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# MIT : PHILOSOPHY AND INDUSTRIAL LIAISON

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## **Introduction**

MIT (Massachusetts Institute of Technology) is a research university committed to fostering education and advancing knowledge for the betterment of the human condition. It is, at the same time, a national institution rooted in American culture and traditions, and an integral part of the nation's education and research system.

MIT's responsibility to the nation in which it was founded and nurtured is served first and foremost by maintenance of its position as a premier institution in education and research in science and technology. But to remain a premier institution requires that MIT be thoroughly engaged in international activities in science and technology. It must be a full participant in the world trade in ideas.

## **MIT and Government**

MIT's relationship with the government of the United States has had a profound influence on its development, especially post-World War II. MIT's extensive involvement in mission research, indeed the very concept of the research university, was formulated during conversations in the late 1930s between Professor Vannevar Bush of MIT and President Franklin Roosevelt. Bush urged Roosevelt to consider forming a national research effort, based at a laboratory at MIT, to develop radar. The Radiation Lab began a half-century of strong alliance between the federal agencies, such as Defence, Energy, and Health, and a series of science-based universities and institutions. Although MIT is a privately incorporated institution, at present, through its variety of mission agencies, the federal government provides about 75% of MIT's research funding.

## **MIT's Historical Links with Business and Government**

Research universities in the United States have a unique heritage in comparison to European institutions of higher education. MIT's philosophy, combining education, research, and service, has made it a sought-after model in Europe because of its strong values of real world problem-solving and commercialization.

From its inception in 1861, MIT has operated under a broad set of goals emphasizing both education and service to the community. Its focus was not only on the pre-eminent goal of providing the highest quality education, but also on ensuring that technology be geared to the practical needs of society and made available for use. MIT's interest in practical applications implied close ties with industry, and made the transfer of knowledge from the laboratory to the commercial sector an important operational goal. MIT's charter and environment have given rise to a variety of policies and activities, such as encouragement of faculty consulting, initiatives to start new companies, industrial support for research, student internship programs, aggressive technology licensing activities, and the creation of the world's first Industrial Liaison Program in 1948.

## **Recent Changes**

Major changes in the last decade have radically altered the scope of the triad of institutions concerned most with the advancement and use of knowledge — governments, corporations, and universities. The role of national governments is changing as never before during a time of peace. In Europe, I need hardly mention the changes in national borders, in alliances, and in sovereignty caused by the integration of the European Community and the dropping of the "iron curtain." In America, we have only begun to comprehend the new priorities of our government in a world not marked by superpower tension, and the tremendous defence implications of that.

Commerce, too, is undergoing tremendous change, involving the globalization of industry, the emergence of vast communication networks, increased global interdependence, and a realization of the planetary impact of issues such as the environmental pollution, global warming, and health epidemics. Until recently, each nation and its companies have conducted much of their business within borders, using their own suppliers and experts, and drawing on their own base of intellect. Global competition and the power of information technology changed all of this. It is now easy for a competitor to search, find, and use the intellectual resources of the entire world, requiring you to do the same.

What do the borderless information economy and the emergence of the knowledge enterprise really imply? In the first case, a world in which knowledge becomes instantaneous; a world in which television viewers during the Los Angeles riots

intervened to halt brutal beatings, and in which police can enforce justice via videotape; a world in which tightly controlled societies of communist governments have been overthrown in domino-style by populations buoyed by the ubiquitous news of the victories of their neighbors.

It is also increasingly a world in which wealth is determined, not by natural resources, as in the past century, but by the skill of a population and work force. In this new world, not just the creation of knowledge, but also its careful gathering and husbanding, are the routes to new markets and products. An island nation like Singapore can embark on a national plan to “become a developed nation within one decade,” by the sheer power of organized information technology. No longer is physical capital or size the issue. Rather, deftness, flexibility, and intelligence are.

The challenge for each firm is to enter and fully understand all markets relevant to its capacities, to take advantage of all available knowledge resources, both internal and external, and to manage production, using the most efficient methods available in the world. This argues for a profoundly international stance, one which can take advantage of every one of the world’s available resources — human, economic, political — wherever they reside.

One could say that the challenge for universities is somewhat the same. Though one does not normally think of universities as competitive institutions in the same manner that businesses compete, it is incumbent upon us to respond more competitively to the markets — students, and those who hire them. Just as we represent a global resource, we compete in a global market.

Among these many changes, the national identity of products and firms is no longer clear. In 1980, everyone would have agreed on the “nationality” of the largest “multinational” companies. Siemens was German; IBM, American; Thomson, French; Olivetti, Italian. But now, what of a company like Asea Brown Boveri? Though its headquarters are Swiss, it employs more Americans than any other national group. And it has very strong cultural roots in Sweden, Germany, and elsewhere. This is the new wave of corporate identity. Even the companies named earlier are trying more and more to “act European in Europe, Japanese in Japan, American in the US,” and so forth.

But let’s not leap to the conclusion that national identification will entirely disappear. Even now, in America, consumers buy American brand name products, thinking that there is an element of patriotism in this. Perhaps they learn after purchase that the product was assembled in Malaysia, with components primarily manufactured in Taiwan and Korea. In contrast, the Japanese brand name product may have more American-made components within it. This brand-name confusion has led some, led by Harvard political economist and Labor Secretary Robert Reich, to ask “Who is Us?,” as a way of illuminating the many sides of this question of the nationality of corporations, and its impact on national competitiveness. What seems a facetious question becomes

more meaningful, as companies attempt to exploit feelings of nationalism on the one hand, while behaving as entities independent of nationalistic motives. Indeed, the “borderless enterprise” is a new ideal among the most knowledge-intensive firms. As part of that strategy, they recognize the need to access from around the world the resources necessary to their success, including knowledge and talent.

As an example, Motorola strives to create an interchangeability among its human resources, aiming to develop the so-called “global engineer.” But consistent with the “thinking globally, acting locally” theme we often associate with the environmental movement, this vision can only be realized through strong interactions and citizenship within the many local product and human resource markets in which they operate. To maintain excellence, the firm naturally seeks alliances with universities, which will assist it with technology and human resource needs all over its network — from Schaumburg, Illinois, to Phoenix, to Malaysia. They press MIT, and other universities, to open up to the potential of delivering an array of services to the same industrial customer all over the globe.

Universities often take the mistaken view of being at the cutting edge of society. While we may function at the frontiers of discovery and research, this masks the ultimately conservative nature of the university. As the refiner of knowledge, and carrier of the culture, universities tend to lag, rather than lead, major cross-cutting trends in all but a few arenas. But it is this culture-carrier role of the university which creates the opportunity to play a more significant role in enhancing intercontinental ties.

### **The Present Mission of the Research University**

With the world’s political changes, and the replacement of the Cold War by a form of economic “balance of power,” it is important to ask what role the university should be playing, and both how this role ought to be shaped by its interactions with various kinds of foreign institutions and how it should shape these interactions.

We must recognize that there are a small number of powerful issues which unite us on this earth. First, we have just ended an era in which the threat of nuclear war dominated our security concerns. Nonetheless, with this threat past, we must be ever vigilant to assure continuing world peace.

Second, it is becoming increasingly clear that many actions of industry and technology have profound and long-term impacts on our planetary environment. Once again, we have an issue which links all nations and all peoples, and serves as a laudatory mission for a research university, which can both contribute efforts to understand the world’s situation, but more importantly prepare leaders, who will be able to make the proper choices in the future.

Third, the peace and well-being of the world seems to depend mightily on the assurance of economic well-being for a larger portion of the world. In particular, within our nations, there is great concern about the economic well-being of our populations. And there is great energy available to better understand the problem and contribute to its solution.

Because of the immediacy of the issue of competitiveness, it has attracted far more attention in this tougher business climate. The debate in the United States rages about the viability or need for national industrial policy to encourage American-based industry to be more internationally competitive. MIT's institutional capacity, and devotion to service for the national mission, have led to programs aimed at contributions to American industrial strength in technology. One example is the MIT Commission on Industrial Productivity, which conducted studies of nine sectors (including higher education) to discover the determinants of competitive success, and suggested means of overcoming America's competitive slowdown.

The arena in which universities have always excelled has been in gathering and using relevant knowledge from throughout the world, and embodying this knowledge into the product of the university — the curriculum and the student. As successful business increasingly depends on those able to function across interfaces, both functional (as in marketing, manufacturing, technological, legal) and geographic, universities will be pressed by industry, their main constituent, to turn out individuals capable of adroitly moving into these interfacial roles.

### **Industrial Linkages**

MIT has perhaps the most ambitious set of programs linking it to industry of any university in the world. The Office of Corporate Relations, of which the Industrial Liaison Program is a large part, itself has a staff of 55 people, fully dedicated to building bridges with industry. The number of Administrative staff at MIT in full-time connection to industry is well over 100 and probably two thirds of the entire community of 1,000 faculty are engaged in one way or another with corporations.

Two hundred ten companies participate in the MIT Industrial Liaison Program, approximately one half from the Americas, one quarter from Europe, and one quarter from the Asia Pacific area. For the past several years, MIT has ranked the number one university in terms of the number of US patents granted; we average about 100 per year, and make over 75 agreements, most of them exclusive. Over 650 companies in Massachusetts alone have been founded by people and technology coming from MIT. More than 18% of the \$370 million of research conducted on the MIT campus last year was sponsored by industry.

Even with this impressive portfolio of partnerships and arrangements, we are continually learning new ways to fashion mutually beneficial arrangements for MIT, the corporations with which we partner, and the society within which we live.

As you consider the sort of university-industry partnerships which need to be crafted, there are some key philosophical points that I would like to leave with you. The first and most important principle is “know your constituencies” and secondly, “deliver them value.” Any technology or knowledge exchange program, whatever the technology of focus, and wherever located, is by its definition working between institutions. It is essential that the effort be guided not by the technology itself but by an appreciation of the different goals, motivations and world views of the parties involved. At the MIT Industrial Liaison Program our constituencies are first the companies which form our membership, second the faculty at MIT, and third the Institution itself. In some university-industry programs, the students may also be a major constituency, as is the case with MIT’s Leaders for Manufacturing, which is committed to educating a new generation of industrial leadership.

Understanding the constituency must come before you can deliver value. Value is not intrinsic but only relates to a real or perceived need of the potential purchaser. Many knowledge transfer efforts have failed because of an insufficient understanding of what the key constituency needs.

Faculty at an institution like MIT need several things — they need money to support their research because we are a private institution; they need understanding of the state of the art in industry so that both their education and research is geared to excellence; and they need professional contacts which will help them advance their careers.

In terms of understanding our corporate constituency, we work in a custom fashion with each member, developing a plan for each year based on their objectives. In addition, we have conducted member surveys to identify their motivation in their university relations. The main features have been monitoring technology, accessing research ideas, recruiting graduates, and stimulating innovative thinking.

The Industrial Liaison Program defines its mission as the building and maintaining of mutually beneficial relationships between MIT and corporations. The key words are “mutually beneficial.” We have defined our agenda in terms of the agendas of our key constituents — industry, faculty, MIT. We accomplish our objectives with professional staff whose job it is to 1) identify the needs, interests, and challenges of our member companies, 2) match these needs and interests with the talents and interests of the MIT faculty, and 3) always aim to achieve a higher level of integration between company and MIT objectives.

The currencies of our program are personal interactions and supportive services. Our member companies are encouraged to visit our campus for research briefings and to

consult with our faculty; they are invited to conferences on a wide array of issues, and they have access to a host of supportive electronic and paper materials which both present and interpret MIT's expertise and research findings in the industrial context.

Beyond these basic services, we assist companies in developing customized relationships with our faculty and laboratories which include personnel exchange programs, collaborative research, student recruiting and technology licensing. With certain key companies, the relationships developed through the Industrial Liaison Program have led to a recognition of the benefits of engaging in a more encompassing partnership. These partnerships acknowledge our mutual dependency and the benefits of planning our interactions from a long-term perspective spanning many years. The Industrial Liaison Program is both a facilitator and actuator in these new arrangements.