TECHNISCHE UNIVERSITÄT

Transatlantische Partnerschaft

Peter Jan Pahl über die Zusammenarbeit mit dem Massachusetts Institute of Technology

Die vielfältigen Verbindungen der Technischen Universität Berlin zu Universitäten und Forschungseinrichtungen im Ausland gehen zurück auf ihre Vorgängerin, die Technische Hochschule Charlottenburg. Angesiedelt in der Reichshauptstadt, erwuchsen ihr Aufgaben, die zu Kontakten mit Menschen und Institutionen in vielen Ländern führten.

Nach dem II. Weltkrieg mußten die Verbindungen der TU Berlin zum Ausland unter stark veränderten Umständen neu aufgebaut werden. Im Nahbereich hatte die TU Berlin große Teile ihres Umfeldes durch die Insellage verloren. Aufgaben, die früher aus den Hauptverwaltungen und den technischen Zentralbereichen in Berlin ansässiger Großunternehmen auf die Wissenschaftler der TU zukamen, sind durch die Abwanderung dieser Unternehmensteile ebenfalls verlorengegangen. Es ist noch nicht gelungen, diese Verluste durch neuartige Industrien auszugleichen.

Der Verlust des Standortvorteils und die entstandenen Standortnachteile zwingen die TU Berlin auf neue Wege und zu besonderen Leistungen Dies gilt auch für ihre Verbindungen zum Ausland. Die klassischen Methoden des wissenschaftlichen Austausches durch Veröffentlichungen, Reisen und Vorträge sind angesichts der heutigen Situation Berlins nicht mehr ausreichend. Substanzverluste im Nahbereich lassen sich insbesondere in den Ingenieurwissenschaften nur dann durch Intensivierung des Fernbereiches verringern, wenn neue Formen der Zusammenarbeit zwischen Wissenschaftlern und Institutionen unter Einbeziehung der Partner in Wirtschaft und Staat entwickelt werden. Die transatlantische Partnerschaft zwischen der TU Berlin und dem Massachusetts Institute of Technology (MIT) ist eine solche neue Form der wissenschaftlichen Zusammenarbeit.

Im Jahre 1964 wurde zum ersten Mal ein Partnerschaftsvertrag zwischen der Technischen Universität Berlin und dem Massachusetts Institute of Technology geschlossen. Ziele waren der Austausch von Wissenschaftlern, die wissenschaftliche Zusammenarbeit, das Kennenlernen der unterschiedlichen Hochschulsysteme sowie die Förderung der Bindung zwischen Berlin und den Vereinigten Staaten von Amerika. Für die Verwirklichung dieser Idee schuf die Ford Foundation einen großzügigen finanziellen Rahmen.

Die Leistungsfähigkeit der beiden Universitäten und die günstigen Randbedingungen führten zu Wirkungsmöglichkeiten, die den beteiligten Wissenschaftlern außerhalb der Partnerschaft nicht in vergleichbarer Weise zur Verfügung standen. Die ersten Jahre der Partnerschaft waren daher durch eine besondere Ausstrahlungskraft gekennzeichnet. Zahlreiche Wissenschaftler beteiligten sich an dem Austausch, der nachhaltige Auswirkungen auf ihren Werdegang gehabt hat. Die Gründungszeit fand ihren Höhepunkt in der internationalen Konferenz „Der Computer in der Universität" 1968 an der TU Berlin. Diese Konferenz hat den Einsatz der Rechner an den deutschen Hochschulen nachhaltig beeinflußt.

Nach 1970 fanden an beiden Universitäten Veränderungen statt, die das Augenmerk von der Partnerschaft ablenkten. Hochschulpolitische Erschütterungen haben in Berlin tiefe Spuren hinterlassen. An die Stelle der massiven Förderung des Programms durch die Ford Foundation trat eine bescheidenere Finanzierung im Haushalt der TU Berlin, die insbesondere für Mitglieder des MIT nicht die Anreize des ursprünglichen Programms bot. Dies führte zu einem starken Rückgang im Umfang der Aktivitäten.

Im September 1980 besuchte der Präsident der TU Berlin, Prof. Jürgen Starnick, das MIT. Gemeinsam mit dem Präsidenten des MIT, Dr. Paul E. Gray, bestimmte er die Grundzüge für eine Belebung der Partnerschaft auf der Grundlage abgestimmter Forschungsvorhaben. Der Senat von Berlin unterstützt die Neugestaltung der Partnerschaft nachhaltig. Im März 1982 besuchte Wissenschaftssenator Kewenig das MIT, um die Voraussetzungen für eine erfolgreiche Zusammenarbeit im Bereich neuester wissenschaftlicher Entwicklungen am MIT zu prüfen. Zusammen mit Wirtschaftssenator Pieroth ließ er sich auch über den Einfluß technischer Neuerungen am MIT auf die Entwicklung des Wirtschaftsgebietes um Boston unterrichten. Als Gast des Regierenden Bürgermeisters von Weizsäcker besuchte der Chairman der MIT Corporation, Dr. Howard W. Johnson, Berlin im Juni 1982 zur Unterzeichnung des neuen Partnerschaftsvertrages.

Ziel der Partnerschaft zwischen der Technischen Universität Berlin und dem Massachusetts Institute of Technology ist die Zusammenarbeit bei abgestimmten Forschungsprojekten in den Ingenieur- und Naturwissenschaften. Die Partnerschaft beruht auf einer neuen Form der wissenschaftlichen Zusammenarbeit zwischen geographisch weit voneinander entfernten Universitäten mit folgenden Merkmalen:

- erste Kontakte über die Beauftragten für die Partnerschaft,
- Vorplanung in ausgewählten Gebieten durch gegenseitige Besuche,
- Arbeitstagungen zur Abstimmung der Forschungsvorhaben,
- Einwerbung von Drittmitteln für die Forschungsvorhaben,
- geregelte Abstimmung während der Durchführung der Forschung,
- gemeinsame Veranstaltungen und Veröffentlichungen zur Übermittlung der Forschungsergebnisse an die Praxis.

Mehrere Faktoren machen die beiden Universitäten zu besonders geeigneten Forschungspartnern:

- Berlin und Boston sind Zentren der wissenschaftlichen und technologischen Entwicklung mit vielfältigen Forschungseinrichtungen.
- Das MIT besitzt weltweites Ansehen als eine der führenden Technischen Universitäten unserer Zeit.
- Beide Universitäten sind um eine enge Zusammenarbeit zwischen Wissenschaft und Industrie bemüht.
- Der Kernbereich des MIT liegt wie der Kernbereich der TU Berlin in den Ingenieur- und Naturwissenschaften.

Der TU Berlin und dem MIT erwächst aus der Partnerschaft folgender Nutzen:

- Die TU Berlin kann ihre Leistungsfähigkeit in internationalem Vergleich unter Beweis stellen.

- Der Wirkungskreis starker Fachgebiete der TU Berlin wird erweitert. Beispiele: Produktionstechnik, Fahrzeugbau, Brückenbau.
- Starke Fachgebiete des MIT unterstützten die Entwicklung vergleichbarer Gebiete an der TU Berlin. Beispiel: Mikroelektronik.
- Fachgebiete vergleichbarer Stärke an MIT und TU Berlin ergänzen einander in Ausstattung und Forschungskapazität. Beispiele: Energiewesen, Anwendungen der Datenverarbeitung, Projekte in Drittländern.
- Die Zusammenarbeit mit dem MIT kann das Verständnis für zweckmäßige Strukturmaßnahmen an der TU Berlin fördern. Beispiele: Industrial Liaison Program, Center for Policy Alternatives, Personalpolitik zur Förderung neuartiger Forschungsgebiete.

Dem Land Berlin und den Vereinigten Staaten von Amerika entsteht aus der Partnerschaft zusätzlicher Nutzen:

- Das am MIT vorhandene Wissen über die Entwicklung des Wirtschaftsraumes um Boston auf der Grundlage neuer Technologien kann für Berlin genutzt werden.
- Die Freundschaft zwischen der Bundesrepublik Deutschland und den Vereinigten Staaten wird durch die Erfahrungen der beteiligten Wissenschaftler und durch gemeinsamen Erfolg bei Forschungsprojekten vertieft.
- Das gemeinsame Auftreten der beiden Universitäten bei Projekten in Drittländern demonstriert die Bindungen zwischen der Bundesrepublik und den Vereinigten Staaten.
- Die mit den Forschungsmethoden und Technologien der beiden Länder aus eigener Arbeitserfahrung vertrauten Wissenschaftler können die Zusammenarbeit zwischen Industrien in der Bundesrepublik und den Vereinigten Staaten fördern.

Initiativen der beteiligten Wissenschaftler haben 1981 und 1982 zu mehreren Schwerpunkten für abgestimmte Forschungsvorhaben geführt. An den meisten multidisziplinären Schwerpunkten sind in der Regel fünf bis zehn Wissenschaftler beteiligt. Sie bleiben voll in ihre Fachbereiche eingebunden. Jeder Schwerpunkt hat einen Sprecher.

Der Schwerpunkt Verkehrswesen befaßt sich mit der Zukunft des Automobils: zukünftige Entwicklungsverfahren und Produktionstechnologien, Anforderungen und Konzepte künftiger Automobile, Verkehrssysteme in Städten und Verhaltensänderungen in der Nutzung von Fahrzeugen.

Der Schwerpunkt Produktionstechnik befaßt sich mit der Zukunft der Fabrik: Robotertechnologie, Sensortechnik in der Fertigung, Schleiftechnologie, rechnerunterstützte Konstruktion und rechnergeführte Fertigung.

Keine Angst vor Wettbewerb

Der Schwerpunkt Bauwesen befaßt sich mit neuen Technologien im Brückenbau: Technologie des segmentierten Brückenbaus, Entwurf und Ausführung segmentierter Brücken, Dauerhaftigkeit und Lebenserwartung sowie Erhaltung und Sanierung bestehender Brücken.

Der Schwerpunkt Energiewesen befaßt sich mit Energieeinsparung: Methodik der industriellen Energieeinsparung, Fallstudien in der chemischen und der Grundstoffindustrie, kostenabhängige Tarifierung der elektrischen Energie sowie Regelung und Lastverteilung in elektrischen Netzen.

Der Schwerpunkt Elektronik befaßt sich mit dem Entwurf hochintegrierter Schaltungen und mit Rechnernetzen: Entwurfsmethodik für hochintegrierte Schaltungen, rechnergestützte Entwurfssysteme, Fertigung und Prüfung integrierter Schaltungen sowie Datentechnologie für Rechnernetze.

Der Schwerpunkt Technologie und Entwicklung befaßt sich mit gemeinsamen Projekten der beiden Universitäten in Drittländern: binnenwirtschaftliche Logistik zur Versorgung der Bevölkerung und der Industrie, außenwirtschaftliche Logistik zur Förderung von Import und Export sowie Transport-, Lager- und Umschlagsysteme.

Die Technische Universität Berlin fördert die Aktivitäten der Partnerschaft teilweise aus eigenen Haushaltsmitteln, die zum Aufbau der Verbindungen zwischen interessierten Wissenschaftlern und zur Vorbereitung der abgestimmten Forschungsprojekte eingesetzt werden. Die Vorbereitung findet im Rahmen gemeinsamer Arbeitstagungen und Seminare statt. In den Jahren 1981 und 1982 wurden Tagungen mit folgenden Themen veranstaltet: Future of the Automobile, Lastverteilung und Tarife in elektrischen Netzen, Brückenbau, Produktionstechnik, Bauten in Erdbebengebieten, die Zukunft der Fabrik, hochintegrierte Schaltungen sowie Technologie und Entwicklung.

Führen die Initiativen einer Gruppe von Wissenschaftlern zu einem Schwerpunkt, so wird dieser durch gleichzeitigen Beschluß am MIT und an der TU Berlin in das Programm aufgenommen. Die Aktivitäten der in der Regel aufgenommenen Schwerpunkte werden aus Mitteln des Senats von Berlin mit insgesamt einer Million Mark pro Jahr gefördert. Die Höhe der Förderung der einzelnen Schwerpunkte richtet sich nach der Höhe der eingeworbenen Drittmittel. Die externe Beurteilung der Drittmittelanträge gewährleistet eine unabhängige Kontrolle der Leistungen.

Die USA und die Bundesrepublik Deutschland befassen sich zur Zeit mit der Erneuerung ihrer Industrien. Diese erfordert die Einführung zukunftsträchtiger Technologien, das Management dieser Technologien und die Finanzierung neuer Unternehmungen. Das im Rahmen der Partnerschaft ausgetauschte oder entwickelte Wissen kann diesen Prozeß fördern. Parallel zu den Forschungsprojekten wird daher im Zusammenwirken mit der Wirtschaft und dem Senat von Berlin ein geeignetes Forum zur Verbreitung des an den beiden Universitäten und in den beiden Partnerländern vorhandenen Wissens vorbereitet. Vorbild ist das Industrial Liaison Program des MIT, das sich als wirksames Fenster zur Industrie erwiesen hat.

Die Leistungen der Partnerschaft zwischen dem Massachusetts Institute of Technology und der Technischen Universität Berlin sollen nach drei Jahren überprüft werden. Dann wird festzustellen sein, ob die in der Partnerschaft gebotenen Anreize und Arbeitsmöglichkeiten zu einem besonderen Nutzen für die beteiligten Wissenschaftler und Institutionen geführt haben. □

AGREEMENT FOR COOPERATIVE RESEARCH

between Massachusetts Institute of Technology (M.I.T.)

Represented by

President Paul Edward Gray

and Technische Universität Berlin (TUB)

Represented by

President Jürgen Starnick

§ 1 PREAMBLE

The following agreement between the Massachusetts Institute of Technology and the Technische Universität Berlin is aimed at providing opportunities for faculty members of both institutions to conduct complementary research projects in areas of importance to the evolution of both universities. Such cooperation will enhance the value of the research for both universities, and be advantageous to both the United States and the Federal Republic of Germany.

The cooperation will be in research and engineering developments. It will concentrate on advancing related science and technology, and their use for the benefit of society.

§ 2 METHOD OF INTERACTION

During a preplanning phase exploratory contacts will be made to identify those areas in which faculty members from both universities express interest in cooperation.

For each area chosen, a workshop (or workshops) will be conducted in which faculty from both universities participate in order to

1. become acquainted with each other, present research and discuss future plans,

2. identify complementary research projects; and

3. develop plans for their implementation.

During the conduct of such complementary research, frequent exchanges of results are envisioned, including exchanges of personnel where it is of benefit to the project. Publications and joint conferences will disseminate the results.

§ 3 FINANCES

Seed money for establishing first contacts and for preplanning will be made available by M.I.T. and TUB (see section 6).

Provision of funding for respective research projects is the responsibility of the respective faculty of both universities.

§ 4 PROCEDURES

Complementary research projects under this agreement will be generated and carried out as follows:

1. Establishment of initial contacts through the faculty and/or the designated M.I.T. and TUB representatives for the partnership.

2. Preplanning in selected areas through mutual visits aimed at identifying possibilities for complementary research projects.

3. Workshops with joint M.I.T./TUB participation to intensify the contacts between the researchers and to develop proposals for complementary research.

4. Acquisition of support for the research projects.

5. Execution of projects with frequent exchange of results and mutual visits when this benefits the projects.

6. Publication of results both individually and, where possible, as joint reports under the partnership.

7. Dissemination of the results of the research to practice through workshops, congresses and similar events is a primary aim of the partnership.

Familiarization of top university administrators of M.I.T. and TUB with the different operational procedures of the two universities will be accomplished through visits.

§ 5 REPRESENTATIVES FOR THE PARTNERSHIP

In order to facilitate the developments under the partnership program, M.I.T. and TUB each will designate a faculty member to serve as follows:

1. Establish preliminary contacts up to preplanning.
2. Advise the university administrations on the base financing in phase § 4 (1)
3. Participate in the generation of the projects.
4. Assist in identifying new sources of support.
5. Monitor projects during execution and dissemination of results.

Correspondence establishing policy or committing funding of the partnership should be exchanged through the designated representatives. Copies of all other correspondence should be sent to both university representatives.

§ 6 FUNDING

The administrations of the two universities will individually provide at least the following base financing for each of the first three years of the partnership under this agreement:

1. TUB will provide DM 60.000,– p.a. for expenses of members of TUB and partnership-related costs at TUB.

2. M.I.T. will provide $ 25.000,– p.a. for expenses of members of M.I.T. and partnership-related cost at M.I.T.

3. In addition, TUB will provide DM 40.000,– p.a. to cover costs for travel and workshops in areas of particular interest to TUB.

Expenditures from funds 1 and 2 are reimbursed according to the regulations of the two universities. Reimbursements to members of M.I.T. from funds 3 are arranged directly with TUB by the individuals concerned. Partnership funds cannot be used to pay consulting fees.

Berlin, June 10 th, 1982

Howard Wesley Johnson
Chairman of the Corporation
Massachusetts Institute of Technology

Jürgen Starnick
President
Technische Universität Berlin

APPENDIX 1 : MANUFACTURING AND COMPUTER-AIDED DESIGN

to the
AGREEMENT OF COOPERATION IN RESEARCH
between the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
and the
TECHNICAL UNIVERSITY OF BERLIN

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1. SPEAKERS FOR THE PROJECT

MIT : Professor Nam Pyo Suh

TUB : Professor Dr.-Ing. Günter Spur

2. RATIONALE FOR COOPERATION

The areas of manufacturing and industrial productivity have clearly become multinational, and it is evident that increasingl strong coupling will occur among nations with respect to the production, financing, distribution and servicing of manufactured products. Since the activities of manufacturing firms increasingly overlap national boundaries, it is important that activities in research and education take account of international issues and also take advantage of the different and complementary talents, institutional arrangements, developments and facilities available in various countries. At present a need exists to improve international interactions in the manufacturing industries and in the related educational and research communities. The new program of cooperation between MIT and TUB in manufacturing is one step in closing this gap.

In the trilateral world (Western Europe, North America and Eastern Asia) strong interactions exist and are growing among the US and Canada, the European Common Market countries, and Japan, Korea and Taiwan. Within the Common Market, the Federal Republic of Germany (FRG) has the largest gross national product and is one of the strongest countries in terms of manufactured products. Further, many major German firms have strong activities in the US and conversely. Thus collaboration in research between Germany and the US should benefit both countries.

From the standpoint of institutions, significant differences exist between Germany and the US. For example, in the FRG, the government, industry and the universities tend to work very much as a team in developing new technology and bringing it into practical use, whereas a less coordinated and to some extent

adversarial climate exists in the US. German universities in combination with associated institutes cooperate closely with industry to introduce state-of-the-art technology into new and existing products and manufacturing equipment and systems. Over the past thirty years, most US university research has been supported by the federal government without strong mechanisms for bringing the results into industry, and until recently very little support for research in manufacturing has been available. On the other hand, US universities place strong emphasis on fundamental advances in technology, whereas German university research in the area of manufacturing has tended to be more applied. A joint effort by US and German universities for collaborative research in the area of manufacturing should therefore be synergistic. Together, the full spectrum from advanced research through industrial implementation can be addressed.

Within the FRG, several universities have major emphasis on manufacturing (e.g. TUB, Aachen, Stuttgart). Of these, TUB is a logical first candidate for FRG/US university cooperation in manufacturing for several reasons:

TUB encompasses all of the disciplines involved in manufacturing, including strong emphasis on computer-aided design and manufacturing systems.

The IPK and IWF at TUB provide both strong connections to other German universities and institutes (e.g., through the Hochschulgruppe Fertigungstechnik - an association including all the German manufacturing institutes) and to German industry. Further relationships already exist between these institutes and US organizations such as CAMI, ICAM, the Society of Manufacturing Engineers and the National Science Foundation, as well as with leading US universities involved in manufacturing research and education.

A US/TUB relationship is consistent with US policy to contribute to the continuing vitability of the city of Berlin.

Within the US an increasing number of universities have begun actively to develop new research and educational activities in manufacturing and to establish the close working relationships with industry which are essential to insure relevance and effective utilization of research results. In addition to MIT, several other universities could be candidates for collaboration with TUB (Wisconsin, RPI, Carnegie-Mellon, Minnesota, etc.). However, MIT is a logical candidate for a first collaborative relationship with FRG and TUB for the following reasons:

Since MIT is recognized as a leading School of Engineering in the US, a collaboration with MIT will attract the attention of both the academic and industrial communities throughout the US and also internationally. Thus the program established at MIT may be replicated or expanded to include other universities in the future.

MIT has undertaken a series of initiatives in manufacturing in several of its departments, centers and laboratories over the past several years. These initiatives have established an extensive research base in many aspects of manufacturing and a cadre of faculty, staff and students which are unmatched in any other US university.

MIT provides strong connections, through its faculty, to all of the major US government and professional society activities in manufacturing and to a significant number of US manufacturing industries, ranging from basic industries such as metals and polymers through consumer products such as automobiles to high-technology systems such as computers and aircraft.

MIT has a history of successful collaboration with TUB since shortly after World War II, and has numerous ongoing relationships between faculty at the two institutions.

3. MODE OF OPERATION OF THE COLLABORATION

Consistent with the overall principles of this Agreement between TUB and MIT reached in 1982 by Presidents Starnick and Gray, the primary basis of the collaboration in the manufacturing and computer-aided design area will be complementary and collaborative research projects defined jointly by faculty from both institutions. Criteria for such projects may include, but are not limited to, the following:

Potential importance and industrial impact of the research results in both countries.

Probability that the collaboration will produce results which would not be likely to be achieved by either institution working separately.

Interest of the faculty in the project and availability of complementary talents.

Utilization of unique facilities or special institutional relationships in one or both countries.

Availability of financial support in both countries for the collaborative project.

The mechanics of collaboration will include exchange of faculty, staff and students for appropriate periods ranging from short visits to one or more academic terms, joint conferences and seminars in both countries, exchange of software, joint publications and complementary industrial research consortia.

While the primary basis of collaboration will be in research, the joint activities may have a strong educational component, including the joint development of curricula and other educational materials, and offering of joint short courses for industry professionals in manufacturing. This is consistent with the educational missions and objectives of both TUB and MIT.

4. AREAS OF INITIAL COLLABORATION

Based on discussions between faculty at MIT and TUB, including a joint workshop held at MIT in March 1982, the following five areas have been agreed upon for the development of collaborative research:

1. Manufacturing Processes

   a) Automation of Composites Manufacturing

   b) Precision Engineering

2. Computer-Aided Design

   a) Exchange of Prototype Software

   b) Development of Manufacturing-Oriented Computer-Aided Design Systems

   c) Simulation and Programming of Manufacturing Systems

3. Robotics and Intelligent Machines

4. The Future of the Factory

   A long-term view of manufacturing in the 21st century, including issues such as the spectrum of automation, the structure of labor, the needs for education, the role of information and computers, the social scenario, and international policies on taxation, finance, industry and commerce.

SIGNED:

MIT, Boston,

Professor Dr. Nam Myo Sun
Speaker for the project

TUB, Berlin,

Professor Dr.-Ing. Günter Spur
Speaker for the project

Kenneth A. Smith
MIT Coordinator of the Partnership

Peter Jan Pahl
TUB Coordinator of the Partnership

APPENDIX 2: Future of the Automobile

to the
AGREEMENT OF COOPERATION IN RESEARCH
between the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
and the
TECHNICAL UNIVERSITY OF BERLIN

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1. SPEAKERS FOR THE PROJECT

MIT: Professor Daniel Roos

TUB: Professor Hermann Appel

2. RATIONALE FOR COOPERATION

MIT has initiated and is coordinating a multi-year international program examining the future of the automobile in Western Europe, Japan, and the United States.

The program consists of an interrelated set of research investigations and international forums. The research component is comparing and appraising experiences to date that appear significantly to bear on future choices, and is providing systematic reviews of the premises and evidential bases that undergird alternative forecasts and policy recommendations. It is being carried out by a network of research teams in Japan, West Germany, France, Sweden, and the United Kingdom as well as the United States. The policy forum meetings bring together government officials, management and labor representatives, and other key decision makers and observers to focus on future issues and options. There are close and continuous ties between the research program and the issues addressed in the policy forums.

The aim of the program is to inform public discussion, both within and among the industrialized nations, about policy options bearing on the future of the automobile. More specifically, it will:

- examine the roots of current policies and private sector arrangements;

- clarify the significant tradeoffs between and among those objectives that have impelled government to promote the automobile industry (e.g., employment, balance of trade, national prestige) and those that have impelled them to regulate it (e.g., energy conservation, air pollution control, safety, inflation control);

- appraise the relationships between national policies and such key transnational objectives as free trade, amicable relations between industrialized and less developed countries, international currency stability, the conservation of scarce resources and environmental protection; and

- consider alternative strategies for reconciling these multiple objectives (and diverse sets of national priorities among them), so as to facilitate the evolution of more socially responsible automobile technologies and patterns of usage, with a minimum of economic disruption, in the years ahead.

The MIT Center for Transportation Studies and the MIT Center for International Studies are jointly administering this program. Co-directors of the program are Professor Daniel Roos, Director of the MIT Center for Transportation Studies, and Professor Alan Altshuler, Head of the MIT Department of Political Science.

The participating institutions have been selected in accord with the following criteria:

- Specialized expertise in the areas under investigation, together with a reputation for independence and objectivity.

- Demonstrated ability to carry out comparative investigations and to work effectively with research groups in other countries.

- Flexibility to involve appropriate professionals who are not staff members of the organization as members of the research team.

- National and international prestige.

- Multilingual capabilities.

The research program is addressing four interrelated sets of topics:

A. Government Policy Making and Implementation;

B. Industry Structure, Corporate Strategy and Labor Relations;

C. Technological Opportunities and Uncertainties; and

D. Automobile Usage Strategies.

3. MODE OF OPERATION OF THE COLLABORATION

Consistent with the overall principles of this Agreement between TUB and MIT reached in 1982 by Presidents Starnick and Gray, the primary basis of the collaboration are contributions within

Part C Technological Opportunities and Uncertainties and

Part D Automobile Usage Strategies,

defined jointly by faculty from both institutions. Criteria for such sub-projects are including, but are not limited to, the following:

C. Technological Opportunities and Uncertainties

Part A focuses in part on regulatory pressures for product improvement that the automotive industry is likely to face in the years ahead. And Part B ist considering the capacity of the industry to finance and successfully market various potential improvements. Both regulatory and corporate decision making will necessarily rest, however, on estimates of the time frame within which promising technologies are likely to become available, their effects on vehicle performance and on automotive system externalities, their reliability, and their costs.

The program is assembling, comparing, and analyzing the most significant technology estimates and assessments that have been developed anywhere in the world, with the aim of establishing both the areas of general agreement among serious students of automotive technology and those of substantial disagreement or uncertainty. Where thorough estimation efforts have yielded widely divergent results, the project will seek to explain why. Similarly, it will endeavor to determine whether there are systematic divergences of viewpoint among nations, sectors, (e.g., regulators vs. producers), or companies, and where such divergences are found, to explain them.

Specific task elements of Part C are including:

1. Inventory and analysis of technological improvements likely to become available during the next two decades via the evolution of known technology.

2. Evaluation of potential breakthrough of technological improvements, innovations and likely trends within the motor vehicle industry.

3. Systematic comparison and appraisal of alternative technological paths, taking into account economic, national security, safety, environmental, distributional and other major impacts.

D. Automobile Usage Strategies

As noted previously, policy instruments to limit the harmful side-effects of motor vehicle usage may be categorized in terms of whether they bear most directly on producers or consumers. We label these, respectively, producer and usage strategies.

The focus of Part D is on automobile usage strategies, and particularly on those that have been utilized or seriously considered as means of conserving energy, enhancing safety, and/or reducing air pollution. Usage measures intended to serve other objectives -- such as pedestrian amenity, downtown revitalization, or congestion relief -- will be considered as well, but they receive detailed consideration only insofar as they also promise significant energy, safety, or air quality benefits.

This set of priorities reflects the fact that energy, safety, and air quality objectives can be pursued by means either of producer or usage strategies. Decisions to rely on the former may have important effects on the structure of auto industry competition, the levels of motor vehicle prices, and international trade. Thus, any study of national policies toward the motor vehicle system must place considerable emphasis on the relative merits of producer vs. usage strategies in pursuing these social objectives.

Specific task elements of Part D include

1. Inventory and technical evaluation (in terms of costs, benefits, and interactive effects on other strategies) of those strategies that have been implemented or seriously debated in each country.

2. Political analysis of the factors bearing on feasibility.

3. Comparison of the more promising usage strategies with producer strategies to accomplish the same obejctives. These comparisons will deal with both technical efficacy and political feasibility.

4. Design of operating demonstrations to test the potential transferability of promising usage strategies from one national context to others and the potential utility of innovative concepts that have not yet been implemented anywhere.

INTERNATIONAL POLICY FORUMS

The forums are providing the critical linkage between the research component and the areas in which major decisions, both public and private, are made. The integration of these components continually reminding the researchers of the program orientation toward clarifying and appraising realistic policy options. At the same time, it will enable the forum participants to consider future options in the light of fresh analyses of how the current situation has evolved, how and why it varies from one country to another, and what lessons can be drawn from experience to date about the efficacy and public acceptability of potential strategies.

Four international forums are planned (see program schedule), at 12 month intervals. In the interest of continuity and an evolution of the dialogue, each forum participant will be asked at the outset for a commitment to participate in the full set of meetings. None will be permitted to send an alternate in his or her place.

The forty to fifty participants are being selected to reflect a wide range of national and interest orientations, and with an eye as well toward their potential for opinion leadership, their profundity as individual thinkers about the topics under examination, and their likely capacity to interact fruitfully with the rest of the group.

It follows that the group as a whole will not be perfectly representative of all relevant interests and national perspectives. The aim is to stimulate and service a free-wheeling review of major policy options by a group of highly distinguished and diverse individuals. It is distinctly not to develop a formal organization constrained by diplomatic niceties and the decision making procedures of large institutions.

The middle forum(s) will focus on substantive policy options. The research group will provide background papers on the leading proposals, their underlying value and forecasting assumptions, and the most significant evidence bearing on their likely effects in practice. The primary aim of the forum discussions will be to clarify the main patterns of agreement, disagreement, and uncertainty among participants, together with priority information needs to move the discussion forward.

The final forum will be structured around review of a draft report, intended for wide distribution, on the outcome of the multi-year series of forum deliberations. Substantive policy agreements that have emerged from the process will be highlighted, but the emphasis will not be exclusively on developing firm recommendations. Equal attention will be devoted to the clarification of basic alternatives and controversies. The intended contribution of the total exercise will be to raise the level of public discussion, not to paper over disagreements or uncertainties.

A small secretariat has been established at MIT which is responsible for arranging all forum logistics, for distributing materials to the participants between (and especially just prior to) meetings and for ensuring wide dissemination of the final report.

PROGRAM REPORTING AND DISSEMINATION

The long term value of the program will depend significantly on theeffectiveness with which findings and conclusions are disseminated As noted above, a brief report on the forum conclusions will be issue immediately after the final forum. At the option of the forum members interim reports on selected topics may be issued as well. The overall research findings, together with the main themes emerging from the forum deliberations, will be reported at greater length in a book oriented toward an audience of nontechnical decision makers and opinion leaders. Great care will be taken in the preparation and marketing of this book to ensure that it receives wide attention.

Second, the researchers will prepare numerous working papers and monographs throughout the life of the project, all of which will be distributed in timely fashion to the forum participants and other interested parties. Eventually the most significant of these will be published as articles and books. These publications, directed to more specialized audiences, will contribute to ongoing expert discussions of the issues concerned, even as they provide an essential foundation of evidence (and credibility) for the more general project outputs.

PROGRAM SCHEDULE

A general outline of the anticipated program timetable is presented below.

Initiative Phase: January-December 1980

- Identify participating research groups and individuals.
- Obtain necessary funding commitments.
- Prepare and circulate detailed scoping documents on the main study elements.
- Hold initial meeting of research team leaders to reach agreement on the detailed work program.
- Commence selection of forum participants.

Phase I: January-August 1981

- Prepare initial working papers based on analyses of prior studies, available data, and a limited number of elite interviews (i.e., with particularly knowledgeable officials, managers, analysts, and interest group leaders). This effort has already commenced in the United States.
- Complete selection of forum participants.
- Hold initial forum meeting.

Phase II: September 1981-December 1982

- Carry out detailed studies that have been singled out for priority during Phase I, and report them in the form of interim working papers and monographs.
- Prepare comparative analyses based on the various country studies.
- Hold second forum.

Phase III: January-December 1983

- Complete and disseminate all books, reports and monographs, including a report on the forum deliberations and a non-technical book summarizing the project's overall findings and conclusions.
- Hold third and final forum.

Signed

MIT, Boston

Professor Dr. Daniel Roos
Speaker for the project

Kenneth A. Smith
MIT Coordinator of the
Partnership

TUB, Berlin

Professor Dr. Hermann Appel
Speaker for the project

Peter Jan Pahl
TUB Coordinator of the
Partnership

APPENDIX: ADVANCED BRIDGE ENGINEERING

to the
AGREEMENT OF COOPERATION IN RESEARCH
between the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
and the
TECHNICAL UNIVERSITY OF BERLIN

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1. SPEAKERS FOR THE PROJECT

MIT: Professor Oral Buyukozturk
TUB: Professor Dr.-Ing. Manfred Specht

2. PROPOSED RESEARCH PROJECTS

For starting the COOPERATIVE RESEARCH PROGRAM MIT/TUB-participants have decided to set up the following testprogram in the field of ADVANCED BRIDGE ENGINEERING with special regards to "SEGMENTAL BRIDGES".

a. TESTING of SEGMENTAL BEAMS
(to be performed at TUB)

Two different types of segmental beams will be tested in order to investigate the behavior of

-UNBONDED PRESTRESSING TENDONS

and to study the

-SHEAR STIFFNESS OF JOINTS.

b. TESTING of JOINT MODELS
(to be performed at MIT)

In order to investigate the special behavior of epoxied joints between the precast segments a MODEL TESTING PROGRAM is proposed in conjunction with a COMPUTERIZED ANALYSIS of these joints.

3. PARTICIPANTS

From MIT: Professor Oral Buyukozturk
Daniel Wium

From TUB: Professor Manfred Specht
Professor Peter Lorenz
Johannes Vielhaber

4. CONTINUATION AND EXTENSION OF THE COOPERATIVE RESEARCH PROGRAM

Proposals of the long-term development of cooperative research activities (integration of further civil engineering disciplines on both sides):

- -Documentation of the behavior of existing segmental bridge constructions in America and Europe
- -Special behavior of joints under cyclic loads (-earthquake).
- -Economic aspects of bridge constructions
- -Influence of temperature-effects on bridge constructions.
- -Special aspects of steel bridge constructions
- -Computer-aided design of bridge constructions
- -Applications of unbonded prestressing tendons in bridge constructions

5. SIGNED:

MIT, Boston

Professor
Speaker of the project

TUB, Berlin 18. 4. 1983

Professor Dr.-Ing. M.Specht
Speaker of the project

MIT Coordinator of the partnership

Professor Dr. J. Pahl
TUB Coordinator of the partnership

APPENDIX : TECHNOLOGY AND DEVELOPMENT

to the

AGREEMENT OF COOPERATION IN RESEARCH

between the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

and the

TECHNICAL UNIVERSITY OF BERLIN

1. SPEAKER FOR THE PROJEKT

M.I.T.: Professor Dr. Fred Moavenzadeh (Director of TAP)

TUB: Professor Dr.-Ing. Helmut Baumgarten

2. RATIONALE FOR COOPERATION

To develop and carry out a tripartite collaborative program on Science, Technology und Development together with a university in a third country. The program's overall objective would be to study the role and contribution of science and technology to socio-economic development; to identify appropriate science and technology infrastructures needed to sustain a viable science and technology capability; and to develop mechanism for strengthening the training and advancing the quality of the needed scientists and engineers. To this end, three specific objectives will be pursued in cooperation with the host university.

1. Mobilization of academic interest in research on specific topics in science and technology.
2. Organization and conduct of technical research in collaboration with M.I.T. and TUB faculty, staff and students.

3. Strengthening through exchange of faculty, graduate students, workshops, seminars, and conferences, the academic programs and graduate studies in the recepient country.

To obtain these objectives by using appropriate strategies, assistance from the advanced countries can play an important role. Inter-university collaboration is a particularly effective mechanism in implementing strategies for the application of science and technology to development.

In consideration of the above, the Massachusetts Institute of Technology (M.I.T.) and the Technische Universität Berlin (TUB) have recently agreed to explore the feasibility of developing a joint program focused on the role of science and technology in the development process with a selected academic institution in other countries. Both M.I.T. and TUB have had extensive experience in collaborating with institutions in other countries and in upgrading their capability to participate in the development process. For such development to occur, it is necessary to provide a better focus for academic research, national systems of higher learning and to bring them into closer contact with government and productive sectors. M.I.T. and TUB can assist by transferring their extensive experience in university/government/private sector collaboration to institutions in other countries, thus allowing these countries to utilize their national recources. By provision of both human and physical resources M.I.T. and TUB can provide a catalytic effect in collaboration with counterpart institutions in terms of creating an environment conducive to productive research, encouraging participation, and insuring continuity of efforts.

3. MODE OF OPERATION OF THE COLLABORATION

Consistent with the overall principles of this Agreement between TUB and M.I.T. reached in 1982 by the Presidents Prof. Starnick and Prof. Gray the primary basis of the collaboration

in the project "Technology and Development" will be complementary and collaborative with regard to the institutions in the host country.

Activities for the project "Technology and Development" may include, but are not limited to, the following:

1. A set of collaborative research projects between faculty members of the host institution, M.I.T. and TUB, with primary focus on science and technology. For example in the areas of

   - energy
   - environment
   - scarce resources
   - civil engineering
   - logistics and
   - technology and society

2. Educational exchange opportunities through which faculty and students from the host university would come to M.I.T. or TUB for special research-related instruction as well as for degree-granting programs, providing that necessary departmental requirements for graduate admissions at M.I.T. or TUB can be met.

3. Mini-research projects designed to encourage the participation of the host university faculty in research for both the public and private sectors.

4. Fellowship programs at the postdoctoral and doctoral levels for faculty and graduate students of the host university which would encourage participation in science and technology-related projects in the home country.

5. Industrial internships to provide faculty in the host university an opportunity to become familiar

with the operations of private and public enterprises.

6. A series of conferences, workshops and seminars and short courses focused on program research activities and findings.

7. Establishment of appropriate institutional mechanism for development and maintenance of advanced science and technology related infrastructures, such as computer facilities, laboratories and library systems.

4 Timing

The program should be divided into three phases of development:

1. Initiation Phase (two years). A period in which a small number of collaborations will be organized, and methodologies for future expansion will be developed and evaluated.

2. Steady State Phase (three years). A period in which the maximum number of collaborations will be reached and major program objectives will be fulfilled.

3. Disengagement Phase (two years). In which the scale and extent of involvement will be gradually reduced.

5 ORGANIZATION AND STRUCTURE

At M.I.T. the program will be administered through the Technology Adaptation Program (TAP) in the Office of the Provost. At TUB it will be administered through the Technology and Development Program within the Office of the President. The program should be organized according to the following principles:

1. The program will relate to those research and educational activities for which there exists faculty support and faculty willingness to participate. The program should not undertake research projects which require large-scale, non-faculty staffing. The research activities will be supervised and conducted by faculty members and administered through their respective departments.

2. Program committees, composed of faculty members from the three institutions will be appointed to maintain academic quality control not only in the conduct of research and educational obligations, but also in the selection of topics for research.

3. The program Directors at the collaboration institutions should be senior faculty members with experience in international collaborative programs.

Signed

M.I.T. Boston
5/27/83

Professor Dr. F. Moavenzadeh
Speaker for the projekt

TUB, Berlin, den 06.05.83

Professor Dr. H. Baumgarten
Speaker for the project

Professor Dr. K.A. Smith
M.I.T. Coordinator of the
Partnership

Professor Dr. P.-J. Pahl
TUB Coordinator of the
Partnership

APPENDIX

to the

AGREEMENT OF COOPERATION IN RESEARCH

between the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

and the

TECHNICAL UNIVERSITY OF BERLIN

"MATERIALS FOR NEW TECHNOLOGIES"

1. SPEAKERS FOR THE PROJEKT

MIT : Professor D. Seyferth
Professor M. Kastner

TUB: Professor R. Steudel
Professor H. Schumann

UNTERSUCHUNGEN AN NICHTMETALLISCHEN UND HALBLEITENDEN MATERIALIEN FÜR NEUE TECHNOLOGIEN

Forschungsschwerpunkt der Partnerschaft
zwischen dem
Massachusetts Institute of Technology
und der
Technischen Universität Berlin

Teilprojekt A:
Molekulare und elektronische Umwandlungen in amorphen und kristallinen Feststoffen, insbesondere in Schwefel- und Selenverbindungen
Sprecher: Prof. Dr. R. Steudel

Teilprojekt B:
Metallorganische Verbindungen der Lanthanoiden und Actinoiden
Sprecher: Prof. Dr. H. Schumann

Zusammenfassung Teilprojekt A

Amorphes Selen und polymerer Schwefel sind industrielle Produkte, die sich beim Erhitzen sowie beim Belichten in kristalline Stoffe umwandeln und dabei ihre Eigenschaften drastisch ändern. Die Verhinderung dieser Umwandlung ist ein wichtiges Anliegen der Industrie und im Zusammenhang damit steht die Aufklärung der molekularen Umwandlungen, die in solchen amorphen Festkörpern beim Erhitzen oder Belichten ablaufen. Es ist daher das Ziel dieses Forschungsvorhabens, bei wohldefinierten Modellverbindungen des Schwefels und des Selens die molekularen Veränderungen bei thermischer oder photochemischer Belastung mit physikalischen Meßmethoden zu studieren. Hierzu muß eine größere Anzahl von Verbindungen synthetisiert und in großer Reinheit dargestellt werden. Anschließend werden die chemischen Umwandlungen mit geeigneten Analysenmethoden (DSC, HPLC, Ramanspektroskopie) verfolgt, während die beim Belichten im festen Zustand ablaufenden Vorgänge am M.I.T. mit spektroskopischen Methoden studiert werden sollen.

Die geplanten Untersuchungen werden zum besseren Verständnis einer großen Verbindungsklasse beitragen, die durch kovalente Bindungen zwischen Schwefel und Selenatomen definiert ist. Die erhofften Ergebnisse sollten daher gleichermaßen von technischer wie von wissenschaftlicher Bedeutung sein.

Zusammenfassung Teilprojekt B

Halbleitende, leitende und lichtempfindliche Materialien und speziell dünne Schichten aus derartigen Stoffen als Überzüge werden aus Oxiden, Nitriden und Legierungen verschiedener Metalle und Nichtmetalle hergestellt, die durch entsprechende Verbindungen anderer Elemente in vom Hauptelement unterschiedlicher Wertigkeit dotiert sind.

Das Ziel dieses Forschungsvorhabens ist die Herstellung solcher Materialien bzw. Schichten auf einem neuen, kostengünstigen Weg durch Zersetzung metallorganischer Verbindungen. Hierzu ist es notwendig, daß die Bestandteile der halbleitenden, leitenden oder lichtempfindlichen Materialien bzw. Schichten in Form löslicher oder leicht flüchtiger metallorganischer Verbindungen zur Verfügung stehen.

Im Rahmen der Zusammenarbeit zwischen dem MIT und der TUB werden metallorganische Verbindungen der Lanthanoiden und Actinoiden mit großen Anionen synthetisiert. Aus dem Studium der physikalischen und chemischen Eigenschaften dieser Verbindungen und der Untersuchung der Zersetzungsreaktionen solcher Verbindungen werden Einsatzmöglichkeiten dieser Substanzen zum Dotieren von Materialien und Schichten im Hinblick auf deren Verwendung als Halbleiter, Leiter oder Lichtenergieüberträger ausgearbeitet.

Steudel

(Prof. Dr. R. Steudel)

Schumann

(Prof. Dr. H. Schumann)

Peter Jan Pahl

(Prof. Dr. P.J. Pahl)

Marc Kastner

Prof. M.A. Kastner

K. A. Smith

(K. A. Smith)