relationship with Ford expanded to include additional grants from the Ford Fund ranging from \$125,000 to \$750,000 annually for undergraduate, graduate and faculty fellowships, educational activities, programs promoting diversity and recruiting, and an MIT-based Nobel Laureate lecture series.

Fellowship Support for Graduate Students and Links to Post Doc, Graduate, and Undergraduate Students for Internships and Employment

Support of graduate students through first year fellowships has been beneficial both to the companies and to MIT. All partner firms that have recruited at MIT have found that supporting graduate students has contributed to their hiring success.

With DuPont, a cadre of DuPont Fellows has been cultivated who have been supported by the partnership. These students have learned more about the company, often have visited the firm, and are de facto ambassadors at MIT for DuPont.

Recruiting has also been enhanced by internship opportunities for students and the close relationships that have developed during collaborative research.

Project Funding Decisions Made by a Designated Governing Body

The joint steering committee, if there is one, or another designated governing body should select the projects to be funded. This ensures company interest in the work being done while eliminating the difficulty that could result from making an individual MIT PI decide whether to accept a colleague's proposal.

3 R E C O M M E N D A T I O N S

The committee offers the following recommendations regarding creating new partnerships:

- Endeavor to maintain a set of active partnerships
- Choose partners strategically
- Ensure consistency with MIT's mission in research and education and existing policies
- Initiate Faculty Policy Committee review of partnerships
- Enhance transparency
- Have the research agenda driven by MIT faculty
- Follow the best practice elements identified.
- Conduct a review of the academic institutional partnerships.

ENDEAVOR TO MAINTAIN A SET OF ACTIVE PARTNERSHIPS

The Institute is probably limited in the number of such relationships it should undertake at one time. The committee estimates 10-15 as a realistic upper limit to the number of partnerships MIT can accommodate, to allow them to continue as an important part of the Institute research portfolio but not to grow to dominate it. We recommend that MIT actively seek partnership opportunities to replace both completed and discontinued partnerships in order to maintain this important source of support.

CHOOSE PARTNERS STRATEGICALLY

The ability to provide a significant financial contribution to MIT does not guarantee substance in interactions. MIT should be strategic when seeking new partners, attempting to match likely areas of interest with areas of expertise at MIT that would benefit from contact with the partner firm.

While these partnerships all have included research support, it has not always been realistic to match researchers at MIT with researchers at the firm. In some cases such as with Merrill Lynch, a better approach might be to have the MIT work proceed without specific collaborators at the company and to provide the firm semi-annual overviews, executive briefings, or short courses on topics of interest to them.

ENSURE CONSISTENCY WITH MIT'S MISSION IN RESEARCH AND EDUCATION AND EXISTING POLICIES

The industrial partnership agreements that have thus far been negotiated have upheld MIT's policies such as intellectual property ownership and publication rights. Each agreement has included wind-down funding for projects the partnership no longer will support. The committee recommends that similar agreements as have been negotiated in the past be used for any future partnerships. Exceptions to MIT policies should not be made for these relationships.

Annually the expectations of the partners should be revisited to be sure that changes in management have not caused a diversion from the original intent of the agreement.

INITIATE FACULTY POLICY COMMITTEE REVIEW OF PARTNERSHIPS

The committee recommends that the Faculty Policy Committee (FPC) review all partnerships at initiation and at renewal to ensure that all institute policies are respected and to be sure that existing relationships are considered in designing the new agreements.¹¹ However, the FPC should not be involved in the specific negotiations for new partnerships.

ENHANCE TRANSPARENCY

The concerns that we uncovered were largely a matter of perception. A transparent and open process would help clarify issues regarding the partnerships. Many MIT faculty members are not aware of the

¹¹ The committee did not hear any complaints about the eight industrial partnerships not fitting with MIT's mission. However, there were comments from faculty members that the Singapore-MIT Alliance has taken faculty members away from responsibilities such as departmental committees. The Cambridge-MIT Alliance was not identified by anyone as distorting faculty responsibilities as SMA has.

partnerships and do not know of the funding opportunities available through them. Information about each active partnership should be available on some easily accessible Web site. This could include information on the research topics of interest, if any are specified, and on the process to apply for grants.

RFPs should be sent to all pertinent MIT Deans and Department Heads for distribution to faculty members who might participate, informing them of the opportunities for funding.

HAVE THE RESEARCH AGENDA DRIVEN BY MIT FACULTY

As has been done in the past, when discussions concerning a partnership initiate between senior officers of MIT and a possible sponsor, if there is to be a specific research focus, teams of researchers from both MIT and the company should be enlisted in the process of setting the agenda.

In all cases, MIT faculty members should propose projects they wish to work on to the partnerships for funding, as has been done.

FOLLOW THE BEST PRACTICE ELEMENTS IDENTIFIED

As much as possible, the best practice elements noted in the previous section should be built into any new partnerships.

CONDUCT A REVIEW OF THE ACADEMIC INSTITUTIONAL PARTNERSHIPS

In the course of our investigation the committee heard several concerns about the Singapore- MIT Alliance, one of the three academic institutional partnerships that were outside of the current committee's charter. This would suggest an examination of these programs that MIT has entered in the past several years.

4 C O N C L U S I O N S

The committee determined that the partnerships have generated significant benefits for MIT. They have given MIT an alternative steady source of research funding for faculty, supplementing government funding and shorter-term industrial support. Students have benefited from closer contact with corporate researchers, exposure to "real problems," as well as from fellowship grants provided through the partnerships.

The partnerships have enabled MIT to engage in strategic initiatives including:

- Research in educational technology supported by Microsoft
- Creation of the Financial Engineering curriculum at the Sloan School through support from Merrill Lynch
- Development of closer industrial contacts for the Biology Department.

In addition to providing major research support, the partnerships dedicated specific resources directly to MIT as gifts, such as grants from NTT towards building the Stata Center, a new professorship in biology from Amgen and graduate student fellowships.

The committee recommends that the form of agreement used in these eight relationships be followed in any future partnerships and that all agreements follow existing MIT policies.

The committee found few negative effects of the partnerships. One consideration is that existing research relationships may be disrupted by the new partnership if the old relationships are not reflected in the focus of new larger agreements.

Partnerships are usually initiated at the top level at both the company and at MIT. They are subject to company personnel shifts and to risks of economic change that may affect renewal.

The committee found no evidence of faculty being asked to undertake research they did not want to do, or of young faculty being asked to engage in work inappropriate for building a tenure case. Engagement of faculty in research through these specific partnerships did not cause undesirable or unanticipated shifts of resources from teaching responsibilities.

The existence of a partnership between MIT and a company does not exclude other firms from engaging with MIT.

Overall, the committee found that the benefits to MIT far outweighed the risks of engaging in the partnerships.

Firms have sought partnerships with MIT in areas of rapid technological advancement. MIT should strategically pursue prospective partners in areas of potential mutual benefit. The committee recommends that MIT actively seek such partnership opportunities with the objective of maintaining a significant set of active alliances.

Study of the partnerships revealed several best practice elements. The committee recommends that as much as possible these best practice elements be built into future partnerships.

The committee also recommends that the Faculty Policy Committee review partnerships at initiation and at renewal to be sure all institute policies are respected.

In summary, the committee found that the partnerships have presented relatively few problems while providing many benefits to faculty, students, and staff by supporting research, teaching advances, and fellowships.

A P P E N D I X

ITEM A – CHARGE TO THE COMMITTEE

Charge Committee on Industrial Partnership Review

In recent years, MIT has initiated a number of industrial partnerships that connect our institutional mission to the interests of major corporations.

While these initiatives vary, they share the features that they are long- term and a major commitment at the institute level and they typically cross-school or departmental boundaries. The partnerships are also significant because they reflect strategic goals for both MIT and the partner.

The charge to this committee is to review the following partnerships which have been initiated in recent years: Amgen, Merck, Merrill Lynch, Ford/MIT Alliance, Nippon Telephone and Telegraph, Dupont, Microsoft, and HP.

Several of these partnerships continue. Some will come up for review or renewal in the next few years. The committee' s review and report will assist the faculty and the senior administration in:

- Assessing the value of this approach to partnering and research development.
- Define how future opportunities for partnering might be addressed.
- Assist academic units in learning from the experience of units that have had successful initiatives.
- Identify how partnering can be more effectively implemented so that its benefits are spread and its problems are minimized.

In entering these partnerships, MIT had several goals. In these industrial partnerships, MIT has sought to:

- Increase research support for faculty
- Develop new strategic relationships with new or existing industrial partners
- Renew or create infrastructure to support teaching or research
- Develop and test new models of distance education
- Support curriculum development
- Support student exchanges, internships, etc.
- Gain access data and other resources from partner firms
- Enhance the excellence of MIT through gifts, endowments, fellowships, and other support.

While initiatives vary in the degree to which they explicitly embody each of these goals, each initiative pursues some combination of these goals. The committee will explore the extent to which the initiatives have made progress on these goals and what other results have been obtained, including unintended or negative ones.

This list reflects MIT's goals. Each partner has its own calculus for what it hopes to gain. The goals of the partners are not intended to be a part of this assessment, though the committee should consider any evidence that sheds light on partner assessments of their interaction with MIT.

To fully explore MIT's interests, the committee will address the following questions:

- What contributions do these initiatives make to the research and educational mission of MIT?
- What have been the benefits and the costs to the faculty in these initiatives? To undergraduate and graduate education?
- What have been the net infrastructure and resource gains from these partnerships?
- What have we learned from these efforts about the management of collaborations, partnerships, and initiatives?
- What are the lessons from these partnerships that should be incorporated in future such dealings?
- What have been the opportunities costs, if any, of these partnerships, and how might these costs be reduced in the future?
- The initiatives cited above may be viewed as especially beneficial to a particular segment(s) of the Institute. In your assessment, please consider whether these benefits have been diffused beyond the areas of immediate impact or whether the costs and benefits have been experienced narrowly.

In carrying out its work, the committee will focus on the partnerships noted above. The committee may want to compare the partnership approach with more conventional contracts with industrial sponsors where the aim is to have MIT produce a discrete deliverable from a single or small group of faculty members. The committee may also want to consider other benchmarks it considers relevant.

To address these questions, the committee should interview relevant faculty and staff and review documents. The faculty should include those involved in the projects and their colleagues, an appropriate sample of department heads, and lab directors. The committee should also seek the views of faculty who were not involved but who might have been impacted by various partnerships. The committee should specifically interview those who have raised doubts about the wisdom partnerships generally or who had particular misgivings.

The committee will have the support of staff and may request additional resources to have appropriate work completed over the coming summer.

We request that the committee forward its report to us no later than December 2002.

The Chair of the Faculty
The Provost
The Chancellor

April 4, 2002

ITEM B – INITIAL INTERVIEW TEMPLATE

Template used for initial interviews with Faculty Principal Investigators of Partnerships and for review of agreements

Partnership History

Theme/ focus of partnership

Public statements, PR pieces

Monetary commitment – we know the stated intent; what do you show as actual?

Gift/research/overhead/# of years

What percent of the support has gone to research, what percent to educational activities?

Governance issues

How is the partnership organized?

How are projects selected for support?

Are projects specified by the company or by faculty?

Faculty and Student involvement

Which faculty (at what ranks) have been supported?

of students involved (G, U)

Effect on recruiting?

Total research support to MIT from company

Prior to partnership

Since partnership

Exit strategy

Is one written into the agreement? What is it?

ITEM C – TEMPLATE FOR SUBJECTIVE INTERVIEWS WITH PRINCIPAL INVESTIGATORS

Template used for subjective interviews with Faculty Principal Investigators of Partnerships

Interview Protocol and Plan:

Note to interviewers: The following is the proposed protocol for interviewing people on their experiences and opinions with MIT's partnerships. It is tailored to questions that would be asked of the Principal Investigators (PIs) for MIT's partnerships along with MIT's administrative director or staff for the partnership. This basic protocol is also to be used with modification for faculty, students and others to comment about their experiences with these partnerships.

One member of the interview team will take and type up notes. Getting data from different interviews in this format will make it easier to consider and compile data from various interviews. This is a flexible format, just be sure that you cover all the issues in your guided discussion.

PREAMBLE: We are interviewing you as part of our committee's charge to assess the value of MIT's industrial partnerships, what we have learned, and their implications for future research. The partnerships include Amgen, Merck, Merrill Lynch, Ford, Nippon Telephone and Telegraph, Dupont, Microsoft, and Hewlett-Packard. Each of these partnerships is broad, involving many different members of MIT's faculty, and each has a very different research/program focus. We are trying to determine how MIT is benefiting, and what we can learn, across these partnerships.

It would be most helpful if you could describe your experience with the partnership for which you are responsible. How did you get involved, what did you expect when you started, have those expectations been achieved, and how have they changed over time. This background will help us to understand the basis of your experience, and then help us target appropriate questions.

(Provide an opportunity for each respondent describe their partnership experience)

Specific question areas to be probed or worked into the interview as appropriate:

After letting respondent describe their involvement, experience and opinion on partnerships, it would be appropriate to ask questions around the following areas that have not been discussed in the interview. If the respondent already provided answers to these questions, skip asking the question and note their response in the appropriate area. You can also use these points as they are listed to summarize and probe on what you heard earlier.

| |
|---|
| <p>NOTE: on the pages that follow critical probes are in regular text and "nice to have" probes are in gray text.</p> |
|---|

SECTION ONE – BENEFITS AND COSTS/RISKS

To understand how MIT is impacted by your partnership, we would like to ask about specific benefits and costs.

I. BENEFITS: What have been the benefits to you and MIT from the working through the _____ partnership? (Ask respondent to list benefits)

- | | |
|---|---|
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |

Probe on benefits (if not mentioned):

Probe on:

| | <u>Yes/no</u> | <u>Comments:</u> |
|--|---------------|------------------|
| ☞ Initiation of new programs or centers of interest to MIT | ___ | |
| ☞ Research that would not be funded otherwise | ___ | |
| ☞ Access to data, interesting problems and situations | ___ | |
| ☞ Access to equipment and capabilities | ___ | |
| ☞ Curriculum innovation and educational materials | ___ | |
| ☞ Easier money than writing a grant proposal | ___ | |
| ☞ Faculty and staff salary support | ___ | |
| ☞ Ph.D. students and support for dissertations | ___ | |
| ☞ Masters student thesis support | ___ | |
| ☞ Undergrad research and UROP opportunities | ___ | |
| ☞ Job opportunities for students | ___ | |
| ☞ Consulting arrangements for you, other faculty or students | ___ | |

Follow up on benefits (if fits conversation)

What faculty, students or staff have particularly benefited from the _____ partnership? Who are they, and why them?

Are these benefits unique to the _____ partnership? Why or why not?

What have you seen or heard of as benefits for MIT from other partnerships?

Could MIT have gained similar benefits otherwise? If so, in what ways would the efforts to do so have been different?

COSTS/RISKS: What do you see as the risks for MIT of engaging with _____ in a partnership?
 (Ask respondent to list cost and risks the have experienced)

- | | |
|---|---|
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |
| ☞ | ☞ |

Probe on risks (if not mentioned):

| <u>Probe on:</u> | <u>Yes/no</u> | <u>Comments:</u> |
|---|---------------|------------------|
| ☞ partnerships negotiated by senior admin and then handed to faculty and staff to execute with unclear expectations | ___ | |
| ☞ uneven distribution of work load across faculty in supporting partnerships | ___ | |
| ☞ increasing conflict between departments and centers/programs because partnerships absorb faculty members' time | ___ | |
| ☞ too much time spent on liaison and non-research related activities because need to please partner | ___ | |
| ☞ decline in teaching emphasis and quality because of partnership opportunities | ___ | |
| ☞ uncertainty of funding because of partner business cycles | ___ | |
| ☞ relationships with other companies that are not MIT partners is now more difficult | ___ | |
| ☞ suppression of research results to support partners' commercial interests | ___ | |
| ☞ hiring of non-tenured research staff to support these partnerships | ___ | |
| ☞ pressure on junior faculty to do things they don't want to | ___ | |

Follow up on costs/risks (if fits conversation)

Have some faculty, students or staff born a greater cost or risk in working through the _____ partnership? Who was that, and why them?

Are these risks unique to the _____ partnership? Why or why not?

What have you seen or heard of as risk for MIT from other partnerships?

Could the risks with _____ been lessened? How so and how would that have changed MIT's efforts?

BALANCING: What have you and others done to balance the various benefits and risks that come from working with and through these industrial partnerships?

VALUE: Based on your involvement in the _____ partnership, how does the company's support contribute to (or deter from) the basic missions of:

- academic research?
- education and quality of life at MIT?
- support and opportunities for students?

What is your experience as to the *advantages and disadvantages* to MIT of working with a large sponsor in a partnership mode rather than through support of individual research projects, consortia and programs?

Advantages:

Disadvantages:

PRESSURES: Have you ever felt any pressure from MIT administration or had to pressure colleagues or students to get involved in projects with the _____ partnership?

Probe the following:

Probe: Do you know someone who has? If so, with what result? Could you explain?

Probe: Are junior faculty members more likely than tenured faculty to be pressured into research with partners? How so?

Probe: Have the pressures from industrial sponsors changed your research? How so?

Probe: In what ways, if any, does working through one on MIT's industrial partnerships inhibit your or your colleagues' research?

Probe: Are the efforts in "liaising" with the industrial partner different from other types of sponsorship? In what ways are they different?

Probe: How has the partnership changed faculty's consulting relationships with the partner company or other companies?

SECTION TWO - IMPACT ON LEARNING

Now let's talk about the impact of partnerships on education at MIT

LEARNING: Have you noticed any change in graduate and undergraduate education at MIT that might come from the _____ partnership? (If so, what is it?)

Would all other faculty working with _____ (partner) have a similar experience to yours? Why or why not? What would that difference be?

What students would be more affected by the _____ partnership? Can you give specific examples?

Probe: Are you aware of any other gains in educational programs at MIT as a direct or indirect result of a partnership?

What would you say has been some of the most important learning from MIT's experience in creating industrial partnerships?



SECTION THREE – FUTURE OF PARTNERSHIPS

CHANGES: In what ways do you see this and other partnerships changing MIT?

Probe: Are these changes for the better or worse? Why?

Probe: How might MIT change internally to better support these partnerships?

How are the operational procedures with the partner different from working with other sponsors (working with faculty, students, OSP and TLO, for example)?

ORGANIZATION: Is MIT well organized to gain value from its partnerships?

Probe: How might it be better organized?

Probe: What practices in working with _____ have most helped your efforts?

What practices, either on MIT's part or on the partner company's part, have given you the most trouble?

RECOMMENDATIONS: What changes would you recommend to better gain and increase the value for MIT from its partnerships?

Probe: Be as specific as possible.

ANYTHING ELSE?

What should I have asked you that I have not asked?

What else is important for us, and MIT, to consider regarding the current and future partnerships?

Item D - PARTNERSHIP COMPARISON CHART

| Partner Company | # of Years | Start Date | Terminated Early? | Renewed? | Termination Clause | \$/year | How initiated? | Range of Scope | Amount for Research | Amount for Education | Governance | How are Projects Selected? | How are Projects Specified? | Publication Review? | # Faculty Funded | # Students Funded | Affect on Recruiting? |
|-----------------|------------|------------|---|----------|--------------------------------|---------|------------------------|---|---------------------|-----------------------------------|---|--|---|---------------------|---|------------------------------------|-----------------------|
| Amgen | 10 | 3/1/1994 | Yes - 2001 | No | Yes | 3MM | Top-down | Biology but not exclusively | 18.58MM total - 80% | 4.5MM total - 20% | Collaboration managers, 1 MIT, 1 Amgen | By Collaboration Managers | By the Faculty; encouraged by Phil Sharp | Yes | 18: 16 full 2 assoc. | 280: 105 G, 175 U | Not Available |
| DuPont | 5 | 1/1/2000 | No | Not yet | Yes | 7MM | Top-down | Biotechnology interest but broad | 6.2MM/yr - 89% | .8MM/yr - 11% | Steering Committee of 6, 3 MIT, 3 DuPont | By Steering Committee | By the Faculty; invited broadly by DMA (alliance) | Yes | 51: all ranks | 64 as of 12/01: 36 G, 28 Post-docs | Positive |
| Ford | 5 | 1/1/1998 | No | Yes | Yes | 3MM | Top-down | Now "Active Safety" and Environment | 100% | 0% | Operating Committee of MIT and Ford people | By MIT Program Managers in conjunction with Ford | By the Faculty; with involvement by Program Managers | Yes | 34: 15 full 6 assoc 4 ass't 4 research 5 other | Not Available | Positive |
| HP | 5 | 11/1/1999 | No | Not yet | For projects; not for alliance | 5MM | Top-down and Bottom-up | Institute-wide | 90% | 10% | Joint Steering Committee of 6, 3 MIT, 3 HP | By Joint Steering Committee | Partnership seeks faculty in areas of interest; both company and faculty submit proposals | No | 14: 3 full 4 assoc. 1 ass't 5 research 1 other | ~50/yr, 150 so far | Outstanding |
| Merck | 5 | 1/27/1997 | No | Not yet | Yes | 3MM | Top-down | Biology and Biotechnology | 52.50% | 44.50% | Collaboration managers, 3 MIT, 3 Merck | By Collaboration Managers, mainly Sharp (MIT) and Skolnick (Merck) | By the Faculty; Scolnick met with some before they submitted proposals. | Yes | 21: 8 full 4 assoc. 8 ass't 1 lecturer | 87 G and Post doc | Outstanding |
| Merrill Lynch | 5 | 3/1/1999 | No; extended .5yr by MIT due to disruption caused by 9/11/01 events | Not yet | Yes | 4MM | Top-down | Financial Technology Research and Education | 70% | 30% - inc \$5 gift for FT program | Executive and Operating Committees - but business done by working groups | Executive Directors and Dept Heads have served as Program Managers; recommend funding to Operating Comm. | By the Faculty | Yes | 18: 9 full 5 assoc. 1 ass't 3 research | ~80 | Positive |
| Microsoft | 5 | 10/1/1999 | No | Not yet | Yes | 5MM | Top-down | Educational Technology, across MIT | 100% | 0% | Executive Sponsors, 1 MIT, 1 Microsoft + Joint Steering Committee, 3 MIT, 3 Microsoft | By the Joint Steering Committee after an RFP is sent to the entire MIT Faculty | By the Faculty | Yes | >50: most full | 57 G, 80 U | Outstanding |
| NTT | 5 | 7/1/1998 | No | Not yet | Yes | 4MM | Bottom-up | Labs for Computer Science and AI | 75% | 10% | Joint Steering Committee of 6, 3 MIT, 3 NTT | By the Joint Steering Committee | Generally by the Faculty | No | 37: 16 full 7 assoc 8 ass't; 4 research 2 other | ~180 G, ~40 U | Not Applicable |