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9/2

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION
ORIGINATOR: 02

DOCUMENT NUMBER: 9202500

SPEECH: YES NO

FROM: HOESS, Friedrich: THE AMBASSADOR OF AUSTRIA

DATE OF EVENT: 09/02/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: THE NEW AUSTRIAN CHANCERY

TIME OF EVENT: 7:30 P.M.-9:00 P.M.

SUBJECT: AN INVITATION TO ATTEND A RECEPTION IN HONOR OF THE
WORLD SPACE CONFERENCE.

RSVP: 07/20/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO: INTERNATIONAL/POL

REMARKS:



DATE OF LETTER: 07/16/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION

Please respond on or before

July 20, 1992

Dr. D. Allan Bromley *Name*

Guest Name

XX will attend will not attend



In celebration of the World Space Congress

*The Ambassador of Austria
and Mrs. Friedrich Hoess
and*

*The Austrian Trade Commissioner
and Mrs. Josef Schwald*

request the honor of the company of

Dr. and Mrs. Browley

at a reception

on Wednesday, September 2nd, 1992

from 7.30 to 9.30 p.m.

895-6700

*R.S.V.P.
with enclosed card
(by July 20, 1992)*

*at the New Austrian Chancery
3524 International Court, N.W.
Washington, D.C.*

*(Shuttle-Bus Transportation available from Convention Center to the Embassy.
Please check with World Space information desk.)*

9.2.92
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"Document Control"

TYPE: INFORMATION

ORIGINATOR: 02

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DOCUMENT NUMBER: 9202486

DIRECTORATE STATUS

FROM: DIEBOLD, JOHN: THE DIEBOLD INSTITUTE FOR PUBLIC POLICY STUDIES, INC.

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 08/17/92

SUBJECT: ENCLOSED DOCUMENT REGARDING THE PROGRESS REPORT ON
THE INFORMATION-BASED INFRASTRUCTURE PROJECT.

DIRECTORATE
ASSIGNED:

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SENDER'S DUE DATE:

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DATE COMPLETED:

STAFF DUE DATE
DATE COMPLETED/DEPT:

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D. Allan Bromley

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The Diebold Institute for Public Policy Studies, Inc.

August 17, 1992

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Dear Allan,

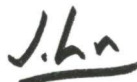
I thought you might be interested in the enclosed Progress Report on the Information-Based Infrastructure Project which The Diebold Institute is conducting.

If you would like any additional information or copies of any of the Working Papers listed in Appendix B of the report, please let me know.

My colleagues and I would be most interested in your reaction to this document as a guide to our future work on this project.

With best wishes.

Sincerely,



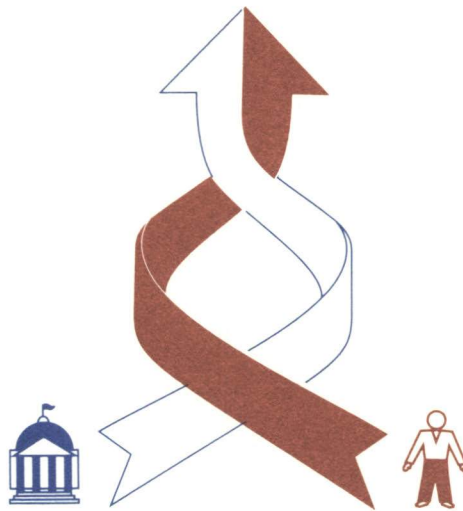
John Diebold

Enclosure

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
Old Executive Office Building (Room 358)
17th St. & Pennsylvania Ave., N.W.
Washington, DC 20506

INFRASTRUCTURES FOR THE 21ST CENTURY

**A Progress Report on the
Information-Based Infrastructure Project**



The Diebold Institute for Public Policy Studies, Inc.

THE DIEBOLD INSTITUTE FOR PUBLIC POLICY STUDIES, INC.

The Diebold Institute for Public Policy Studies, Inc. is an operating foundation established in 1968 by John Diebold, Chairman and founder of The JD Consulting Group, Inc., formerly The Diebold Group, Inc. Exploring the public-private interface in order to obtain maximum societal benefit from technological change is the principal focus of the Institute's activities.

Part of this process assesses the interplay of government and business for the optimum achievement of public and private goals. The Institute, which pioneered some of the early work on the concept of privatization, aims to explore the participation of the private sector in the delivery of public services. In addition to privatization, the Institute studies the way that markets and technology have catalyzed each other -- how technology facilitates market systems, and how markets stimulate technological and societal advancement. The Institute seeks to identify policies that encourage rather than inhibit this relationship.

The Diebold Institute, as an operating foundation, seeks out, creates and undertakes projects that enable the study of these issues. For example, a lecture program at Harvard University examined technology, business and policy, as well as the role of profit. In addition, the Institute has sponsored books on various topics in management and technology. The Institute has conducted seminars for individuals in public policy to discuss issues related to privatization and technological change. It also has a research interchange arrangement with over 100 academic and research institutions. The Institute also manages the Marietta Schweitzer Fellowship Fund, which provides scholarships for Europeans studying in the United States.

INFORMATION-BASED INFRASTRUCTURE PROJECT

The project is an international cooperative effort whose goal is to assess the value of information technology in societal infrastructures and, where appropriate, bring about the policy conditions which facilitate its development and application to improve the quality of life for the broadest possible segment of the general public. Policies are evaluated to determine which stimulate and which inhibit development of effective information-based infrastructures in the United States, Europe and Japan.

Just as the commercial application of information technology has vastly impacted and improved business, critically important areas of public, non-commercial life could also make dramatic gains through further use of technology. Public infrastructures that could be improved by information technology include road transportation, health care, and environmental monitoring and response studies on which we have already begun, as well as education, communications, and public safety. The project is supported by the Alfred P. Sloan Foundation.

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THE DIEBOLD INSTITUTE COMMISSION

The project is being advised by a Commission of influential individuals from the public and private sectors in Europe and the United States. The Commission is also concerned with focusing attention on the findings and recommendations of the project. The members of the Commission are:

United States

Dr. Craig I. Fields, President and CEO
MCC Corporation

Robert W. Galvin, Chairman, Executive Committee
Motorola Inc.

Maurice R. Greenberg, Chairman, President and CEO
American International Group, Inc

John D. Macomber, Chairman, President and CEO
Export-Import Bank of the U.S.

H. Ross Perot, Chairman
The Perot Group

Dr. P. Roy Vagelos, Chairman and CEO
Merck & Co, Inc

Europe

Dr. Karlheinz Kaske, Chairman of the Supervisory Board
Siemens AG

Jacques Maisonrouge, Former Chairman, IBM World Trade, and
Former Director General of Industry for France

Dr. Heinz Riesenhuber, Minister for Research and Technology
Federal Republic of Germany

The Rt. Hon. Lord Sharp of Grimsdyke, Stanhope Properties plc
Former Chairman, Cable and Wireless plc

Dr. Werner Ungerer, Rector, College of Europe - Institute of Post-Graduate
European Studies
Former German Ambassador to the EC

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GOALS AND CONCLUSIONS TO DATE

A. ORIENTATION OF THE PROJECT

Information technology has revolutionized the way the private sector operates. In the private sector, the technology has not simply improved the efficiency and economy of the operations, it has also brought about the complete redefinition of entire industries.

With the notable exception of the military and a limited number of other examples, new technologies have been applied in the public sector primarily in a peripheral way with the result that the delivery of many public services is still overwhelmingly labor-intensive benefiting only marginally from technologies already at hand and which are increasing daily in capacity and economy. This is not due to any shortage of capable staff, rather it stems from an institutional structure which is risk averse.

The task of renewing public or societal infrastructures -- those systems which provide services to a broad sector of the public -- is too often considered as a matter of merely refurbishing systems conceived in many cases in the late 19th or early 20th century. This status perpetuating approach is totally inadequate for any advanced industrial society. A more forward-looking approach is required.

Renewing societal infrastructures in light of the needs of the early 21st century and applying the available technologies should bring two important benefits:

- Improved productivity and effectiveness of the infrastructure itself, which leads to increases in business productivity and ultimately improved international competitiveness for the nations or regions pursuing such an approach.
- A "demand pull" for advanced technologies, systems and software, thus ensuring vigor in those sectors of the economy which supply these goods and services, in a far more direct and effective way than has been tried in the past through "spin-off" from military or space programs on the one hand, or supplier subsidies on the other.

B. THE CHALLENGE WE HAVE SET OURSELVES

Against this background, the main premise of our project, the initial work of which has been primarily funded by the Alfred P. Sloan Foundation, is that we should re-examine the renewal of societal infrastructures in light of the needs of the early 21st century and the technologies becoming available now for use then. Specifically our project aims:

- To ascertain what is desirable, feasible and economic and what are the obstacles inhibiting the use of information technology in societal infrastructure in such areas as highway transportation, the delivery of medical and health care services, and other areas such as environmental protection, public safety, education and entertainment.

- To review what is being done in these areas in the United States, Europe and Japan.
- To ascertain, drawing on these international comparisons, which policies and conditions encourage and which inhibit the use of information technology in societal infrastructure.

The project is being advised by a Commission of influential individuals from the public and private sectors in Europe and the United States. The Diebold Institute Commission is also concerned with focusing attention on the recommendations of the project by the policy communities in Europe and the United States in order to help bring about socially useful results

Throughout the project, we have also commissioned papers by experts in Japan and Europe and in the United States on societal infrastructure. A number of working papers have been prepared by these experts (see Appendix I) and a high-level workshop of international experts and Commission members was held in Washington, DC (see Appendix II). Others, such as Professor William Baumol, New York University, Dr. Robert B. Cohen, Economic Strategy Institute, Washington, D.C., and William Diebold, retired Director of Economic Studies of The Council on Foreign Relations, New York, have made important contributions through direct consultations.

C. A TOTALLY DIFFERENT APPROACH TO THE DELIVERY OF SOCIETAL SERVICES IS NOW POSSIBLE

Computers and communications, with the continuing decline in the unit cost of this technology and continued improvement in interface capabilities allowing for easy use by the average and untrained person, has the potential for a totally different approach to delivering those services which are usually considered part of society's infrastructure. Many of the restrictions of the past need no longer apply:

- The receiver of the service, the provider, and all of the required equipment no longer need to be located at the same location. This means that cars, homes, offices, schools, shopping centers, etc., both local and out-of-town, are now appropriate locations for dispensing societal infrastructure services, and resources can be more highly utilized. Under-populated areas can also be served cost-effectively.
- Payment for the use of a societal infrastructure will be accomplished without immediate post-usage queuing or even a separate and later invoicing/payment activity but can be automatic. Thus, the possibilities for pay-for-use are enhanced.
- Decisions concerning each receiver of societal infrastructure services need no longer be made in a vacuum but can easily consider both the particular recipient's history and the needs and actions of all of the other individuals who are involved or impacted by this decision. The ability of the decision making processes to be refined automatically and to learn continuously from previous experience is now also possible.

- Traditionally separate infrastructures can be linked (for example, health care with emergency services, highways with hazardous waste tracking). Infrastructure and commercial activity can be linked (for example, societal air quality surveillance and company specific emission control systems).
- To the extent it is desirable, uniformity can be achieved. Likewise, the ability to differentiate based on the circumstances of each particular situation can as easily be achieved. Special provisions can be made for individuals with special needs (for example, the handicapped). Language can be at the user's choice. Normal business hours need not be a restriction. Where fast response is necessary, it can be achieved. Fraudulent use, including organized fraudulent use, can be detected.
- Job opportunities within societal infrastructures can command the same respect and compensation as other information intensive areas of our economy.

D. CONCLUSIONS TO DATE: PUBLIC-PRIVATE SECTOR COOPERATION IS THE KEY TO ACHIEVING THE BENEFITS

We have begun by examining in detail two infrastructures - highway transportation and health care. Plans are being developed for similar work to be undertaken with respect to the environment protection infrastructure and are commented on briefly in this report. Other societal infrastructures such as public safety, education and communications are candidates for future research. We have tentative conclusions and recommendations with respect to highway transportation and health care, whose importance is such that they should be reviewed by The Diebold Institute Commission and then subject to public discussion and debate. These findings and recommendations can be summarized as follows:

- Information-based infrastructures promise significant direct benefits in terms of improved services (for example, reduced congestion and improved patient care), and savings for the consumer of billions of dollars a year. Much more work is needed to improve the quality of the assessment of these benefits (and the associated costs) -- good quality cost-benefit studies are lacking in both the fields we have studied.

In addition, information-based infrastructures promise indirect benefits through the stimulation of a number of economic sectors, including the creation of new information technology markets and new information service industries. Such stimulation is a sounder way of ensuring the economic vigor of high technology industries than relying on "spin-off" from military and space programs or supplier subsidies.

- These benefits will be achieved only in part unless some major obstacles are overcome. These obstacles primarily relate to public policy rather than technological issues, and include some very important conceptual issues relating to the role of the private sector in the delivery of infrastructure services.

- In highway transportation, Japan appears to be in the lead with Europe running hard in the deployment of information technology systems, while in health care, the picture is less clear with the United States in the lead in deployment of systems though still at an early stage in development.
- In order to achieve the significant benefits of information-based societal infrastructures, we recommend that the private sector take a leading role in the funding and operation of societal infrastructures, in partnership with the public sector. Public-private partnerships need to be developed which draw on the complementary skills of the two sectors -- the ability to innovate, to assess commercial risks and to operate services efficiently in the case of the private sector, and the ability to regulate, and to ensure equity and continuity of services in the case of the public sector.

E. SUMMARY OF THE PROMISE AND THE OBSTACLES

Below we summarize the promise of information-based transportation and health care infrastructures and the obstacles to the achievement of this promise. Our detailed findings are given in Chapter III for highway transportation, and Chapter IV for health care.

Throughout our study we have been struck by the lack of good quality cost-benefit studies in both the fields we have studied (see pages 49 and 77). Work needs to be carried out to overcome these deficiencies (see pages 58 and 88). Far too many opinions, including some of our own, are subjective and based too frequently on anecdotal evidence rather than sound cost studies.

Much of our analysis to date has emphasized a United States perspective. There is, however, considerable commonality between highway transportation in Europe and the United States -- highways are almost exclusively funded and operated by the public sector, with a small minority of funds generated from tolls on roads, bridges and tunnels. Thus, we believe that our analysis of the obstacles in the United States to the use of information in the highway infrastructure, also has considerable validity in the European context.

The situation with regard to health care is somewhat different, with Europe and the United States adopting different approaches to funding and organizing medical services. In the United States the delivery of health care is operated on a professional/commercial basis, with only a minority of the funding from the public sector (Medicare and Medicaid). In Japan, the European Community and Canada, the situation is very different. There the public sector supplies most of the funds and because of this adopts a very interventionist approach often controlling the overall availability of resources, setting prices and generally setting standards.

Our analysis has concentrated on the United States health care system, but where appropriate, we have drawn on the findings contained in the working papers for the European and Japanese health care systems. We have identified a number of obstacles to the use of information in the American health care system. All of these probably have relevance to European health care systems. However, because of the above differences in the organization of health care, we are unsure at this stage of the relative importance

of these obstacles, or, whether we have identified the most important obstacles for the European situation. We believe that this an area for further work.

1. Intelligent Vehicle/Highway Systems

The Promise

Information-based transportation infrastructures, often referred to as Intelligent Vehicle/Highway Systems (IV/HS), are made up of systems for automated traffic management, traveler information systems and automated vehicle control, plus specialized systems for commercial vehicle operations and electronic monitoring of the physical infrastructure (see Figure 1, page 7). The implementation of IV/HS will potentially lead to vehicle users saving vast amounts of journey time and fuel, significant reduction in pollution and improved highway safety.

- Traffic will be managed on the main roads of major metropolitan areas through controlling road junctions and access to major routes, detecting and responding more rapidly to incidents, and advising people about traffic conditions. In addition, through automatic vehicle identification and automatic toll collection, the way is opened to variable pricing of access to roadways (congestion pricing).
- A wide variety of information systems will be available to travelers, for example, route guidance, the location of the next McDonald's, the time to the airport, etc. In addition, drivers and passengers will receive information via eye-level "heads-up" displays or voice synthesizers.
- Drivers will be automatically alerted to the proximity of other vehicles or obstacles. Later, automatic steering control and inter-vehicle spacing will provide collision avoidance and allow for increased highway through-put.
- Commercial vehicle operators will receive regulatory documents (permits, registrations, etc.) for multiple states in a single transaction, and automatic weight checking, as needed, without requiring the vehicle to stop.
- The continuous monitoring of the physical state of the road itself, bridges, tunnels, etc. with early warning of roadway deterioration and structural weaknesses in bridges and tunnels, will be possible through a network of probes embedded into the physical infrastructure.

Section A in Chapter III provides more background on the promise of IV/HS.

The Potential Benefits

The potential benefits and commercial opportunities offered by an information-based transportation infrastructures are immense (see Chapter III, Section B for more details). These benefits are distributed among three groups of beneficiaries -- individual travelers, specialized road users (for example, trucking companies) and society in general.

FIGURE 1

THE PROMISE OF IV/HS

Shown here is a schematic of various IV/HS functionality elements. To be sure, IV/HS is a collection of information technology concepts which can be installed incrementally and will continue to be designed, limited only by engineering ingenuity.

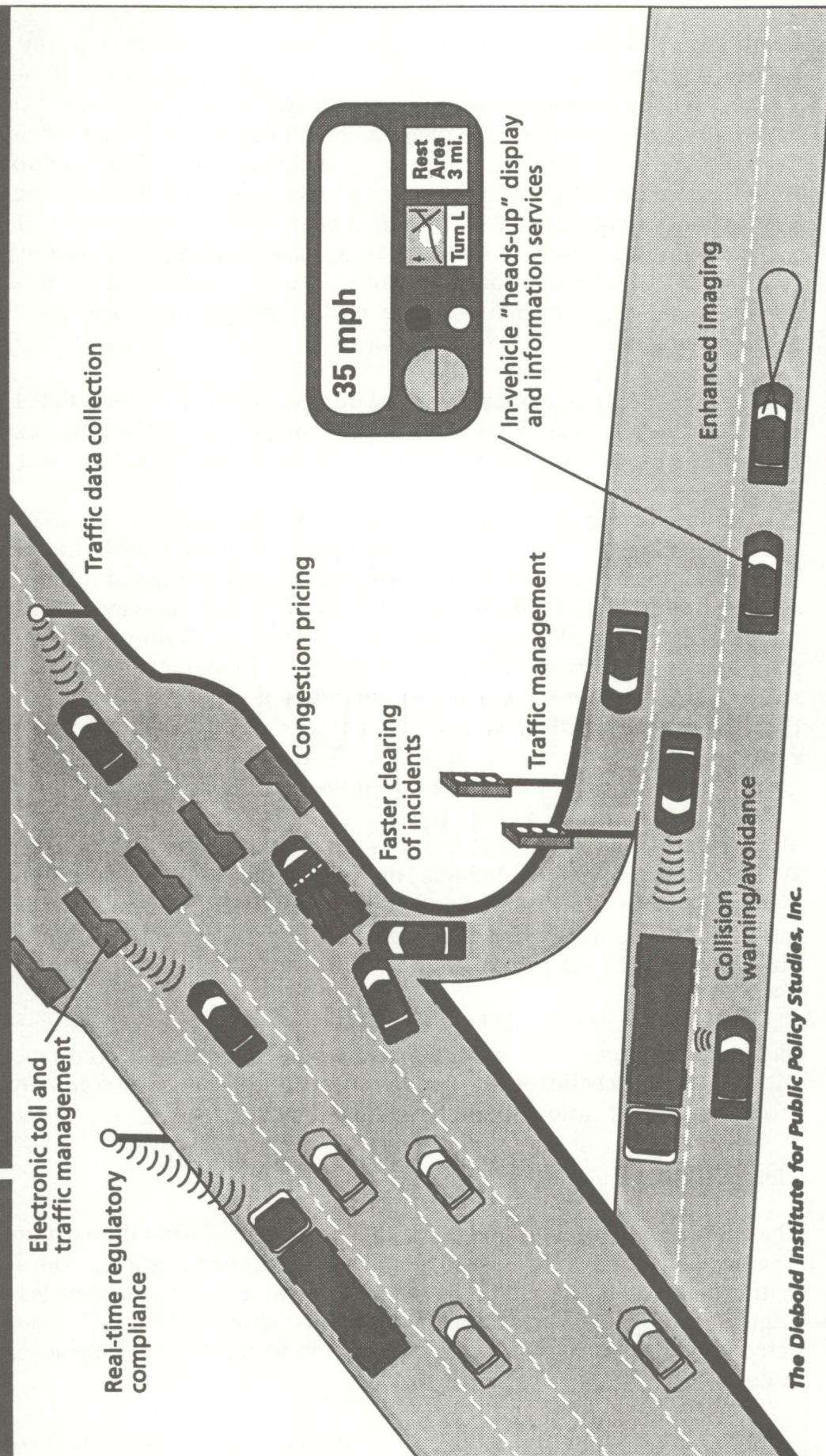
In the schematic, we show vehicles equipped with safety devices such as:

- Enhanced imaging to overcome the vision limitations of drivers with perhaps poor night vision or to enable all drivers to "see" through fog
- Systems for keeping track of where other vehicles are, for example to alert drivers to vehicles in their blind spots or to sound an alarm if one is overtaking a vehicle too rapidly
- New ways of communicating information to drivers including "virtual" displays, similar to a hologram, at eye level which may be able to receive information from street signs, etc. and display this information in the vehicle at eye level.

Paying tolls will be a snap and not require a full stop although slowing down is recommended. Commercial vehicles will also be able to avoid stopping for weighing and checking of documents as this will be done electronically. Highway authorities will have an electronic and often visual picture of the entire roadway so that accidents can be responded to immediately, the travellers aided, and, inoperable vehicles cleared to get traffic moving again very quickly. This same surveillance information will assist travelers in selecting less congested routes.

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Tomorrow

The Promise of Intelligent Vehicle/ Highway Systems (IV/HS)



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In addition to achieving more throughput from the existing highway infrastructure, we believe that a substantial percentage of the costs of highway inefficiency can be saved. We have examined a range of industry and government estimates and integrated these to arrive at a \$300 billion overall estimate of annual highway inefficiency in the United States. There are also other non-quantifiable costs such as environmental impacts. Important quantifiable components of this waste include \$100 billion a year in lost time due to road congestion, \$70 billion a year in accidents, and \$60 billion a year in navigational waste, which includes time, gasoline, and wear and tear because of poor routing. The electronic management of the physical infrastructure will also lead to significant savings in maintenance costs through more timely, and therefore less extensive repairs.

Although much more work needs to be done to quantify the benefits of particular aspects of IV/HS, there is considerable evidence that savings in the range of 15-25 percent are realistic within a reasonable timeframe. Even greater direct savings are possible.

In addition to the above direct benefits, IV/HS will also yield indirect benefits by providing economic stimulation to a number of sectors, including the creation of new markets for information technology products and a new multi-billion dollar information services industry. We believe such stimulus is a sounder way of ensuring the economic vigor of high technology industries than relying on "spin-off" from military and space programs or supplier subsidies. We believe world markets for products and services for societal infrastructures are likely to expand, whereas defense expenditures are expected to contract. Societal products and services are more likely to be utilized in other commercial and consumer applications than defense products. Moreover, direct government funding of R&D has not proved totally successful.

These benefits must be set against the deployment costs for IV/HS in the United States. IVHS America (Intelligent Vehicle Highway Society of America), the focal point for IV/HS development in the United States, estimates that long-term deployment costs of the infrastructure to be about \$40 billion and in-vehicle consumer costs to be about \$170 billion over a 20 year period.

The bulk of the planned IV/HS expenditure is earmarked for passenger vehicles. Given that half the potential benefits of IV/HS are likely to accrue to commercial vehicles, the Diebold Institute believes that a redirection of funds towards commercial vehicles could produce a higher ratio of benefits to investment.

The Obstacles

The obstacles to the creation of both the information-based infrastructures studied relate primarily to public policy issues including questions such as the role of the private sector in the delivery of infrastructure services, and are considerably less technological in origin. The impact of technological problems is further reduced by the extraordinary rate of technological development in information technology and the accompanying decline in costs.

Highway construction has a long established tradition and is a field where technological change has only taken place slowly over the years. As a result there is more resistance to the application of information technology (see Section D, Chapter III) than in the health care system which has always had an important information content. This is reflected in the obstacles we have identified.

The key obstacle to the creation of an information-based road transportation infrastructure is the difficulty of getting the whole process started in new ways. Traditionally highway transportation investment is funded by the public sector. However, public sector authority is fragmented vertically. In the United States, transportation planning is carried out at federal, state, regional, and municipality levels. Similarly in Europe, for example in the Netherlands, transportation planning is carried out by central, provincial and city governments. Moreover, there is considerable geographic fragmentation; any major project will cross several jurisdictional boundaries. There is, thus, no single focus for initiating an IV/HS project. In addition, the public sector lacks some of the technical and procurement skills necessary to implement IV/HS projects.

We believe that an important consideration is the need to move more of the investment risks from the public sector to the private sector. However, in order to make sensible judgements about this reallocation, greater understanding and quantification of the costs and benefits of IV/HS are needed.

Other obstacles we have identified are:

- Attitudes that expect IV/HS to be free at the point-of-use, despite the fact that the public sector lacks the funds to provide such services.
- Attitudes that expect IV/HS to be universally available despite the fact that such an approach would be much more costly than providing services to niche customers.
- Possible conflicts between IV/HS and other societal goals, such as privacy and low speeds, and conflicts between IV/HS and other solutions to highway problems, such as investing in more miles of roadway or discouraging road usage.
- The imperfect understanding of the costs and benefits of IV/HS. Without an improved understanding, both the public and private sectors will have reservations about investing in IV/HS.

2. Information-based Health Care Infrastructure

The Promise

By building on the existing investments in information technology, to move information faster, to consolidate information on patient outcomes and to make this information more accessible, an information-based health care infrastructure can be created (see Figure 2, page 11). We believe that such an infrastructure will improve patient care and reduce costs. It will:

- Provide full patient information regardless of location. It will be possible to access a complete set of medical records for each patient, regardless of the location of the inquiry. In addition, important inter-relationships between medical variables, and, where appropriate, preliminary diagnoses will be routinely checked and automatically brought to the attention of the physician.

FIGURE 2

THE PROMISE OF AN INFORMATION-BASED HEALTH CARE INFRASTRUCTURE

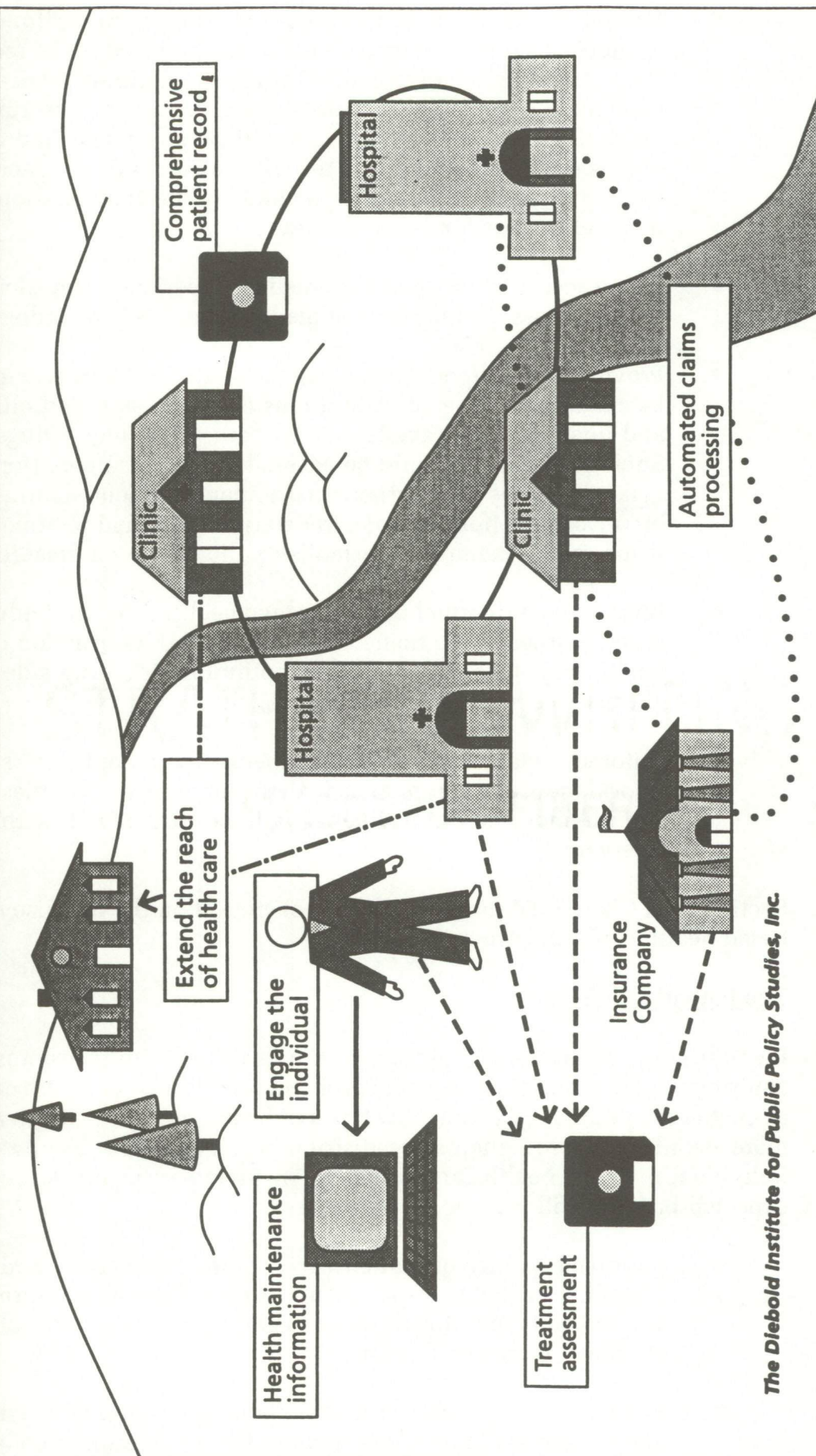
Shown here is a schematic of what might result from electronically interconnecting health care sites, providers, insurers and patients.

There are three loops of interconnectivity shown:

- A provider loop with emphasis on avoiding the need to co-locate buildings, human resources, equipment and patient records
- A patient involvement loop to allow individuals to access the health care system wherever they are located both for health, home health care, health maintenance, patient initiated assessment of treatment alternatives and providers, and to extend the reach of health care to rural communities
- A claims processing loop

With these communication loops in place, we anticipate a continual development of new services to support and enhance each of these loops.

Competitive Infrastructures for Tomorrow



- Extend the reach of health care, allowing more treatment to be provided without hospitalization. Patients in the home could be remotely monitored, thus providing positive control of life maintaining devices and alerting the emergency services of life threatening conditions. In rural areas, two-way video links between centralized medical specialists and general physicians will be established, enabling the wider availability of specialized care. These consultations will be supplemented by the transmission of x-rays, etc, to medical centers for expert review.
- Allow access to accumulated medical experience. Physicians will be able to search across a wide range of medical databases regardless of location.
- Provide access to performance assessment. Community-wide information will be available on specific conditions detailing expected clinical performance and quality of life, availability of care, consumer ratings and likely costs. Such information would be accessible by consumers (for example, to help make decisions on whether a particular treatment should be entered upon), by physicians (for example, to determine optimal treatments) and by health insurers (for example, to establish policy on reimbursability).
- Engage the individual in his/her own health care. Individuals will be able to access, either in the home or public places, information on a wide range of health related topics, including optimum diet, drug side effects, treatment alternatives, provider performance, etc.
- Automate claims processing. Checks for completeness and accuracy of information, and compliance with the reimbursement rules will be facilitated, and in most cases, payments will be authorized with minimal human intervention.

Section A in Chapter IV provides more background on the promise of an information-based health care infrastructure.

The Potential Benefits

Increasing the information intensity of the health care infrastructure we believe will contribute to the solution of the main problems of the current health care system, as well as enable the practice of whole new types of health care (see Chapter IV, Section B, for more details). These benefits are distributed among four groups of beneficiaries -- individual patients, health care providers, insurers/payers and society in general. The expected benefits will include:

- Improved quality of patient care. More information and expertise will be brought to each doctor-patient encounter. Extending information to the home and remotely monitoring patients allows patients to stay at home where they often feel more comfortable.
- Reductions in the cost of health care. The potential savings for the United States have yet to be quantified but there is reason to believe that duplicate testing and unnecessary procedures may be as high as 10 per cent of non-administrative expenditures or about \$60 billion per year.

Further savings of \$30 billion per year are possible if administrative costs in the United States were reduced by at least 25% through greater automation of administrative processes.

Patient costs such as traveling to doctors and hospitals and resulting loss of work time are generally not included in estimates of national health care expenditures, but these could also be significantly reduced by systems that electronically link patients, providers and health care sites.

In arriving at the above figures, we have been forced to make some simplistic assumptions because of the lack of good quality cost-benefit studies. Clearly, this is an area where considerable further work is necessary.

- More effective health maintenance and education. With the availability of electronic health maintenance and education information, individuals will be able to develop better health habits and make better health care decisions.

The Obstacles

Despite considerable investments in the use of information technology within the health care sector, a true information-based health care infrastructure has yet to be created because of a number of obstacles to the use of information within the sector (see Chapter IV, Section D):

A major obstacle is the lack of an appropriate mechanism for recapturing the real cost of employing information technology. The health care system in the United States does not explicitly recognize the monetary value of health information. For example, physicians are not directly compensated for computerizing patient information. The collection and handling of patient data is viewed as a cost - something to be minimized. The problem is exasperated due to the fact that the benefits of an information infrastructure include an important component received by the insurer/payer while the decisions to utilize such an infrastructure are made primarily by health care providers and patients who are understandably reluctant to incur the full cost of these services. As a result, there are far fewer opportunities for third-party organizations providing analyses of health care data to help patients, providers and insurance companies make better health care decisions.

A second major obstacle is that the use and ownership of patient information is not clearly established. There are considerable concerns relating to privacy and misuse. These factors greatly inhibit the wider use of information within the health care system.

Other obstacles are:

- The liability exposure for information providers may be significant and may inhibit the provision of information services in health care.
- Information standards are insufficiently developed. Without such standards the ability to interchange information will be severely impaired.
- The economic case for the creation of information-based health care infrastructures has not yet been made. Without such a case, investments in the appropriate systems will not take place.

3. Environmental Protection

Many believe that the most important decisions facing mankind today relate to the exploitation, on the one hand, and the protection, on the other hand, of our natural environment. Certainly, concern about environmental issues has reached unprecedented levels -- resulting in ever increasing pressures on business to improve its environmental performance.

Within any given regulatory framework, environmental protection is basically about collecting environmental data, analyzing this data and then making the appropriate adjustments -- a process ideally suited to the use of sensors, communications networks, and computers. Yet, preliminary analysis suggests that the opportunities provided by these information technologies have hardly been exploited. Thus, we believe that the work planned for later this year and next will put us in a position to put forward recommendations which could have a particularly significant impact on what is essentially a new societal infrastructure.

An information-intensive environmental protection infrastructure offers for pollution monitoring and management the promise of:

- Monitoring levels of pollutants at fixed locations.
- Measuring the impact of pollutants at places to be protected.
- Initiating remedial action, for example, through automatic reduction of highway speed limits, or levying financial penalties.

and for waste disposal management the promise of:

- Tagging and tracking waste management, particularly toxic and nuclear waste, and monitoring the movement of the associated documentation.
- Monitoring toxicity levels, etc., at waste sites.
- Activating alarms and initiating remedial action in critical situations, for example, railway accidents involving containers of toxic material.

Our approach to analyzing this infrastructure will be to follow the approach adopted for the other two societal infrastructures reported on in this document -- a thorough analysis of the promise and the benefits of an information-intensive infrastructure, identification of the public policy and technological obstacles to the achievement of this promise, and finally the development of ways to overcome the identified obstacles. As before, we shall seek inputs from international experts.

F. SUMMARY OF THE CURRENT PUBLIC POLICY INITIATIVES

Public policy towards the application of information technology within societal infrastructure has mostly been approached from a supplier subsidy standpoint. This is more pronounced in some countries than others. There is virtual unanimity of agreement that government should support basic research but beyond this, there is considerable divergence with Europe and Japan heavily subsidizing the development of information

technology, and with the United States adopting a much more fragmented and less committed approach.

In IV/HS, for example, Europe has supported PROMETHEUS, a private sector consortium of car companies, and Drive, a public sector consortium of national highway authorities. Japan has supported two public-private consortia now being merged under one group (VICS). Following a period of curtailed funding, the U. S. Department of Transportation and Congress recognized the importance of IV/HS and interest has been renewed through Mobility 2000, its governmentally authorized successor IVHS America, and ISTEA (see below).

As has been true in other areas where stimulation of information technology has been a societal objective, as in the European Community, supplier subsidies for IV/HS have only had slight impact. In highway transportation, it was one of a number of factors in Japan taking the lead in the deployment of information technology systems. Japan has achieved its leadership position through its ability to make public-private partnerships work to develop new products, and through conditions especially favorable to the implementation of IV/HS -- particularly pressing congestion problems and a shortage of urban land for highway construction. The specific areas of leadership are traveler information systems, highway communications infrastructures, and active safety measures.

In health care, pressures on resources and the consequent need to improve productivity, have been the most important stimulant to the introduction of information technology, and have been significantly more important than supplier subsidies. These market pressures have had the greatest impact in the United States which, as a result, leads in the deployment of information technology systems in health care.

In both the United States and Europe, a number of recent public policy initiatives have sought to stimulate greater private sector involvement in societal infrastructures. In the United States, the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 provides \$660 million for IV/HS demonstration projects, and encourages the private sector funding of IV/HS. The April 1992 Executive Order on Privatization of States and Local Government Assets complements the innovative funding arrangements proposed in ISTEA. This Executive Order removes most of the factors inhibiting states selling to the private sector infrastructure assets, built in whole or in part with federal money. The Information Infrastructure and Technology Act of 1992 ensures that the technology developed by the High Performance Computing Program is applied widely in education, in libraries, in health care, and in industry, particularly manufacturing. For example, it will fund new ways to use high speed telecommunications networks to link schools, access digital libraries of information, and consult with experts around the country.

The European Nervous System is an idea developed by the European Commission. The aim is to build a European computer and communications network, initially providing services to the public sector (for example, for inter-governmental communications relating to transportation, health care, trade, security, environmental control, etc.) and later to the private sector. A step towards achieving this aim took place in early 1992 when Groupe Bull (France), Olivetti (Italy) and Siemens-Nixdorf (Germany) jointly

formed Trans European Information Services (TEIS), a computer services company headquartered in Brussels, to develop trans-European systems for public sector authorities.

Appendix III provides additional comparisons of regional public policy initiatives.

G. SUMMARY OF THE SOLUTIONS

In order to achieve the significant benefits of information-based societal infrastructures, we recommend greater private sector involvement in societal infrastructures as the most important single factor in the creation of an environment in which market forces will stimulate the application of information technology. The private sector (see Figure 3, page 19) provides the focal point for introducing and operating information-intensive infrastructures and for achieving regional cooperation with the public sector (for example, between state and local governments). The private sector will utilize its skills in innovating and operating services efficiently, while the public sector will ensure equity, continuity and stability of services.

Beyond this, there are three other very important contributory factors. Firstly, there should be acceptance that monetary values should be placed on the use and handling of information. This means in road transportation that some IV/HS services should be provided on a pay-for-use basis, and in health care that the handling and use of health care information should be regularly charged for and reimbursed under insurance coverage. Secondly, the operation of the infrastructure should be consistent with major societal goals. For example, in road transportation IV/HS must be consistent with the Clean Air Act in the United States; and in health care the use of patient-related information must respect the patient's privacy. Thirdly, the necessary technology, for example, telecommunications services, must be available at an acceptable price.

1. Highway Transportation

Our analysis has shown that the obstacles facing information-based highway transportation infrastructures indicates requirements for:

- A champion for IV/HS who can operate in a multi-interest environment, and who is willing to take financial risks.
- Entrepreneurial vision to identify commercial opportunities.
- The ability to operate innovative services efficiently.

These are the characteristics of the private sector, not the public sector which makes the majority of the investments in the transportation system today. Thus, **an important preliminary recommendation is that the private sector should take a leading role in the funding and operation of IV/HS, in partnership with the public sector.** We need to develop public-private partnerships which draw on the complementary skills of the two sectors, for example, the public sector is skilled in ensuring equity and social cohesion, and the private sector is skilled at innovating and responding to rapid change. Figure 4, page 23, illustrates the conditions for private investment in societal infrastructure.

We believe that a more market driven approach would yield significant dividends:

- Focusing on areas where beneficiaries indicate a willingness to pay will ensure that investments produce benefits in excess of the costs involved.
- It would convert IV/HS from a burden on the taxpayers to a new source of revenues by concentrating initially on user groups and services where there is willingness to pay.

We are actively developing appropriate models of public-private investment partnership in order to achieve the introduction of innovative IV/HS services. In some cases this will involve privatization, for example, toll collection operations. In other cases, there will be a public part, for example, a traffic management system funded by the public sector and, a private part, for example, a pay-for-use traveler information system funded and operated by the private sector. It is important to recognize that the public parts of IV/HS may be operated by the public sector or, alternatively, contracted out to the private sector perhaps on a cost plus basis or, better yet, with an incentive arrangement based on the performance of the system. Figure 4, page 23, illustrates the conditions for private investment in societal infrastructure.

In developing these public-private investment partnerships in the United States, we shall be taking advantage of two important recent pieces of public policy -- the Intermodal Surface Transportation Efficiency Act (ISTEA) and the April 1992 Executive Order on Privatization of State and Local Governments Assets, mentioned earlier. We shall also be examining ways in which to build into routine infrastructure financing, incentives which will encourage the utilization of advanced technologies.

In addition to our main recommendation, **we have made further preliminary recommendations:**

- **Focused campaigns aimed at Transportation Authorities in the United States should be carried out to create a climate where IV/HS pay-for-use services are encouraged, and where the introduction of IV/HS niche services are seen as beneficial.**
- **Good practice guidelines should be established for handling potential conflicts between IV/HS and other societal goals.**
- **The procedures for identifying and evaluating commercially attractive IV/HS services should be improved.**

Our recommendations are summarized in Chapter II and discussed in more detail in Chapter III, Section F. We are currently developing action plans for implementation of these recommendations.

2. Health Care

A major obstacle to the implementation of an information-based health care infrastructure in the United States is the lack of explicit monetary value placed on health information. The problem is exasperated in health care due to the fact that the benefits of an information infrastructure include an important component received by the

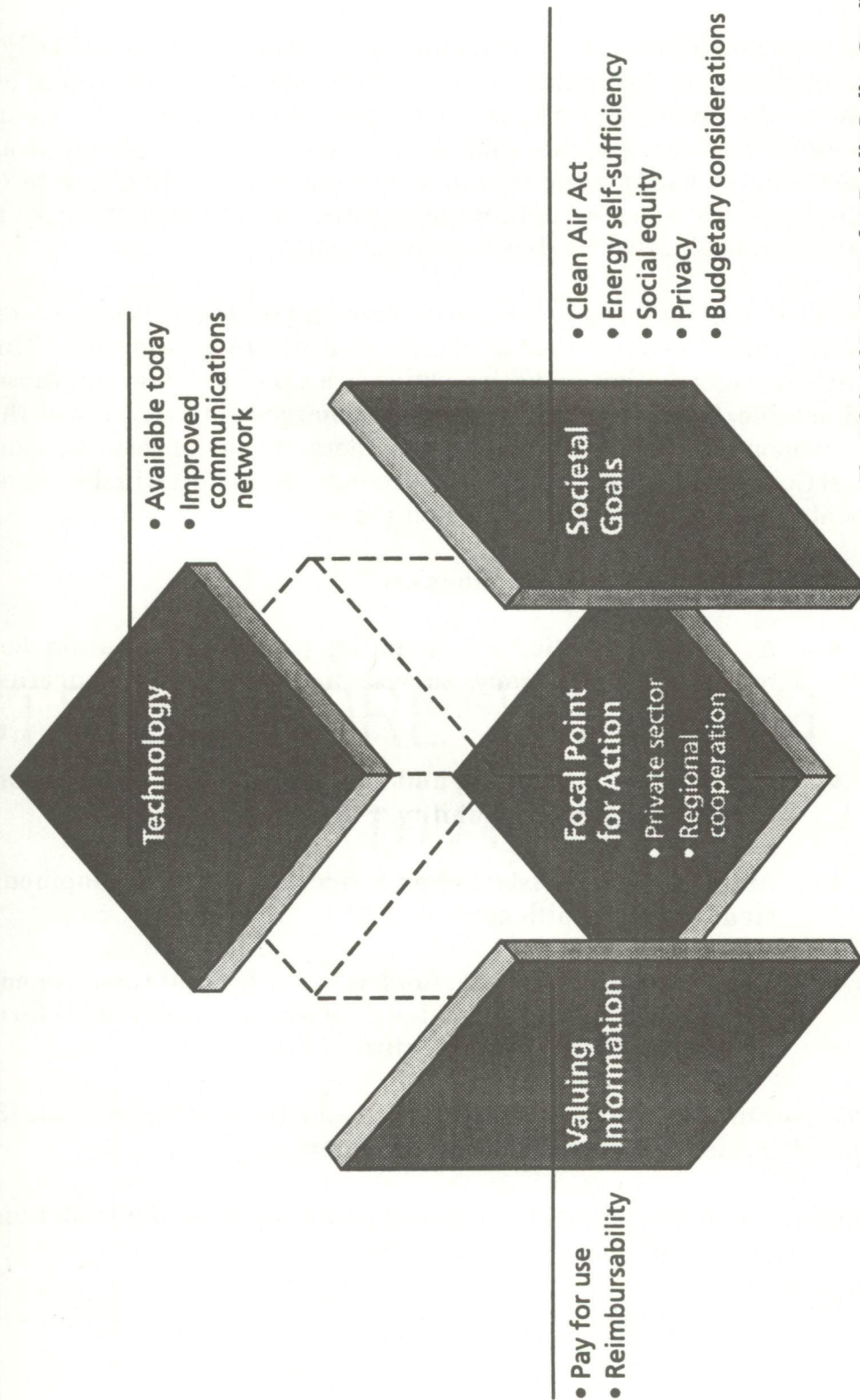
FIGURE 3

MAKING THE VISION OF INFORMATION-INTENSIVE SOCIETAL INFRASTRUCTURE A REALITY

The cube represents the need for the harmonious inter-relationship of four factors if reinvention of societal infrastructure is to proceed without undue delay:

- The technology must be available, reliable, cost effective and practical to use
- A mechanism must be available for recapturing the real cost of employing the technology: pay-for-use where the user receives the bulk of the benefits or passing the cost through reimbursability to the beneficiary where the user and the primary beneficiary are two different parties. Pay-for-use or reimbursability by insurers is preferable to taxpayer financing which by necessity is political
- Other societal goals must not be comprised so significantly that opposition is encountered
- There must be a focal point for action able to bring together the multiple parties whose cooperation is required; in many cases a private sector player can perform this unifying role.

Making the Future Vision of Information-Intensive Societal Infrastructure a Reality Today



insurer/payer while the decision to use such services as maintaining and accessing patient medical histories is made by the provider or patient. The provider or patient is understandably reluctant to personally fund the cost savings which will be received by insurers. Thus, the demand for these services is low and the insurers do not receive the benefit of reduced duplication of testing or reductions in the cost of processing claims.

If the collection and handling of health care information were regularly charged for and reimbursable under insurance coverage, we believe there then would be any number of private sector systems available to supply added value, for example, to indicate procedures that are not appropriate, that are not successful, that have a low outcome of success, etc. Such information would help to improve the quality of care, by for example helping to identify the most appropriate type of care and to improve operating efficiency, by for example eliminating duplicate diagnostics.

In order to facilitate this process, **we recommend that serious consideration be given to the development of a payment model for health care information. This model should identify the information activities which are reimbursable and those which are not reimbursable, but for which a fee could be charged.** Once accepted this model should be implemented by key players - the providers, the major insurers including the Federal Government and pharmaceutical companies. We are in the process of outlining a model for discussions with interested parties.

Other preliminary recommendations are:

- **A code of practice for handling patient information be established to minimize the privacy, misuse and ownership concerns about patient information.**
- **Procedures for handling and analyzing patient information be established in order to limit tort liability.**
- **An institution be established to accelerate the development of information standards in health care.**
- **Further experimentation, funded by the Federal Government, be carried out to help develop the economic case for increasing the information intensity of our health care infrastructure.**

We are currently developing these recommendations in more detail (See Section F in Chapter IV) prior to seeking their implementation.

Chapter II provides a summary of all our preliminary recommendations.

H. NEXT STEPS

In the next stages of the project, we expect to carry out the work outlined in the above paragraphs. Our results will be reviewed with the key participants and public policy groups. In parallel, we shall be disseminating our results both in the United States and abroad. This process has already begun with presentations to the Council on Foreign Relations, New York, the New York Academy of Sciences, and the Centre for European Policy Studies, Brussels. Our dissemination program aims to create a dialogue with participants in order to strengthen and expand our analysis, and, if possible, to stimulate others to implement our recommendations, particularly those relating to quantitative analyses, where considerably more work is required.

FIGURE 4

FACTORS DETERMINING THE RATE OF PRIVATE SECTOR INVESTMENT

This exhibit illustrates the importance of certain factors in the regulation of the rate of private investment in societal infrastructure. When all three conditions are favorable, investment is not impeded.

The three factors are:

- Amelioration of risks. A number of ways to achieve these are listed. Governmental action can be very helpful in this area.
- Ability to match costs with benefits. This is very important as the ability to charge for a service is predicated on there being a buyer who is willing to incur certain costs because the buyer realizes certain benefits which exceed the costs.

In infrastructure even if the benefits exceed the costs it may be difficult to match the two. This happens if those who benefit are not those who are expected to pay. This needs to be avoided or overcome for the project to be successful.

Examples of possible mismatches include expecting providers and patients to pay for benefits received by insurers, or taxpayers to pay for benefits received by vehicle operators.

- Acceptance. Here three elements are listed. The new concept must be acceptable to those in control of the infrastructure, there must be a willingness to allow private sector players to participate and there must be a means to obtain agreement among the multitude of entities involved.

Factors Determining the Rate of Private Sector Investment

Amelioration of risks

- Liability limitations
- Technical standards
- Legislative mandates

Ability to match costs with benefits

- A match between those who benefit and those who pay
- A mechanism to collect from those who benefit

Acceptance by existing players in the infrastructure

- Acceptance of concept
- Private sector participation
- Interjurisdictional cooperation

II SUMMARY OF RECOMMENDATIONS

In this section we bring together all those preliminary recommendations that have thus far been developed. We believe that these tentative recommendations require further debate and reflection, and will benefit from the kind of dissemination dialogue we have already begun.

A. INTELLIGENT VEHICLE/HIGHWAY SYSTEMS

1. Fund and Operate IV/HS, As Far As Possible, through the Private Sector

- Raise awareness about IV/HS in order to encourage the involvement in IV/HS of a wider range of industries than are currently involved at the moment. Possible industries that could make an important contribution but are not yet involved include information service companies and cellular phone companies.
- Encourage state and local Transportation Departments to develop public-private investment partnerships so that the innovative and risk taking skills of the private sector can be harnessed for IV/HS deployment.
- Develop models of public-private investment partnerships for IV/HS which will exploit the complementary skills of both sectors, and which incorporate private sector funding and operation.
- Identify how best to implement the Intermodal Surface Transportation Efficiency Act, and the recent Presidential Executive Order on Privatization to encourage private sector funding and operation of IV/HS.
- Establish Federal Highway Administration operational tests to validate private sector participation in IV/HS.

2. Create a Climate Where IV/HS Pay-for-use Services Are Encouraged

- Develop the economic argument for pay-for-use IV/HS services, in order to make the case for pay-for-use IV/HS services.
- Convince Transportation Departments that pay-for-use services are necessary to finance the deployment for IV/HS.
- Establish where IV/HS pay-for-use services would be accepted by vehicle users and what the perceived benefits of such services are.

3. Create a Climate Where IV/HS Niche Services Are Encouraged

- Convince Transportation Departments that niche services have an important role to play in the deployment of IV/HS.

- Identify through market research the most commercially-attractive niche services in order to encourage potential service providers to invest in these services.

4. Establish Good Practice Guidelines for Handling Potential Conflicts between IV/HS and Other Societal Goals

- Review how societal conflicts have been handled in IV/HS applications to date in both the United States and Europe in order to establish a number of general principles and to create a set of case histories.
- Establish and document conflict guidelines to provide training and reference material to help service providers implement IV/HS in situations where there are potential conflicts between IV/HS and other societal goals.

5. Improve the Analytical Tools for Identifying and Evaluating Commercially Attractive IV/HS Services

- Raise awareness among lawmakers, Transportation Departments and potential suppliers not only about the opportunities provided by IV/HS, but also about the gaps in our knowledge, particularly the lack of cost-benefit understanding, in order to stimulate research into improving our understanding of various aspects of IV/HS (see below) and also to encourage the establishment of commercially-oriented model IV/HS projects (also see below).
- Carry out research on the behavior patterns of vehicle users, their likely information needs, their willingness to pay for IV/HS services, etc., in order to improve our understanding of IV/HS benefits and costs.
- Establish commercially-oriented model IV/HS projects in selected metropolitan areas to gain practical experience of the likely benefits and costs of IV/HS.

B. INFORMATION-BASED HEALTH CARE INFRASTRUCTURE

1. Develop a Payment Model for Health Care Information

- Specify a payment model for handling and analyzing patient information, identifying those activities for which a fee could be charged, and indicating which of these might be reimbursable under insurance coverage.
- Establish an indicative fee structure for the above information handling activities.
- Carry out pilot trials to test the practical feasibility of using the above payment structure for reimbursability for health care information.
- Outreach to insurance companies, the government and health care providers, whose approval is important for introducing reimbursability of patient information.

2. Establish a Code of Practice for Handling Patient Information to Minimize Privacy and Misuse Concerns

- Determine what and how patient-related information could be released to the various interested parties including the patient himself, health care providers other than those directly involved in treating the patient, insurance companies, employers, and pharmaceutical companies, while at the same time taking into account legitimate concerns about privacy and misuse.
- Identify whose authorization is needed to release the various types of information (above), and how and when this authorization is to be sought.
- Produce a code of practice encompassing the above procedures to make those involved aware of their rights and responsibilities, and establish certification procedures to ensure that the code of practice is adhered to.

3. Establish Procedures for Handling and Analyzing Patient Information to limit Tort liability

- Create good practice guidelines for handling patient-related data to ensure that such data is not lost or corrupted.
- Create software certification procedures whereby panels of medical experts can certify the quality of software used to analyze patient data.
- Create quality control procedures for treatment assessment analysis to standardize data definition, to remove bias from patient samples and to ensure that the appropriate statistical tools are used.

4. Create an Institution to Accelerate the Development of Information Standards

- Set up an organization, preferably part of an existing standards or health care organization, and funded by the providers of health care, government, insurance companies and suppliers of information systems, to oversee and where necessary accelerate the development of information standards in health care. The main tasks of this organization are outlined below.
- Establish a strategic framework for the development of health information standards, to ensure that the required standards are available at the required time and, where necessary, to ensure priorities are established.
- Arrange for sufficient resources to be made available so that the priorities established above can be achieved.
- Ensure that existing standards are updated to meet changing needs.

5. Carry out Further Experimentation to Help Develop an Economic Case for Increasing the Information Intensity of our Health Care Infrastructure with Emphasis on Stage II Interconnectivity

- Establish a clearing house funded by insurance companies, government and suppliers of information systems to analyze and publicize the economic benefits of an information-intensive health care system.
- Carry out a number of federally funded health care projects to gain practical experience in quantifying the benefits and costs of an information-based health care system with emphasis on Stage II Interconnectivity.

III

INTELLIGENT VEHICLE/HIGHWAY SYSTEMS

Intelligent Vehicle/Highway Systems (IV/HS) consist of a group of information technologies implemented in vehicles and on highways that allow information to be gathered, exchanged and/or displayed in a way that helps traffic management, provides traveler information, automates driving tasks, or monitors the physical state of the highway.

A. THE PROMISE OF IV/HS

IV/HS is made up of systems for automated traffic management, traveler information systems and automated vehicle control, plus specialized systems for commercial vehicle operations and electronic monitoring of the physical infrastructure. The implementation of IV/HS will potentially lead to vehicle users saving vast amounts of journey time and fuel, significant reductions in pollution and improved highway safety.

1. Automated Traffic Management

Today, automated traffic management consists largely of systems for controlling localized groups of traffic lights, for measuring traffic volumes and for controlling variable traffic signs.

IV/HS offers the promise of traffic management on the main roads of major metropolitan areas in order to make the most efficient use of the road network. This will be achieved by automatically gauging traffic conditions, and detecting and responding rapidly to incidents, for example accidents or broken down vehicles; by controlling traffic lights and access to major highways; and by advising people about traffic conditions and alternative routes through, for instance, variable road signs.

Traffic movement through toll booths will be greatly assisted by automatic vehicle identification and automatic toll collection. The vehicle will pass through a sensor which identifies the vehicle and automatically debits the driver's account, without the vehicle having to stop, thereby relieving a frequent focus of congestion.

Automatic vehicle identification and automatic toll collection also allow the possibility of introducing variable tolls for the use of particularly heavily travelled areas (congestion pricing). Higher tolls can be charged during the more congested periods, as a disincentive to road usage.

2. Traveler Information Systems

Current in-vehicle information systems usually consist of a few dials on the dashboard giving traveling speed, engine speed, etc. supplemented by broadcast radio reports on traffic and weather conditions.

IV/HS offers the promise of greatly expanded traveler information systems providing traffic and travel-related information to travelers to improve their travelling efficiency, and other services required by people on the move. Some of the information will be

stored within the vehicle and some will be obtained from external sources by interactive communications. Examples of these information services include:

- Route guidance, taking into account traffic conditions and the vehicle user's preferences, for example, for scenic routes or shortest journey time.
- Information, giving the location on displayed maps, of fast food outlets, shops, restaurants, hotels, etc. close to the highway, and advertisements for the establishments similar to the advertisements in the "yellow pages" of telephone directories produced by U.S. telephone companies.
- The ability to make hotel reservations, or book airline flights, or send messages to business colleagues, while on the move.

In addition, systems will deliver information to drivers and passengers in convenient ways, for example, eye-level "heads-up" displays giving cruising speed or voice synthesizers giving route directions or infra-red imaging providing an enhanced picture of the road at night or in misty conditions.

3. Automated Vehicle Control

Automated vehicle control systems aim to provide better control of the vehicle to enhance safety, to reduce the burden of driving, and, ultimately, to improve the utilization of the highway. Today, automatic vehicle control systems are limited to such systems as automatic cruise control and anti-lock brakes.

In the future, there will be in-vehicle systems that detect the proximity of other vehicles, the edge of the road or lane, and alert the driver accordingly, or, later, make the appropriate correction automatically. More advanced systems will implement steering and speed control and regulate inter-vehicle spacing. Reduced inter-vehicle spacing distances will dramatically increase highway through-put. Ultimately, "automatic highways" are envisioned where traffic moves along in platoons of vehicles in close order.

4. Commercial Vehicle Operations

Commercial vehicle operators face a considerable number of highway-related challenges which directly impact their businesses -- the need for efficient routing, the need for information on vehicle location and likely destination arrival times, and the need to comply with trucking regulations which vary between states (in the United States) and between countries (in Europe). As a result, commercial vehicle operators are among the most progressive users of currently available IV/HS technologies, such as automatic vehicle location, tracking, two-way communications, and in-vehicle text and map displays.

In addition to the automated traffic management systems, traveler information systems, and automated vehicle control systems which will be available to all vehicles, future systems of specific relevance to commercial vehicle operators will allow regulatory compliance (electronic issuing of permits, registrations, etc.) for multiple states in one transaction, and automatic weight checking, as needed without requiring the vehicle to stop.

5. Electronic Monitoring of the Physical Infrastructure

Today, the state of repair of the physical structure of highways - the road itself, bridges, tunnels, etc. - is monitored by labor-intensive physical examinations. IV/HS offers the promise of embedding a network of electronic probes into the various elements of the infrastructure. This would enable continuous monitoring of the physical state of the infrastructure giving early warning of carriage-way deterioration (ruts, potholes, etc.) and structural weaknesses in bridges and tunnels.

6. The Creation of an Information-based Infrastructure

In summary, an information-based transportation infrastructure will be created (see Figure 1, page 7). Information on vehicle location, speeds and traffic conditions will be collected directly from sensors on vehicles or in the road itself. In addition, service companies will provide information services for people on the move. This information-based infrastructure will be accessed by a wide range of groups:

- The traveler, either on the road or before the journey is started
- Traffic managers, to monitor traffic conditions
- Toll collectors, to receive toll information
- Emergency services, for early warning of the need for their services
- Regulators, to monitor adherence of the regulations
- Fleet managers, to help with the management of commercial fleets
- Large employers, to provide traffic information to their employees

7. Deployment

Figure 5, page 33 illustrates a possible, but not comprehensive, U.S. scenario, showing the interaction over time between a number of trends and events, and the level of deployment of various IV/HS components -- autonomous route guidance systems, two-way communications to and from the vehicle, traveler information systems, simple active safety devices (like devices warning of the proximity of other vehicles), and complex active safety devices, involving automatic steering correction.

The deployment of IV/HS over the next few years will depend on a number of social and political trends and events, for example, successful field trials of advanced traffic management and traveler information systems, widespread deployment of automatic vehicle identification for toll collection, and successful private sector participation as suppliers of IV/HS products and services. Looking further ahead to the beginning of the next decade, the pace of IV/HS development is likely to be linked to such factors as the successful widespread funding of IV/HS by the private sector, the widespread recognition of the need to reduce congestion, and advances in spread spectrum technology. Figure 5 also highlights a number of other events likely to be important for IV/HS development at the beginning of the next decade and beyond.

B. THE POTENTIAL BENEFITS OF IV/HS

Following a review of many studies, we believe that IV/HS will yield significant benefits in congestion reduction, safety improvements, economic savings, environmental improvements, driver convenience, and indirect benefits in terms of providing economic stimulus to a number of sectors, including the creation of a new service industry providing information for people on the move. Each of these benefits is distributed (see Figure 6, page 35) to three groups of beneficiaries -- individual travelers, specialized road users (for example, trucking companies), and society in general. The distribution among the beneficiaries of each type of benefit varies. For example, for reduced congestion, both individual travelers and specialized users are the main beneficiaries; for environmental improvements, society is the main beneficiary. Benefits received by society are usually able to be financed only by taxes, whereas benefits to individual travelers and specialized road users are likely able to be funded on a pay-for-use basis.

1. Reduced Congestion

IV/HS can help to reduce street and highway congestion and thereby achieve more throughput from the existing infrastructure. Traffic management systems will seek to optimize traffic flow and to provide quicker response to road accidents and incidents. Moreover, information provided to travelers will permit many travelers to avoid congestion, either by diverting around the traffic, choosing another mode of transit, or time-shifting their trip.

The U.S. Federal Highways Administration has estimated that on urban freeways there are 800 million hours of delay per year due to recurring congestion, and 1,300 million hours of delay per year due to traffic accidents and incidents on the highway. Current estimates indicate that traffic and accident management systems could reduce delays due to accidents/incidents by 35%, and delays due to recurring congestion by 10%, giving delay savings of 525 million hours annually (see Diebold Institute Working Paper #1). The impact of IV/HS in urban areas will be much greater because of the more intensive congestion problems.

2. Safety Improvements

Safety on the roads is a prime concern. In the United States, roughly 44,000 people die in road accidents each year, and more than 5 million are injured. Since many traffic accidents are caused by congestion, reductions in congestion will reduce the number of accidents. Experts have estimated that about an 8% reduction in traffic fatalities will eventually be achieved through the implementation of IV/HS - amounting to thousands fewer fatalities each year (source - IVHS America 1992 Strategic Plan).

IV/HS will also bring safety improvements through collision warning and avoidance systems, and imaging systems giving a clearer picture of road conditions. Older drivers, the fastest growing segment of the population, will benefit from such

FIGURE 5

DEPLOYMENT OF INTELLIGENT VEHICLE/HIGHWAY SYSTEM INFRASTRUCTURE

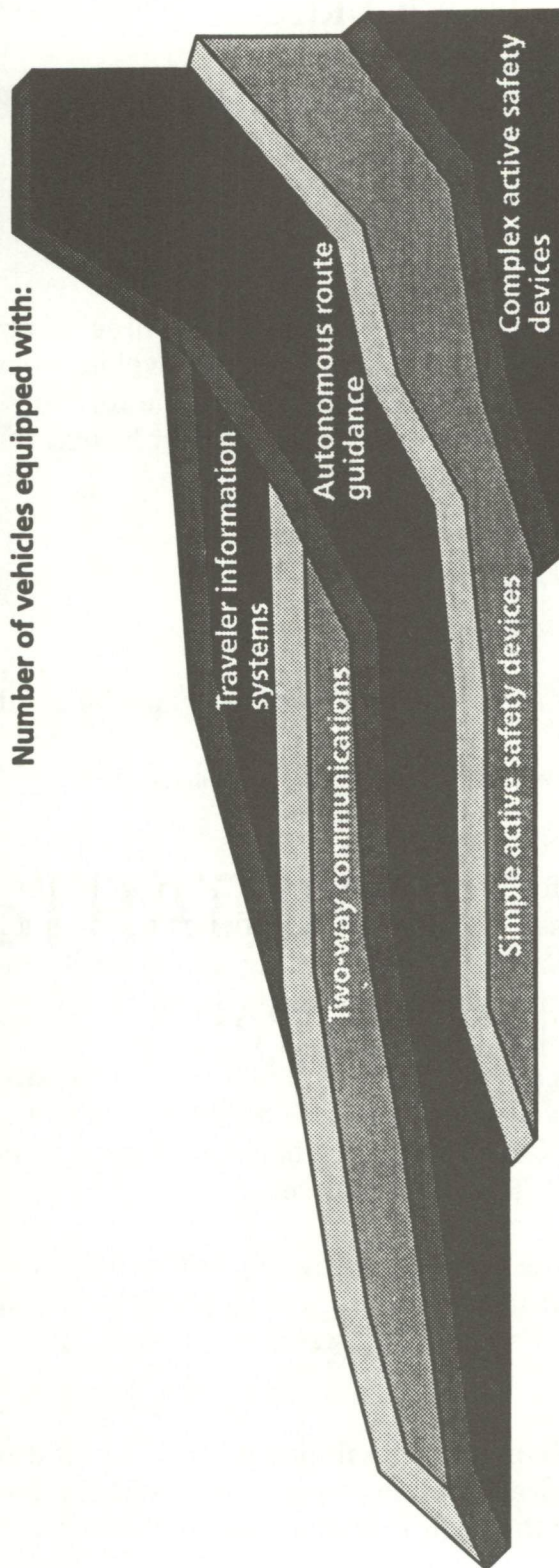
This exhibit shows the level of deployment through time of five selected categories of IV/HS functionality. The actual level of deployment will depend on many factors, some of which are difficult to forecast.

Certain important trends and events which we feel will significantly impact the rate of deployment are shown in the bottom of the exhibit in four timeframes. Alternative scenarios might lead to faster or slower deployment of the five categories of functionality shown.

We believe that this type of exhibit is useful for planning purposes and in discussing the importance of various technological and public policy outcomes that might impact the deployment of technology in societal infrastructure. We would encourage those making forecasts of deployment to use an approach such as this to link their forecasts with the associated assumptions on the timing of the underlying factors which determine the rate of deployment.

Deployment of Intelligent Vehicle/ Highway Systems Infrastructure

Number of vehicles equipped with:



1992-1996

- Initial field trials of advanced traffic management and traveler information systems
- Widespread deployment of automatic vehicle identification for toll collection
- Private sector participation as supplier of products and secondary services

1997-2001

- Agreement on standards
- Deployment of active safety devices in commercial vehicles
- Spectrum allocated to IV/HS
- Widespread private sector participation as entrepreneur
- Congestion declared a national priority

2002-2006

- Voice recognition practical
- Liability limitations established in U.S.
- Vehicles routinely equipped with high performance parallel processor
- Advances in spread spectrum technology
- Deployment of active safety devices in passenger cars

2007-2011

- Liability pool and tax
- Meaningful automatic vehicle control operational tests

FIGURE 6

INTELLIGENT VEHICLE/HIGHWAY SYSTEMS: DISTRIBUTION OF BENEFITS

This exhibit illustrates that benefits are of many types; nine categories are shown. There are three major recipient groups -- individual travelers, society at large and specialized users. Each of these recipient groups can be further segmented, for example, individual travelers can be segmented based on such traveler characteristics as:

- City, suburbs, rural
- Level of usage of vehicle
- Age, disabilities or other factors leading to special needs
- Split of usage between business and non-business and local versus out-of-town travel, etc.

The nine categories of benefits are split differently among the three user groups. This is important in that it can provide some guidance as to which benefit categories to stress and in turn the corresponding functionality to invest in depending on which beneficiary group is being favored.

For example, energy savings are realized significantly by individual travelers but more significantly by society at large. Each traveler benefits from his lowered consumption of fuel, but all benefit from the balance of trade improvement and lowered energy prices that IV/HS may produce.

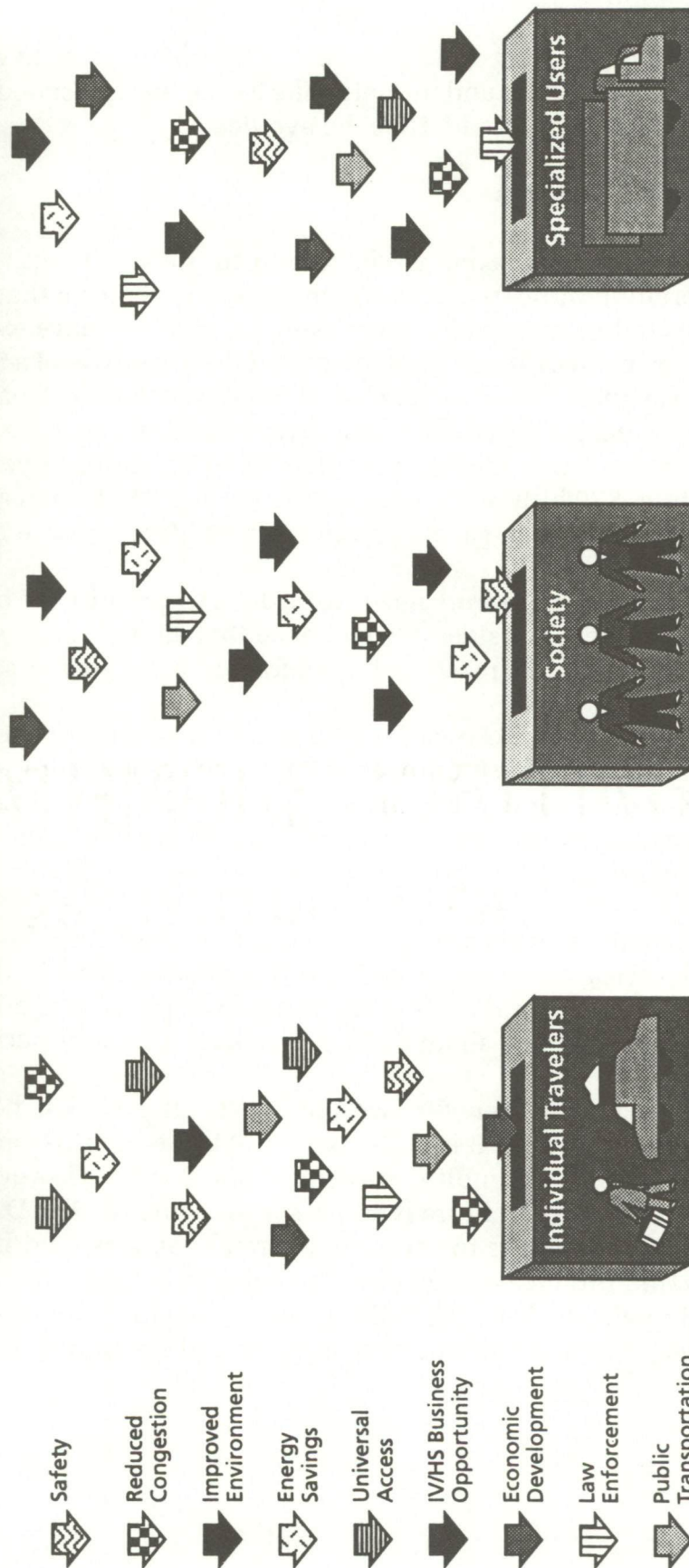
Individual travelers may value and be willing to pay for their direct savings in energy usage through pay-for-use fees but are unlikely to be willing to pay fees for that portion of the benefit to be received by society at large. This will need to be financed by taxpayers.

On the other hand, reduced congestion will benefit individual travelers and specialized users in a very direct and measurable way and can be easily funded by user fees. The functionality that will produce these benefits can thus be planned to be financed in this way.

Competitive
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Tomorrow

Intelligent Vehicle/Highway Systems: Distribution of Benefits

Intelligent Vehicle/Highway Systems



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technologies as heads-up displays that provide information for drivers at eye level thus not requiring them to take their eyes off the road.

Electronic monitoring of the physical infrastructure would give early warning of unsafe carriageways, bridges and tunnels. The loss of life associated with collapsed bridges and elevated highways would, thus, be avoided.

3. Economic Benefits

The benefits and commercial opportunities offered by an information-based transportation infrastructures are immense. We believe that a substantial percentage of the costs of highway inefficiency can be saved. We have examined a range of industry and government estimates and integrated these to arrive at a \$300 billion overall estimate of highway inefficiency in the United States (see Figure 7, page 37). There are also other non-quantifiable costs such as environmental impacts. Important quantifiable components of this inefficiency include \$100 billion a year in lost time due to road congestion, \$70 billion a year in accidents, and \$60 billion a year in navigational waste, which includes time, gasoline, and wear and tear because of poor routing.

Although much more work needs to be done to quantify the benefits of particular aspects of IV/HS, there is considerable evidence that annual savings in the range 15-25 percent are realistic within a reasonable timeframe. Even greater savings are possible.

The electronic monitoring of the physical infrastructure should also lead to significant cost savings as well as improved safety. The early warning provided by the monitoring network would allow problems to be corrected at an early stage, thus preventing them becoming major problems involving large-scale repairs, or in extreme cases, the loss of the use of the infrastructure altogether, as when a bridge or elevated highway collapses.

These benefits must be set against the deployment costs for IV/HS in the United States. IVHS America, the focal point for IV/HS development in the United States, estimates long-term deployment costs of the infrastructure to be about \$40 billion and in-vehicle consumer costs to be about \$170 billion over a 20 year period.

In considering the benefits, we note with interest that half of the benefits relate to commercial vehicles. It is quite likely that these benefits can be achieved with less than half of the total expenditures planned for IV/HS. However, we see that the bulk of planned IV/HS expenditure is for passenger vehicles. The Diebold Institute believes that a redirection of funds towards commercial vehicles, and hence, away from passenger cars, would produce a higher ratio of benefits to investment. In particular, the Diebold Institute believes it might make sense to consider an automated lane for commercial vehicles rather than automating all lanes and equipping all vehicles.

FIGURE 7

**IV/HS POTENTIAL BENEFITS -
SOURCES OF HIGHWAY INEFFICIENCY IN THE UNITED STATES**

Sources	Passenger Cars (Annual cost \$billion)	Commercial Vehicles (Annual cost \$billion)	Total (Annual cost \$billion)
Accidents	50	20	70
Congestion			
- Time	50	50	100
- Fuel	5	10	15
Navigation waste	40	20	60
Trucking regulation		35	35
Theft	5	15	20
Total	150	150	300
	Source: various		

4. Environmental Improvements

A 1989 U.S. Environmental Protection Agency study reported that emissions from highway vehicles accounted for a third of total emissions of nitrogen oxides, a quarter of volatile organic compounds, and more than half of carbon monoxide.

The U.S. Federal Highway Administration recently estimated that existing urban freeway congestion wastes 2.2 billion gallon of fuel annually, rising to 11.6 billion gallons of fuel by 2005.

The implementation of IV/HS offers the potential for reduced pollution and fuel savings resulting from reduced travel times and delays, fewer stops and starts, and following the most effective route. Several organizations, including the U.S. Government Administration Office and Mobility 2000, have found that it is possible to improve pollution emissions by about 10 percent, and reduce fuel consumption by approximately 12% as a result of implementing IV/HS. Annual savings of 6.5 billion gallons of gasoline can be anticipated when IV/HS is fully deployed (see Diebold Institute Working Paper #1).

5. Driver Convenience and Safety

The enjoyment and comfort of driving will escalate considerably as IV/HS is implemented. Clear directions from route guidance systems and reduced congestion and travel times, will lower stress levels. Electronic driving aids will improve the quality of life for the elderly and disabled driver population by maintaining their mobility as the aging process or handicap reduces their physical abilities.

6. Economic Stimulation

The development of IV/HS will also provide considerable stimulation to a number of economic sectors. The value-added chain is illustrated in Figure 9, page 41. For example, it will lead to the creation of a new information business for people on the move; it will stimulate growth in businesses serving people on the move; and it will create new markets for information technology. We believe that this "demand pull" through investing in societal infrastructure is a sounder way of ensuring the vigor of high technology industries than relying on "spin off" from military and space programs or supplier subsidies because:

- There are likely to be expanding world markets in products and services for societal infrastructure, whereas defense expenditures are likely to shrink
- Products and services used in societal infrastructure are likely to be more easily utilized in other commercial and consumer applications than defense products
- Direct governmental funding of R&D has not proved totally successful in Europe

The current U.S. and European models for stimulating technology industries, as well as what we believe to be a viable post-cold war model is given in Figure 10, page 42.

A New Information Business

The communications link to the vehicle will not be exclusively for the provision of transportation information. IV/HS offers the possibility of creating a whole new business of providing information for people on the move - for example, "yellow page" services indicating the nearest hospital, gas station, hotel, restaurant, etc.

The size of this information service business in the United States could well be as large as, and possibly much larger than, the cellular phone business. Here, 5 million private users have spent a total of \$2.5 billion for in-vehicle equipment (at an average cost of \$500 per unit). The annual revenues for usage amounted to \$3.8 billion in 1990 (\$760 in billings for the average customer) (see Diebold Institute Working Paper #3).

Businesses Serving People on the Move

IV/HS will also have a major growth stimulating impact on businesses serving people on the move. Being electronically interconnected with travelers will encourage increased utilization of services such as restaurants, hotels, tourist attractions, gasoline stations, vehicle repair and towing facilities, and parking garages.

There may be other and unforeseen impacts. For example, sites, previously non-economic because not visible from the highway, will become economically viable. In the long term, automatic vehicle control may change the definition of what a vehicle is and the services it requires. A platoon of vehicles may have food, lodging and entertainment included in the platoon analogous to the cafe car on a train.

New Information Technology Markets

The development of IV/HS will open new and important markets for the information technology industry, for example, systems in vehicles and at the road side, communications systems for transmitting information to and from vehicles, and value-added information services. The semiconductor industry has, in particular, recognized the importance of IV/HS. In its February 1992 report, "Attaining Pre-eminence in Semiconductors," the National Advisory Committee on Semiconductors exhorted the United States government to facilitate a U.S. role in markets related to IV/HS. Figure 8 gives the specific recommendations relating to IV/HS.

FIGURE 8

"ATTAINING PRE-EMINENCE IN SEMICONDUCTORS" - SPECIFIC RECOMMENDATIONS RELATING TO IV/HS

The government should facilitate a U.S. role in markets related to IV/HS

- Encourage cooperative efforts to set a national agenda for the development and deployment of IV/HS and to promote the coordination of private and public IV/HS efforts.
- Increase funding for R&D in critical IV/HS programs.
- Encourage improvement in highway infrastructure by providing incentives in Federal highway funding for the installation of IV/HS.
- Support extensive field trials for IV/HS.
- Establish nationwide standards for IV/HS.
- Settle the outstanding product liability questions that inhibit IV/HS deployment.

- "Attaining Pre-eminence in Semiconductors," a report by the U.S. National Advisory Council on Semiconductors, February 1992

FIGURE 9

INTELLIGENT VEHICLE/HIGHWAY SYSTEMS VALUE-ADDED CHAIN

In IV/HS, value and business opportunities will be created in the process of providing services to users.

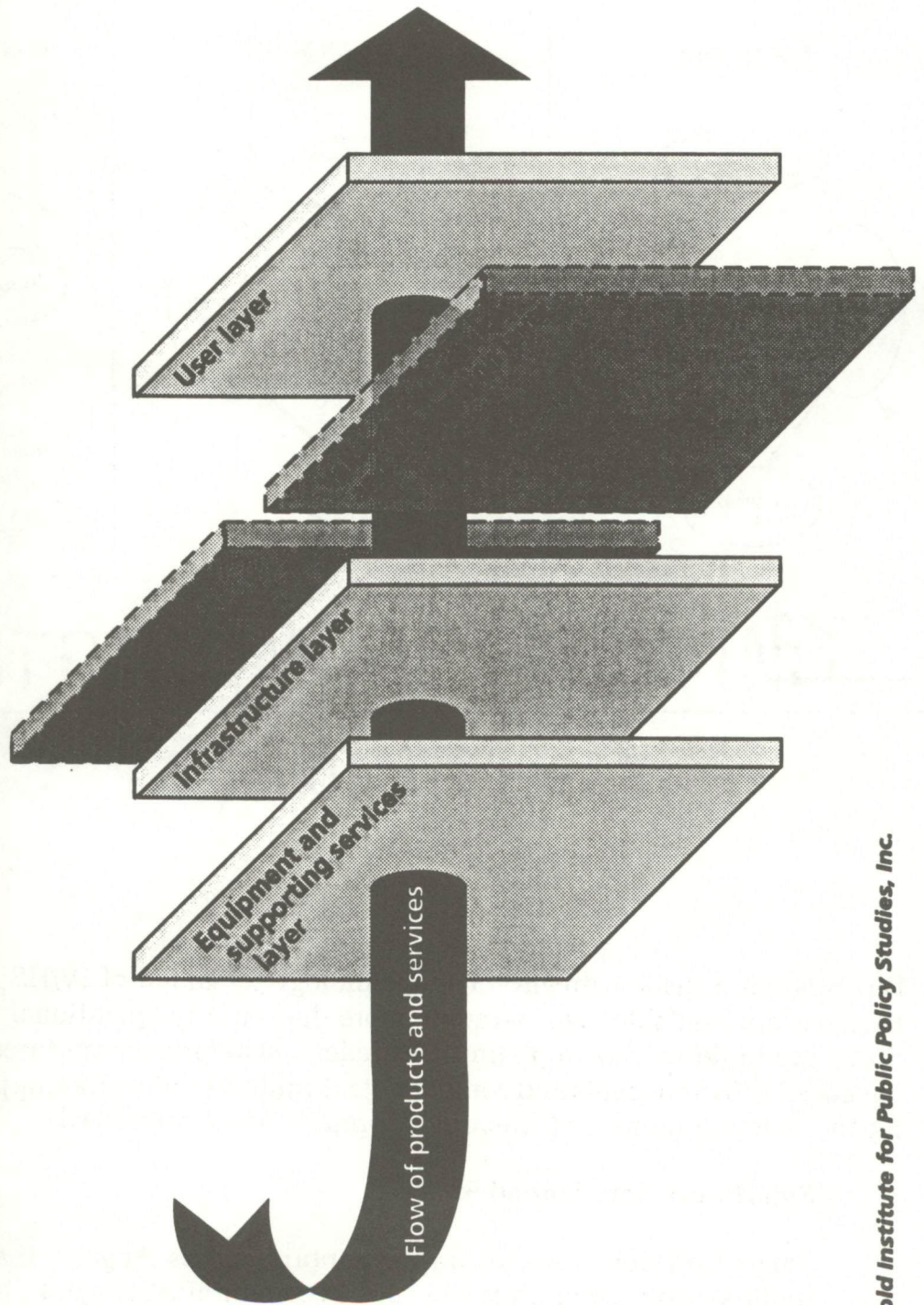
The provision of these services springs most directly from the creation of a new category of service offerings and the associated service providers forming what we call the "Infrastructure Layer." Here we are talking about basic surveillance, vehicle control, and traveler information services provided by the Transportation Authority or its designee.

A wide variety of existing and possibly also new businesses will find the infrastructure a good customer. Additional and substantial value will be created within a new "In-Vehicle Component Layer." In-vehicle components will range from two-way communications, position locating, navigation and a range of devices providing driver assistance and ultimately automatic vehicle control.

A third area of value and business opportunity is the "Value-Added Services and Distribution Layer." Although the infrastructure will provide basic services, there will be no limit to the creativity of others in offering additional value-added services built on and supplementing the basic services. These may be new services which the infrastructure will ultimately absorb or they may be services aimed at highly specialized subsets of users. There is a need for communications between users and the infrastructure. This may be provided by the existing communications providers with existing networks or new dedicated networks may be developed. Economic efficiency suggests that this be done only if existing networks are inappropriate and not able to be economically modified to provide the required capabilities.

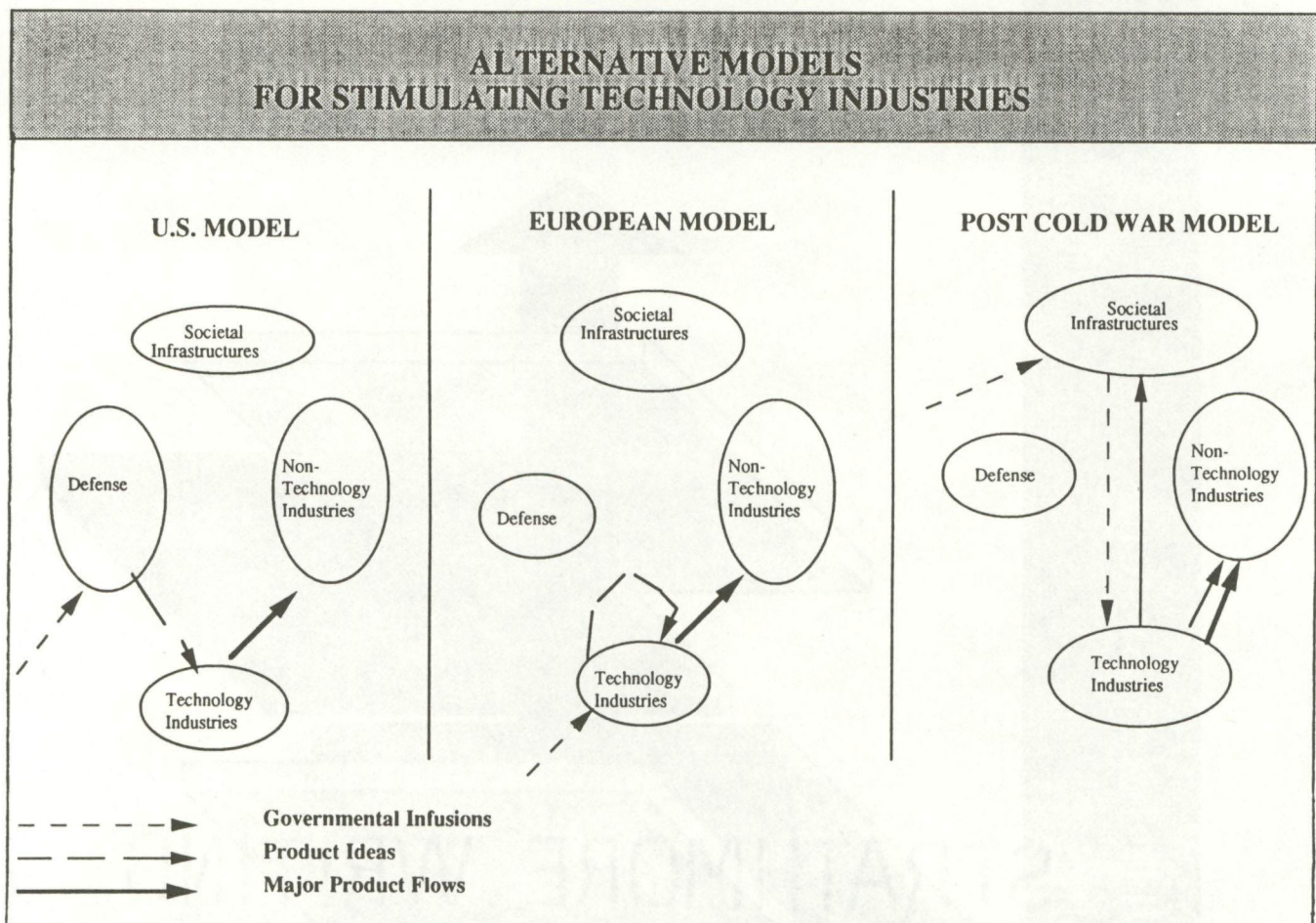
Competitive
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Tomorrow

Intelligent Vehicle/Highway Systems Value-Added Chain



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FIGURE 10



C. IV/HS TODAY

IV/HS is not a distant dream. The technology for much of IV/HS is available today. Products are available. Furthermore, more than twenty operational tests in the United States are underway or in planning as federal/state/private ventures to evaluate more advanced IV/HS concepts and components. Similar activity is taking place in Europe and Japan. Below, a number of illustrative projects are summarized.

Smart Corridor - United States

Smart Corridor is a cooperative venture in Los Angeles that integrates traffic sensors, computers and various communications links to coordinate traffic and disseminate real-time traffic information. It involves the Santa Monica Freeway and five major highways between downtown Los Angeles and the San Diego Freeway. The Federal Highway Administration, the California Department of Transportation and many local agencies are participating in the \$80 million project which started in 1989 and is expected to be implemented in 1992.

LLAMD - Europe

The LLAMD (London, Lyon, Amsterdam, Munich and Dublin) project is part of the Drive program, and encompasses 40 public and private sector partners. Its primary focus is to create a comprehensive framework and common systems architecture for integrating travel and traffic information, integrated urban traffic management, and public transport systems. To this end, each of the above five European cities is currently carrying out a field trial.

HELP - United States

Heavy vehicle Electronic License Plate (HELP) is a \$20 million research and demonstration project involving fourteen states, one Canadian province, the Federal Highway Administration and Trucking Associations. It is testing the feasibility of various IV/HS technologies. The concept is for a network of sensors at state and country border crossings to capture and communicate information needed by the trucking industry for fleet management, and needed by regulatory, monitoring and taxing authorities.

TrafficMaster - Europe

TrafficMaster is a privately operated information system for drivers using the M25 beltway around London. The system has been in operation since 1990. An in-vehicle unit is the receiver with a display panel for maps and traffic information. The driver selects a quadrant of the M25, the display zooms in on sections experiencing delays and shows queue length, speed and direction. The data comes from a privately owned information center that collects traffic data by radio link from detectors. General Logistics, the provider of TrafficMaster, claims to have over 3,000 users, and has recently signed licensing agreements with firms in Austria and Italy.

VICS - Japan

The Vehicle Information and Communications System (VICS) was established in 1990 to integrate two navigation and traveler information systems, AMTICS (Advanced Mobile Traffic Information and Communications System) and RACS (Road Automobile Communications System), initiated in the mid-80s. The principal differences between AMTICS and RACS are that AMTICS was sponsored by the National Police Agency and concentrates on urban streets, while RACS was sponsored by the Ministry of Construction and concentrates on inter-city roads and inner city expressways.

For those systems which assume some of the control of the vehicle in place of the driver, additional technological development still needs to be carried out. This applies to nearer term capabilities such as automatic vehicle control and active safety methods through totally automatic highways where full deployment could be 30 or 40 years away.

D. THE OBSTACLES TO IV/HS IN THE UNITED STATES AND EUROPE

Much of our analysis to date has emphasized the United States perspective. There is, however, considerable commonality between highway transportation in Europe and the United States -- highways are almost exclusively funded and operated by the public sector, with a small minority of funds generated from tolls on roads, bridges and tunnels. Thus, we believe that our analysis of the obstacles in the United States to the use of information in the highway infrastructure, also has considerable validity in the European context, as do the proposed solutions summarized in Section F of this Chapter.

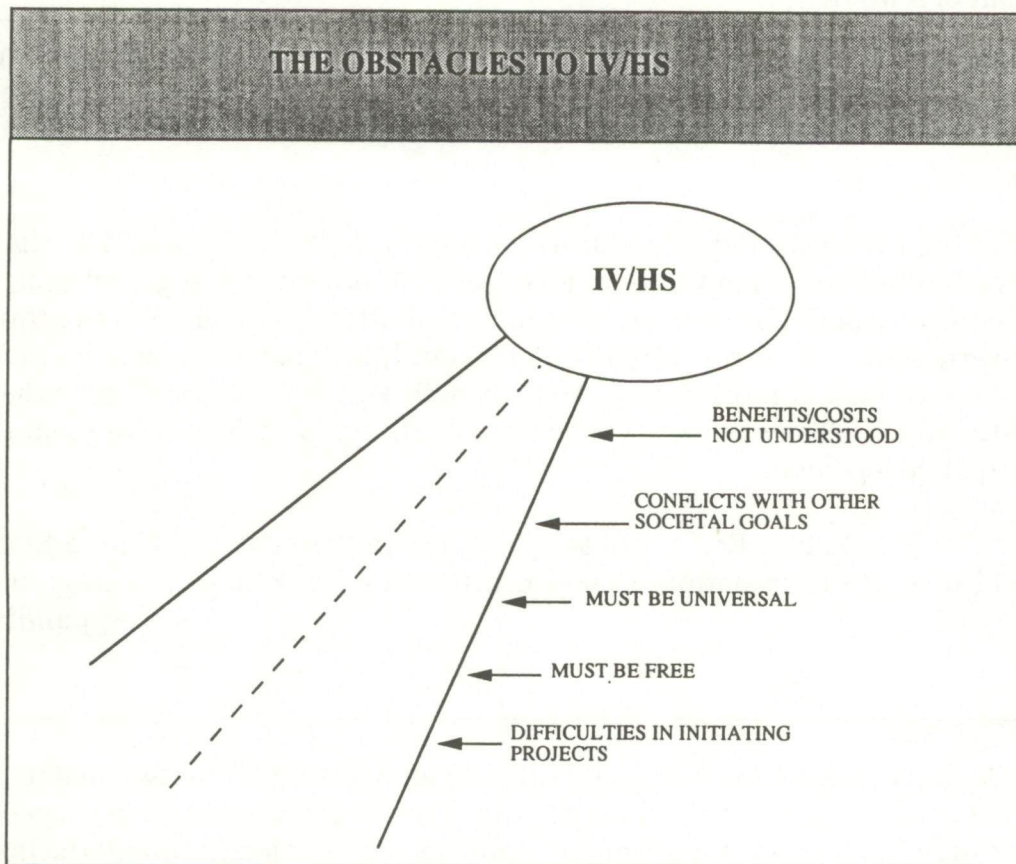
While the many benefits of IV/HS suggest the positive impact information technology will have on road transportation, there are a number of obstacles, which if not removed, will delay the achievement of these benefits. These obstacles primarily relate to public policy issues and are considerably less technological in origin.

Highway construction has a long established tradition - the earliest roads were constructed around 3000 BC in the Persian Gulf - and, is a field where technological change has only taken place slowly over the years. Moreover, information has historically only played a minor role in highway transportation. As a result there is some natural resistance to the application of information technology. This is reflected in the obstacles (Figure 11) we have identified:

- The difficulty of initiating IV/HS projects
- The perceived view that public sector IV/HS investments must be free at the point of use
- The perceived view that IV/HS must be universal
- Conflicts between IV/HS and other societal goals
- IV/HS benefits and costs are not clearly understood and quantified

Implicit in these obstacles are a number of fundamental public policy questions regarding IV/HS. Should IV/HS be exclusively funded and operated by the public sector? Should IV/HS be fully funded from tax revenues or wholly/partly from usage charges? Is IV/HS a technology that benefits everyone? In the next section, we discuss the issues raised by these questions.

FIGURE 11



1. The Difficulty of Initiating IV/HS Projects

Today highway transportation investment in both the United States and Europe is funded by the public sector. However, public sector authority is fragmented vertically. In the United States, transportation planning is carried out at federal, state, regional, county and municipality levels. Similarly in Europe, for example in the Netherlands, transportation planning is carried out by central, provincial and city governments. Moreover, there is considerable geographic (horizontal) fragmentation. Any major IV/HS project will cross multiple jurisdictional boundaries. In addition, projects will also involve other public authorities, such as the police, fire services, toll authorities, etc.

The procurement of IV/HS systems involves new approaches which are radically different from the approaches Transportation Authorities are familiar with. The majority of procurements made by Transportation Authorities are for road repair or new road construction. These procurements involve relatively low-tech, well-understood and highly structured procedures, and a well-defined set of potential contractors. IV/HS procurements are fundamentally different in three respects. Firstly, IV/HS systems are highly technical and require staff skilled in procuring major computer and telecommunication systems. Secondly, it is not always clear who would be the potential suppliers of IV/HS systems. For example, information service companies could be important suppliers but have so far played a very limited role in the development of IV/HS. Moreover, since it is possible no one supplier can provide all the necessary products and services, consortia need to be created before a procurement can take place. Lastly, attention is primarily focused on life cycle costs rather than initial costs.

Whose road is it anyway?

The State of Michigan has control of the 200 miles of freeways in metropolitan Detroit. In addition, there are about 4,000 miles of arterial roads, which are the alternative roads to the freeways. These arterial roads carry more traffic than the freeways.

"If you go to the Michigan Department of Transportation to bring in IV/HS, they will say, we can tell you what to do on I-94 and I-75, but once you get off that, you can't talk to us anymore because we have no jurisdiction. So you go to the three county governments (Macomb, Wayne and Oakland) that have the responsibility. Then you start to look at more detail. You say, will Wayne County tell me what I can do in Dearborn? They say, no, you are done talking to us, you have to go to the municipal government."

- Prof Robert Ervin, transcript of "IV/HS Policy in the United States",
Diebold Institute Information-based Infrastructure Workshop, Washington, DC,
(see Appendix II).

Finally, unlike Japan where the National Police Agency is one of the two major drivers of IV/HS, law enforcement authorities in the United States are discouraged from involvement in IV/HS because involvement would generate concerns about the invasion of an individual's privacy, for example, using IV/HS to identify traffic violators.

In summary, there is no single focus within the public sector for initiating IV/HS projects. Moreover, there are considerable difficulties in creating a consortium of interested parties from the public sector. In addition, the public sector lacks some of the technical and procurement skills. Without a champion, the full benefits of IV/HS will not be achieved. The Japanese have demonstrated what can be achieved through a highly focused approach (see Section E).

2. The Perceived View that Public Sector IV/HS Investments Must be Free at the Point of Use

Many in Europe and the United States would argue that if the public sector makes investments in IV/HS then the resulting societal benefits should be free at the point of use, as is the case with traffic lights or road signs. However, many transportation authorities lack sufficient funds to invest in sophisticated IV/HS systems which would be free at the point of use. Waiting until the public sector has the funds will involve deferring the societal benefits or possibly going without them altogether.

We believe that there is significant potential for charging for IV/HS services, such as route guidance information, transactions with businesses serving travelers on the move, and specialized services for commercial vehicle operators. Without some form of pay-for-use, the public sector may not be able to exploit the full potential of IV/HS, because of lack of funds. In addition, the private sector will show little interest in playing the entrepreneurial role within IV/HS since the only source of revenue will be the transportation authorities.

"The states are broke"

The overall cost for installing ATMS (Advanced Traffic Management System) capability in America's largest cities is estimated at \$22 billion. And yet, in 1990 the total national expenditure for deployment of ATMS installations amounted to approximately \$250 million. Clearly, America's current expenditure on conventional ATMS is a drop in the bucket relative to the need....The financial reality alone tends to argue that no more than a skeleton ATMS infrastructure will be available in virtually all major cities by the year 2005. In the words of former DOT Secretary, Sam Skinner, "The states are broke." And many cities are virtually bankrupt, as well. Thus it is sobering to note that 20,000 more or less financially troubled units of government stand between the ATMS concept and its effective implementation in urban America. It is also true that most of these jurisdictions are short on professional expertise and tradition for supporting ATMS installations.

- Prof Robert Ervin, Diebold Institute Working Paper #3

3. The Perceived View That IV/HS Must Be Universal

Many would also argue that if the public sector makes investments in IV/HS then the resulting services must benefit all users, whether charged for or not, as is the case with traffic lights or toll bridges. However, providing IV/HS services for all types of road user is much more costly than providing services for selected groups of road users. Moreover, universality ignores the possibility of high value-added services for niche customers willing and able to pay for these services. For example, road signs are available to all users, while some users will be prepared to pay a premium for in-vehicle route guidance systems.

Providing niche services points to private sector involvement. If the cost of providing niche services were borne by the public sector, questions would be raised as to the justification of the services and the fairness to non-users. However, private sector provision of niche services could lead to concerns about "cream skimming" -- the most profitable services are provided while other services are neglected.

IV/HS offers the potential for niche services (traveler information, route guidance, compliance with trucking regulations). Insisting on a universal approach from the start would mean that these niche opportunities would not be exploited. Sometimes a half of a loaf is better than none and the success of niche services may set the stage for more comprehensive services later.

Cream skimming may be socially undesirable

As in any private service-providing activities, there is the risk of "cream-skimming" so that the easiest and the most profitable services are provided while the more difficult but perhaps much needed services are neglected. For example, TrafficMaster has focused on the M25 not only because it is the most traveled motorway, but also because the average speed can be measured most conveniently and the operating company needs to deal with only one public authority - the UK Department of Transport. It is encouraging to learn that TrafficMaster has recently considered expanding to the arterials (the A roads) in the London area. Questions may still be raised, however, as to whether the future extension of TrafficMaster may never measure the traffic in the other routes (the B roads as well as the A roads outside of London) which go through multiple jurisdictions and which may provide the best alternative routes for some drivers. Also, would the success and dominance of TrafficMaster prevent other service providers marketing the more sophisticated systems?

- Prof Kan Chen, Diebold Institute Working Paper #6

4. Conflicts Between IV/HS and Other Societal Goals

IV/HS may be perceived by some as conflicting with other important societal goals such as privacy, environmental control, local democracy, and competing with other solutions to highway problems.

Privacy

First and foremost in people's minds is privacy. Automatic vehicle location could be misused by unauthorized persons or organizations. It could be used by the government for purposes other than originally intended. For example, vehicle location information could be used for speed limit enforcement. Video enforcement of electronic toll collection could lead to photographs being taken of people who would rather not be seen together, for whatever reason. Another privacy issue is the freedom to choose whether to use a particular aspect of IV/HS. For instance, a user may want to deactivate an electronic toll collector for a particular journey.

Environmental Control

Many environmentalists see increased vehicle miles as harmful. Hence, if IV/HS by reducing congestion and travel time leads to increased vehicle miles, then "IV/HS is harmful too."

Local Democracy

IV/HS will allow the highway network to be used more efficiently. Thus, some secondary and tertiary roads, currently lightly used, will become significantly more heavily travelled. In some cases, this will lead to protests about loss of local control.

Competition with Other Solutions

Finally, IV/HS may be perceived as competing with other potential solutions to highway problems, for instance, building more roads, investing in public transportation systems, or reducing traffic volumes.

Without some recognition that IV/HS can conflict with other societal goals and that guidelines are needed to resolve these conflicts, IV/HS will struggle to achieve its full potential.

5. IV/HS Benefits And Costs Are Not Clearly Understood And Quantified

Detailed understanding is beginning to emerge of the benefits of some aspects of IV/HS, for example, ramp metering in terms of congestion and accident reduction. However, the understanding is far from comprehensive. For instance:

- Of the many possible IV/HS design features, those that produce the majority of the benefits have not yet been identified. In particular, the opportunities for local businesses providing information to people on the move are hardly understood at all.
- The distribution of these benefits among the various potential beneficiaries is not understood.
- The willingness of the beneficiaries to pay for specific benefits and taxpayers to pay for societal benefits has not been determined.

This lack of understanding has arisen because:

- The limited funds available to IV/HS has meant that relatively few pilots have been carried out to date. Moreover, these pilots have focused on a limited number of mainly technological aspects of IV/HS.
- Transportation authorities are not experienced in estimating the "soft" approaches to improving the effectiveness of existing roadways. The predilection towards offering new services for free on a universal basis tends to make the decision to deploy political, rather than financially or otherwise analytically justified.

Ramp metering has been a considerable success

Ramp metering involves controlling the flow of traffic onto major highways.

In Minneapolis/St. Paul, evaluations of a 10-year ramp metering implementation show that the average peak period freeway speeds increased 35%, from 35 to 46 miles per hour, and that the average number of peak period accidents declined by 27%.

In Seattle between 1981 and 1987, average travel time on a seven mile stretch of interstate highway (I-5) was reduced from 22 minutes to 11.5 minutes due to the implementation of ramp metering. This occurred while peak period traffic volumes increased 86% northbound and 62% southbound. Over the same six year period, the accident rate decreased by 39%.

- Diebold Institute Working Paper #1

- Many potential private sector players are not yet involved in considering the opportunities provided by IV/HS. Today, private sector involvement is largely restricted to the automobile companies and the equipment manufacturers who are the traditional suppliers to transportation agencies. A likely key player, the information industry, is not involved. This industry is accustomed to marketing information and bundling information types together.

Without further awareness raising and experimentation, the potential for IV/HS will not be fully understood and many potential private sector players will not become involved.

Failure to understand costs and benefits inevitably leads to both under and over engineering. Areas with the greatest potential for providing benefits may not be as fully developed or desirable and other areas representing a major part of the costs may produce minimal benefits.

Referring to Figure 7, page 37, we note that approximately half the potential benefits derive from commercial vehicles yet we see no evidence that investments relating to commercial vehicles are anywhere near half of the envisioned portfolio of IV/HS investments. Perhaps long term, an automated lane for commercial vehicles makes more sense than automated vehicle control for passenger cars.

Studies show that a substantial percentage of congestion results from accidents. Faster detection and clearing of accidents might be a very high payback investment.

In-depth identification and segmentation of benefits is also required if the planned multi-billion dollar U.S. Federal Highway Administration contract leading to an approved system architecture, is to be constructive.

E. CURRENT PUBLIC POLICY INITIATIVES - JAPAN LEADING IN THE DEPLOYMENT OF SYSTEMS

Public policy towards the application of information technology within IV/HS has mostly been approached from a supplier subsidy standpoint, with Europe and Japan heavily subsidizing the development of information technology, and with the United States adopting a much more fragmented and less committed approach.

Such supplier subsidies have only had slight impact in highway transportation. It was one of a number of factors in Japan taking the lead in the deployment of information technology systems.

Japan has achieved its leadership position through its ability to make public-private partnerships work to develop new products, and through conditions especially favorable to the implementation of IV/HS - particularly pressing congestion problems and a shortage of urban land for highway construction. The specific areas of leadership are traveler information systems, highway communications infrastructures, and active safety measures.

Japan: In-vehicle navigation systems are being rapidly commercialized

....the navigation systems discussed here give route guidance using stand-alone in-vehicle units....Navigation systems which are able to display the vehicle's own position on a CRT screen are being rapidly commercialized....Toyota Motor Corp. introduced a navigation system in 1988, and Nissan Motor Co. Ltd. followed in 1989....At the end of 1991, five automobile manufacturers (Toyota, Nissan, Honda, Mazda, Mitsubishi) had already started installation of navigation systems, including Toyota's second generation system.

- Hironao Kawashima and Haruki Fujii, Diebold Institute Working Paper #7

Europe has a slight lead over the United States in IV/HS research arising from two pre-competitive consortia-based initiatives (PROMETHEUS and Drive). Europe's ability to build on its achievements is, however, inhibited by the fragmentation of its markets.

Following the curtailment of federally funded research in the 1970s and 1980s, the U.S. Department of Transportation and Congress recognized the importance of IV/HS. Interest has been renewed through Mobility 2000, an ad hoc association of individuals and organizations interested in IV/HS, and its government-authorized successor IVHS America (Intelligent Vehicle Highway Society of America), which is now the focal point for the development of IV/HS in the United States. This latter program has built on the lessons of the PROMETHEUS and Drive programs and, being a single program, avoids some of the difficulties in coordination that Europe has experienced. A particular strength of the United States is the number of large nationwide trucking companies, a key driver in the implementation of IV/HS. By contrast, the Japanese and European trucking industries are very fragmented.

More details about US/Japan/EC comparisons are given in Appendix III.

F. THE SOLUTIONS

In order to achieve the significant benefits of IV/HS, we recommend greater private sector involvement, as the most important single factor in the creation of an environment which will stimulate the application of information technology.

As indicated in Chapter I, our analysis has shown that the obstacles facing information-based highway transportation infrastructures indicate requirements for:

- A champion for IV/HS who can operate in a multi-interest environment, and who is willing to take financial risks.
- Entrepreneurial vision to identify commercial opportunities.
- The ability to operate innovative services efficiently.

These are the characteristics of the private sector, not the public sector which makes the majority of the investments in the transportation system today. Thus, **an important preliminary recommendation is that the private sector should take a leading role in the funding and operation of IV/HS, in partnership with the public sector.** We need to develop public-private partnerships which draw on the complementary skills of the two sectors, for example, the public sector is skilled in ensuring equity and social cohesion, and the private sector is skilled at innovating and responding to rapid change. We are actively developing appropriate models of public-private investment partnership in order to achieve the introduction of innovative IV/HS services.

The public and private sectors have complementary skills

Business does some things better than government, but government does some things better than business. The public sector tends to be better, for instance, at policy management, regulation, ensuring equity, preventing discrimination or exploitation, ensuring continuity and stability of services, and ensuring social cohesion through the mixing of races and classes, for example in public schools. Business tends to be better at performing economic tasks, innovating, replicating successful experiments, adapting to rapid change, abandoning unsuccessful or obsolete activities, and performing complex or technical tasks.

- "Reinventing Government - How the Entrepreneurial Spirit is Transforming the Public Sector," David Osborne and Ted Gaebler, Addison Wesley, 1992

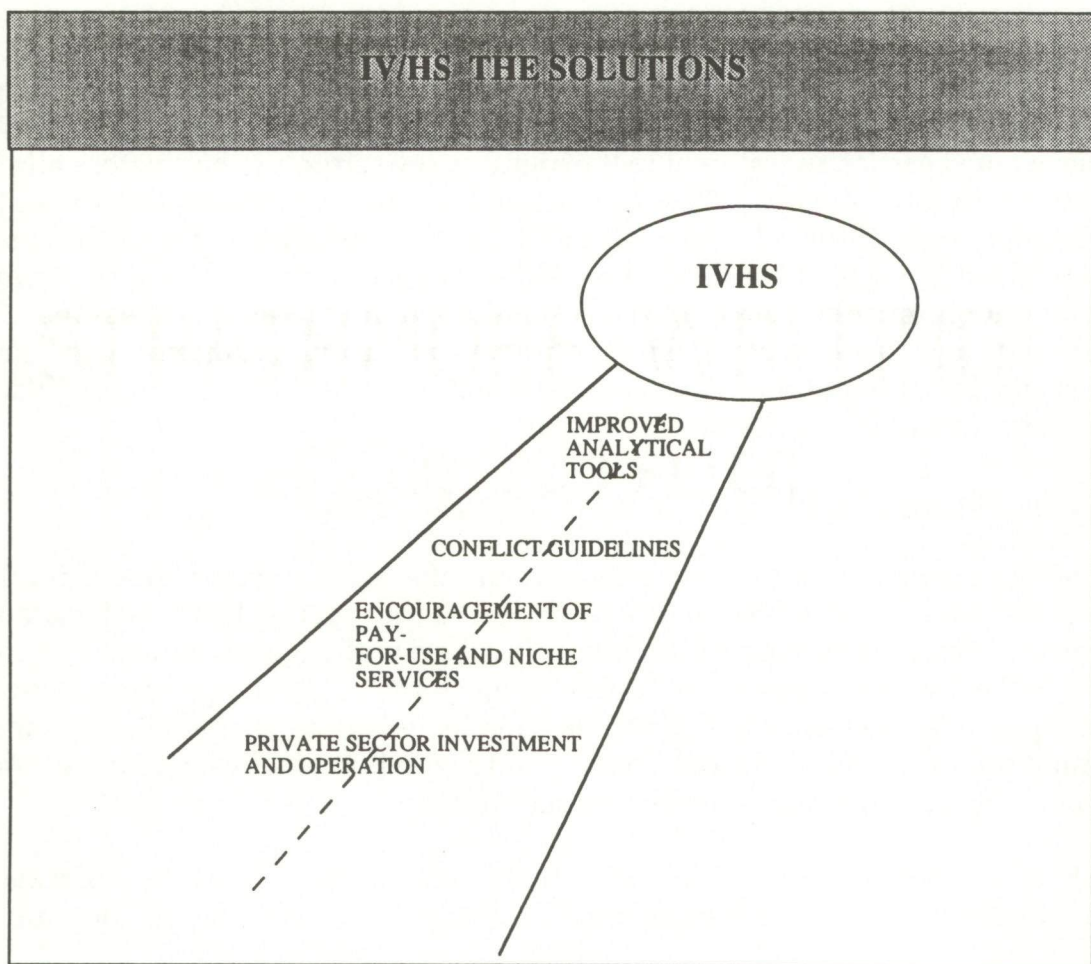
A more market driven approach we believe would yield significant dividends:

- Focusing on areas where beneficiaries indicate a willingness to pay will assure that investments produce benefits in excess of the costs involved.
- It would convert IV/HS from a burden on the taxpayers to a new source of revenue by concentrating initially on user groups and services where there is willingness to pay.

In addition to our main recommendation (see Figure 12), we have made further preliminary recommendations:

- Focused campaigns aimed at Transportation Authorities in the United States should be carried out to create a climate where IV/HS pay-for-use services are encouraged, and where the introduction of IV/HS niche services are seen as beneficial.
- Good practice guidelines should be established for handling potential conflicts between IV/HS and other societal goals.
- The procedures for identifying and evaluating commercially attractive IV/HS services should be improved.

FIGURE 12



1. Achieving Public-Private Investment Partnerships

We believe that the impact of many of the obstacles identified can be significantly reduced by greater involvement of the private sector through its entrepreneurial vision, its access to funds, its ability to implement innovative technology and its ability to operate services efficiently.

A Wider Range of Industries Needs To Become Involved in IV/HS

At this early stage of the development of IV/HS, there is no clear view of the way it will develop. Many alternatives are still possible. For example, commercial radio could be the base service with traffic information added in. Alternatively, the delivery of traffic information could be the base service with traffic-related information added in. Yet again, a wide range of information services, including traffic information, could be bundled together. Each alternative implies completely different sets of players who will be the business drivers. It is therefore important to ensure that potential groups of entrepreneurs are not shut out at this early stage of the development of IV/HS.

To the traditional groups of suppliers involved with IV/HS (automotive and electronics companies) we must encourage the greater involvement of a wider range of industries, including information services companies, commercial radio/television networks, the cable companies, computer hardware manufacturers, systems integrators and cellular telephone operators. Restrictions on participation by private industry in general or specific categories of private companies must be avoided.

Encourage Development of Public-Private Partnerships

As we have noted earlier, investment in the highway infrastructure has historically been made by the public sector. This has created a mindset where Departments of Transportation only think in terms of public sector investment for highways and highway-related projects. This mindset has to be changed. State and local Departments of Transportation must be encouraged to establish public-private partnerships. They need to be able to recognize potential public-private opportunities; the strengths that the private sector can bring to public-private partnerships; and the opportunities that the private sector would find attractive.

Appropriate Models of Public-Private Investment Partnership

Our overriding principle is that as far as possible the private sector should fund and operate IV/HS, and where it does not fund IV/HS, it should operate IV/HS on behalf of the public sector. Since the public sector is highly involved with highway transportation and is likely to be for the foreseeable future, some form of public-private investment partnership will be necessary to deliver the benefits of IV/HS. Included in this idea of partnership are mechanisms for risk sharing and regulation of service delivery. We are currently identifying the most appropriate partnerships.

For each of the major types of IV/HS - traffic management, traveler information, automated vehicle control, and commercial vehicle systems, we need to determine the optimal:

- **Mix of public and private funding.** In some cases this will mean existing public sector operations being privatized. A possible example would be toll collection operations.

In other cases there would be total public management with the day-to-day operations handled by a private sector operator under contract. The private sector operator might provide part of the risk capital.

A third model would be a new operation, privately funded and operated, perhaps under a franchise agreement. A possible example of this would be an integrated traveler information and advanced traffic management system.

A fourth more complicated model could have a public part, for example, a traffic management system operated by the private sector and funded by the public sector with payments related to performance (for example, congestion levels at peak periods), and, a private part, perhaps a pay-for-use traveler information system funded and operated by the private sector.

- **Degree of regulation.** In most cases these new public-private investment partnerships will not be fully subjected to the disciplines of the market place on price and quality of service. Consequently some degree of regulation will be necessary:
 - Tolls - for example, there may be a need for regulatory constraints on the level of highway tolls and congestion pricing systems.
 - Quality of service - similarly there may be a need for standards on the quality of service offered to the public. For example, a privatized traffic management operation will need to take into account the local preferences for traffic management.
 - Standards - certain technical standards may need to be mandated. For example, standards are clearly useful in electronic toll collection. Vehicle users will not want a different system for every toll authority and every jurisdictional authority traveled through.

In seeking to establish regulatory frameworks for IV/HS, where possible lessons should be drawn from other countries and other societal infrastructures where private sector investment has recently taken place, for example, TrafficMaster in the United Kingdom, and private prisons in the United States.

Regulation should be structured so as to encourage the private sector to improve productivity. For example, for its main group of services, British Telecom can raise average charges at rates equal to the general inflation index less average productivity gains in its industry. If British Telecom improves productivity better than the industrial average, it will make above average profits. Thus, British Telecom is provided an incentive to improve productivity.

Two Helpful Pieces of U.S. Public Policy

In developing these public-private investment partnerships, we shall be taking advantage of two important recent pieces of public policy. The first is the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Based on some innovative thinking advanced by the U.S. Department of Transportation, it provides \$151 billion over a six year period for improvement of surface transportation. A little over \$660 million of this money is directly allocated to experimentation in IV/HS. Activity in IV/HS stemming

from this legislation should also result in private sector participation, particularly in advanced travel information systems where marketing expertise is a key success factor.

The Act also exhorts Metropolitan Areas and States to develop "Transportation Improvement Programs", which must consider private sector funding for transportation, in general, and IV/HS, in particular. As a result, substantial amounts (additional to the above \$660 million) will be invested in such IV/HS areas as automatic toll booths and variable pricing that are expected to accompany the purchase of existing roads, and the construction of new ones by private investors.

The second policy initiative is the April 1992 Executive Order on Privatization of State and Local Government Assets, which removes most of the factors inhibiting states selling infrastructure assets built in whole or in part with federal money. The Executive Order directs federal agencies to approve of requests by state and local governments to privatize infrastructure assets -- it indicates specifically that "assets" are meant to include roads, tunnels, bridges, etc. Previously, the Office of Management and Budget had insisted that the Federal Government be paid its past grants in the event the infrastructure was sold. The Executive Order does away with this disincentive. State and local governments will be able to keep the majority of the proceeds of such privatization. The Executive Order goes a long way toward removing any remaining blocks to action along the lines envisioned by ISTEA.

We are now focusing attention on ways in which to build into routine infrastructure financing, incentives which will encourage the utilization of advanced technologies. We believe that this would create a strong "demand pull" and that this force would be of immense importance in unleashing the innovation necessary to create an infrastructure suitable to an advanced industrial society.

Operational Tests of Private Sector Participation in IV/HS

The ideas developed above need to be validated through operational tests of private sector participation in IV/HS. The key roles to be tested are private sector funding of IV/HS, and private sector operation of IV/HS. The approach we recommend is to identify a number of major IV/HS projects willing to include the private sector as a provider of risk capital and/or operator of IV/HS. The next step would be to develop joint business plans, perhaps with some assistance from the U.S. Department of Transportation's Federal Highway Administration. Once agreement has been reached, the operational tests should be carried out, with extensive feedback to interested parties.

2. Encouraging Pay-for-use Services

A major obstacle to the implementation of IV/HS is the view that it must be free at the point-of-use. The alternative to services being free at the point-of-use, is to adopt an approach, where IV/HS is viewed as a revenue source for municipalities and where IV/HS services are charged on a pay-for-use basis (as is the case with toll bridges and roads) and investment priorities are set by profit generating potential. This approach has the added attraction that incentives can be introduced to encourage/discourage certain types of behavior by highway users. For example, travel during periods of low vehicle usage might be at lower rates.

Encouraging pay-for-use IV/HS service is a two-fold activity. Firstly, it is necessary to convince Transportation Authorities that insisting on IV/HS services being free at the point of use will significantly impede the development and delay the benefits of IV/HS. The initial cost and operating costs of IV/HS are not likely to be supported by the public sector. **By foregoing revenue opportunities, the private sector is effectively eliminated as a potential investor.** A focused awareness campaign is needed to get this message across.

Secondly, pay-for-use is already an accepted part of highway transportation. Toll roads and bridges are commonplace. We believe that analysis is desirable to determine why these pay-for-use services are considered acceptable and what benefits the users perceive they are receiving. Once these findings are known, they should be used to identify those parts of IV/HS where pay-for-use would be acceptable.

The taxpayer should not foot the bill!

....the erection and maintenance of the public works which facilitate the commerce of any country, such as good roads, bridges, navigable canals, harbors, etc. must require very different degrees of expense in the different periods of society....It does not seem necessary that the expense of those public works should be defrayed from the public revenue....The greater part of such public works may easily be so managed, as to afford a particular revenue sufficient for defraying their own expense, without bringing any burden upon the general revenue of society. A highway, a bridge, a navigable canal, for example, may in most cases be both made and maintained by a small toll upon the carriages which make use of them.

- Adam Smith, The Wealth of Nations, 1776

3. Introducing Niche Services

Another major obstacle to the implementation of IV/HS is the view that it must be a universal service. We need to create a climate where the introduction of niche services is seen as beneficial. Here again we believe a campaign focused at Transportation Authorities is necessary to demonstrate that insisting IV/HS services should be universal from the outset, will significantly impede the development of IV/HS.

The introduction of niche services is often an important pre-cursor to the development of universal services. A good example of this is the telephone which once was affordable only by a few people. Now the telephone is available in the majority of homes in the United States and Western Europe. Even within IV/HS we can see that this process is well advanced in Japan with autonomous in-vehicle navigation systems. Originally these were low functionality gadgets for the "motorist with everything". Progressively the price was reduced and the quality improved, so that now over 250,000 systems have been sold, and the system is well on the way to becoming a standard facility in vehicles in Japan.

A succession of niche services may very rapidly evolve into a more universal service and at any rate will make the ultimate task of expanding IV/HS to incorporate all travelers more manageable. In many cases, those who do not subscribe and hence pay for an IV/HS service will nevertheless benefit from the use by others. This is certainly the case

with automated toll booths and approaches that divert equipped drivers from congested roadways to other less congested alternatives.

Complementary to encouraging Departments of Transportation to establish niche services, we believe that market research should also be carried out to identify the most commercially attractive niche services.

4. Establishing Guidelines for Resolving Conflicts with Other Societal Goals

IV/HS can in some cases conflict with other societal goals such as personal privacy, preservation of the environment, and local control of transportation, and is in competition with other potential solutions to highway transportation problems. The importance of each of these will vary enormously from location to location. There is thus no general approach relevant to all situations. We believe that the best approach is therefore to establish guidelines on good practice.

The establishment of the guidelines for handling conflicts with other societal goals is a task which should be carried out by an organization with no vested interests in selling IV/HS equipment or services. These guidelines should encompass how to:

- Predict conflicts with other societal goals
- Develop IV/HS systems to accommodate other societal goals
- Interrelate IV/HS solutions with other approaches for solving highway problems
- Present IV/HS solutions, to groups concerned about possible infringements of their interests.

The guidelines would be drawn from the experience gained during projects like the Electronic Toll and Traffic Management (ETTM) project in the New York/New Jersey/Pennsylvania area. In developing the technical specification for this electronic toll collection system, a number of privacy issues were considered. One aspect was the freedom to choose whether to use the system or not. The ETTM specification requests a mechanism to deactivate the system for selected trips. Another concern relates to the use of the transaction data. ETTM intends to keep the data confidential. Video enforcement and speed limit enforcement also raised privacy issues. Regarding video enforcement, only the license plate, and not individuals, will be photographed. Liability will be imposed on the owner of the vehicle. In addition, legislation is to be passed prohibiting the use of video enforcement or electronic toll data for speed limit enforcement.

5. Improving the Quality of Benefit Assessment Procedures

We believe the prospects for the deployment of IV/HS would be greatly enhanced if the procedures used to investigate IV/HS benefits were improved. Those involved in this process should include potential suppliers of IV/HS goods and services, lawmakers at federal, state and city levels, and departments of transportation at all levels. Improving the quality of the analytical tools is a three stage process.

The process would begin by raising the awareness of interested parties about the social and commercial opportunities provided by IV/HS. At the same time, these interested parties should also be made aware of the gaps in our knowledge about the relative importance of the benefits. For example, we do not know whether rapid identification and response to incidents on the highway would be more beneficial than traffic management. An awareness presentation needs to be prepared and delivered to interested parties.

The second stage would involve improving our conceptualization of vehicle user behavior and traffic patterns. Much can be achieved through surveys and simulations without the need for expensive experimentation. For instance, we do not know how many vehicle journeys users make when the journey could be time-shifted. Such information would help identify what type of pre-trip information would be useful to people. A program of urgent research to improve our conceptualization of vehicle user behavior and traffic patterns, needs to be developed and evaluated.

The time has come for serious economic evaluations

Most of the systems and techniques in Drive and PROMETHEUS [the two main European pre-competitive research programs] have been investigated only from the technical point of view. Some attempt at evaluation has been made, but only in a very limited area, particularly due to the fact that very few data are yet available. It is now time to undertake serious economic evaluations to determine the efficiency of the proposed IV/HS systems regarding the targeted objectives: safety, efficiency, environment.

- Willy Maes, Diebold Institute Working Paper #6a

The third stage involves carrying out further IV/HS experimentation. Improved conceptualization will help improve our ability to predict the most promising IV/HS applications. These improved predictions will need to be tested in commercially-oriented model IV/HS projects in selected metropolitan areas to gain practical experience of the likely costs and benefits of IV/HS.

An area where we believe special attention should be devoted is commercial vehicle operators. Approximately half of the potential benefits of IV/HS (see Figure 7, page 37) derive from commercial vehicles, a group of road users who would be willing to pay for appropriate IV/HS services. Furthermore, any improvement in efficiency would directly enhance national competitive advantage.

6. Possibilities for U.S. - European Collaboration

All the above work areas would benefit from the sharing of research results and, in some cases, joint projects because of the similarity of the approaches to highway transportation in the United States and Europe. The area which we believe would benefit most from collaboration is the area of determining the cost-benefit case for the most promising IV/HS applications. This knowledge is key to determining priorities for investing in IV/HS. Another fruitful area for collaboration is standards setting for IV/HS systems.

IV INFORMATION-BASED HEALTH CARE INFRASTRUCTURE

The health care infrastructure is becoming information-based in two stages. In the first stage, information technology is utilized within each site where health care is provided. In the second stage, these islands of automation are interconnected to enable the exchange of health information for health maintenance and medical treatment. It is this second stage that we are primarily concerned with in this project and which fundamentally changes the way health care will be provided in the second half of this decade.

A. THE PROMISE OF AN INFORMATION-BASED HEALTH CARE INFRASTRUCTURE

By building on the existing investments in information technology, to move information faster, to consolidate information on patient outcomes and to make this information more accessible, and by implementing already developed telecommunications technology, the health care infrastructure can be reinvented. This reinvention will improve patient care and, at the same time, offer the potential for substantial reductions in costs. The reinvention will (see Figure 2, page 11):

1. Provide Full Patient Information Regardless of Location

It will be possible to access a complete set of medical records for each patient, regardless of the location of the inquiry. Thus a patient's full medical history will be available, avoiding the need to replicate already carried out tests, whether the patient is seeing his/her regular doctor, a specialist clinician or a physician while away from home, or receiving in-patient care either on an elective basis or on an emergency basis, for example, following an accident.

Patient information will be stored as text, data and also where needed images, and in some cases as moving images. Medical records will be automatically updated after each successive patient interaction with the health care system. Important relationships between medical variables and, where appropriate, preliminary diagnoses will be automatically brought to the attention of the physician.

2. Extend the Reach of Health Care

An information-intensive health care infrastructure offers the promise of extending the reach of health care to the home allowing more treatment to be provided without hospitalization, improving the quality of health care in rural areas, and improving the quality of communications between physicians.

From the home, data from self-performance tests will be transmitted via telecommunications networks to hospital facilities for analysis. In addition, patients in the home will be remotely monitored, thus providing positive control of life maintaining devices and alerting emergency services if life threatening conditions occur. Such services will be particularly beneficial to elderly patients who often prefer to be treated in their own homes rather than in hospitals.

In rural areas, two-way video links between centralized medical specialists and general physicians will be established enabling the wider availability of specialized care. These consultations can be supplemented by the transmission of medical images such as x-rays and MRI to medical centers for expert review. The quality of communications between physicians will be improved through video-conferencing of geographically dispersed practitioners providing for the exchange of professional opinions on specific cases and the provision of advice or training for on-site practitioners in the home, rural areas or emergency situations. Here again, these consultations will be supplemented by the transmission of medical images.

3. Allow Greater Access to Accumulated Medical Experience

Physicians will be able to search across a wider range of medical databases regardless of location, and to access expert systems providing such services as computer-aided diagnosis and drug interaction warnings. Multimedia learning material, accessible via the infrastructure, will play a major role in continuing medical education (CME) for health care professionals.

4. Provide Access to Performance Assessment

Community-wide information will be available on specific conditions detailing expected clinical performance and quality of life, availability of care, consumer ratings on treatment outcomes, and likely costs. Such information would be accessible by:

- Patients, to help make decisions on whether a particular treatment should be entered upon and which health care provider should be approached.
- Physicians, to determine optimal treatments.
- Health insurers, to establish policy on conditions to be covered by policies.

5. Engage the Individual in His/Her Own Health Care

In addition to the use of performance assessment analyses to help make decisions on specific treatment matters, individuals will be able to access either in the home or public places (schools, fitness centers, etc.) information on a wide range of health related topics, including:

- Optimum diet and exercise programs which can be individually tailored.
- Optimum frequency for check-ups, diagnostic tests and immunization needs.
- Provision of information and case histories on medical conditions and their relation to lifestyle.
- Drug side effects, interactions and comparative costs.

6. Automate Claims Processing

Once patient and administrative data are electronically captured, these data can be moved quickly and accurately between treatment and administrative functions within hospitals and medical centers, and between these and insurance companies. Checks for completeness, accuracy of information, and compliance with the reimbursement rules will be facilitated and in most cases payments will be authorized with minimal human intervention.

7. Deployment

Figure 13, page 65, illustrates a possible but not comprehensive U.S. scenario showing the interaction over time between a number of trends and events and the level of deployment of various IV/HS components -- computerized patient records, accessible by all involved in the treatment of a patient; community-based information utilities, providing analyses of treatment outcomes, health maintenance information, etc.; and a national/international information utility, providing analyses of treatment outcomes, etc., on a national basis and in some cases (for example, for rare conditions) on an international basis.

The deployment of an information-intensive health care infrastructure over the next few years will depend on a number of social, political and operational trends and events, for example, successful tests of community-based information utilities; successful tests of charging for the collection and handling of patient information and the subsequent reimbursement under insurance coverage. Looking further ahead to the beginning of the next decade, the pace of development of the information-intensive health care infrastructure is likely to be linked to such events as Medicare and Medicaid allowing reimbursement for information charges, mandatory information searches for some treatment options, and the widespread deployment of advanced (ISDN) network services.

B. THE BENEFITS OF THE HEALTH CARE INFRASTRUCTURE BEING INFORMATION-INTENSIVE

Increasing the information intensity of the health care infrastructure will contribute to the solution of the main problems of the current health care system, as well as enable the practice of whole new types of health care. Expected benefits will include improved quality of patient care, reductions in the cost of health care, and more effective health maintenance and education. Each of these benefits is distributed (see Figure 14, page 69) to four groups of beneficiaries -- individual patients, health care providers, insurers/payers, and society in general. The distribution of each type of benefit among the beneficiaries varies, for example, all four groups derive benefits from reductions in costs, but the main beneficiaries are insurers/payers and society in general (through lower taxes); for improved quality of care, individual patients are the main beneficiaries; and for improved access to health care-related information, the main beneficiaries are individual patients and health care providers.

Benefits received by society are usually able to be financed only by taxes, whereas benefits to other groups can often be funded on a pay-for-use basis. If benefits are received by one group (for example, insurers) but require actions by a second group (for example, patients and providers) a cross-subsidy arrangement is usually required so that the costs are incurred by the party receiving the benefits. This is an important point that

we will return to when we discuss the reimbursability of the costs of collecting and handling patient information.

1. Improved Quality of Patient Care

More information and expertise will be brought to each doctor-patient encounter, including patient data analysis highlighting interesting relationships between medical variables, and nationwide (and in some cases worldwide) assessments of treatment regimes. Constant and closer scrutiny of patients at risk, will be provided by automatic patient monitoring systems. Decision support tools will give doctors added confidence in treatment plans and help to eliminate extra procedures that doctors perform to provide insurance against malpractice suits.

In addition, in an era when concerns have been expressed about the quality of health care in rural areas, information intensity should allow specialist advice to be brought electronically to remote locations, broadening the range of quality care. Thus rural hospitals and other small facilities should be able to treat patients with outside specialist guidance, if needed, without prematurely referring to larger medical centers to avoid liability.

Extending information to the home and remotely monitoring patients allows patients to stay at home where they often feel more comfortable. This is particularly important for the elderly, a growing proportion of the population.

2. Reductions in the Cost of Health Care

With more than 12% of the U.S. GNP devoted to health care, total costs rising faster than inflation, and administrative costs amounting to 20% of total health care costs, reductions in health care costs are a highly-sought economic priority.

Increasing the information intensity of the health care infrastructure should make information widely available on patient outcomes and costs, thus strengthening the market mechanisms for health care provision. Consumers should be able to make health care decisions based on provider effectiveness, treatment outcomes including quality of life, and costs. Physicians should be able to make clinical decisions based on a complete set of patient information (avoiding the need to repeat procedures for which the information is not accessible) and on a comprehensive analysis of the effectiveness of treatment options (avoiding low outcome options).

In addition, insurance companies should be able to control health care costs better. Using the treatment assessment systems, they will be able to determine which treatment and diagnostic procedures they will support based on an analysis of their effectiveness. In particular, the insurance companies would be able to identify low outcome conditions and weakly justified usage of expensive equipment, and discourage their use.

FIGURE 13

DEPLOYMENT OF HEALTH CARE INFRASTRUCTURE

This exhibit shows the level of deployment through time of three selected categories of health care information infrastructure functionality. The actual level of deployment will depend on many factors, some of which are difficult to forecast.

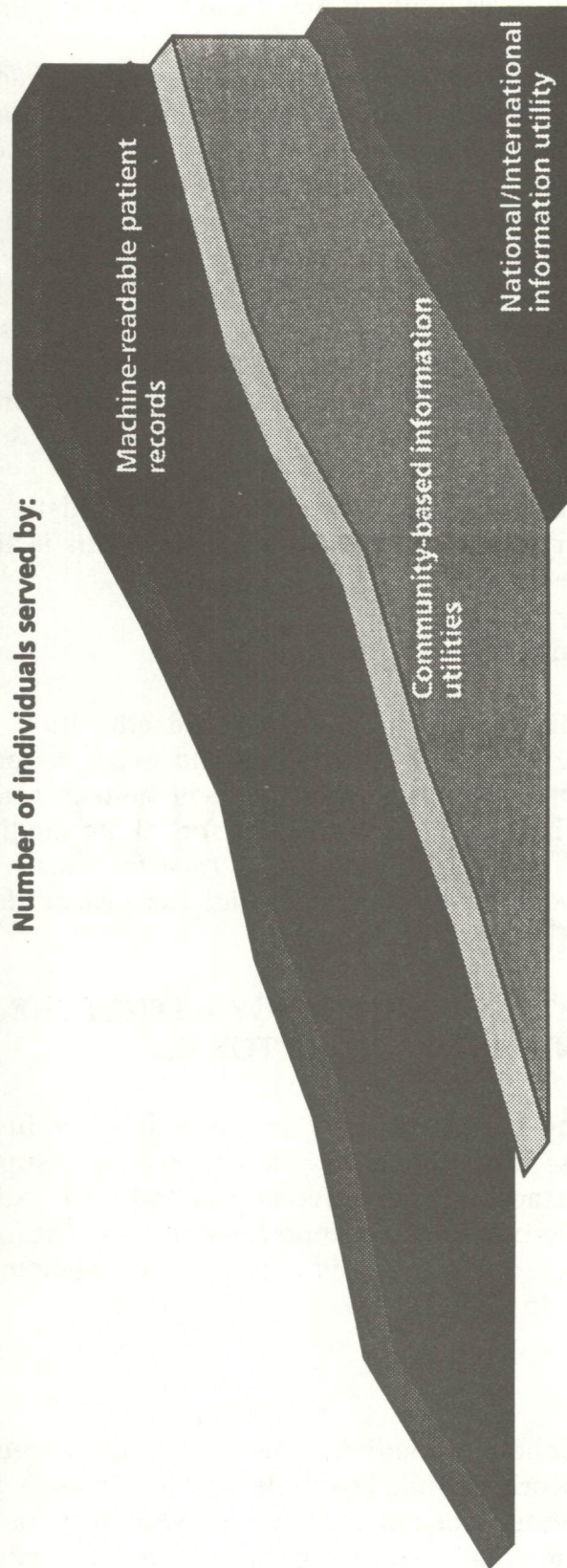
Certain important trends and events which we feel significantly impact the rate of deployment are shown in the bottom of the exhibit in four timeframes. Alternative scenarios might lead to faster or slower deployment of the three categories of functionality shown.

We believe that this type of exhibit is useful for planning purposes and in discussing the importance of various technological and public policy outcomes that might impact the deployment of technology in societal infrastructure. We would encourage those making forecasts of deployment to use an approach such as this to link their forecasts with the associated assumptions on the timing of the underlying factors which determine the rate of deployment.

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Deployment of Health Care Infrastructure

Number of individuals served by:



1992-1996

- Community-based information utilities established on test basis
- Tests begin on reimbursement ability for information charges

1997-2001

- Supreme court rules that providing information services is not practicing medicine without a license
- ISDN substantially deployed worldwide
- Reimbursement of information charges approved for Medicare and Medicaid
- Possibility that single payer insurance will be instituted in U.S.

2002-2006

- Transjurisdictional licensure approved in U.S. and Europe
- Directory standard approved and universal directory initialized
- Supreme court rules patient information co-owned with government insurer
- Information searches mandated for some treatment options

2007-2011

- International licensure approved
- Information utilities interconnected across national boundaries
- UN assigned role in regulation of information utilities

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The potential savings for the United States have yet to be quantified but there is reason to believe that duplicate testing and unnecessary procedures may be as high as 10 per cent of non-administrative expenditures or about \$60 billion per year.

The use of information technology will also allow greater automation of administrative processes, thereby reducing administrative costs. Savings can be achieved through transferring information electronically between the various players in the health care system, since electronic transmission provides quicker and more accurate transfer of information. Savings of \$30 billion per year are possible by cutting administrative costs by at least 25% through greater automation of administrative processes.

Patient costs such as traveling to doctors and hospitals and the resulting loss of work time are generally not included in estimates of our national health care expenditures, but these could also be significantly reduced by systems that electronically link patients, providers and health care sites.

In arriving at the above figure, we have been forced to make simplistic assumptions because of the lack of good quality cost-benefit studies. Clearly, this is an area where considerable further work is necessary.

3. More Effective Health Maintenance and Education

With the availability of electronic health maintenance and education information, individuals will be able to develop better health habits and make better health care decisions. They will be assisted in deciding when medical help is needed, receive customized health maintenance help such as reminders for taking medicine, getting checkups, tracking tests, etc. Studies have shown that 40-70% of the causes of premature death in the United States are preventable by changes in diet, exercise or lifestyle, where easily accessible information can help.

C. THE USE OF INFORMATION TECHNOLOGY WITHIN THE HEALTH CARE INFRASTRUCTURE TODAY

Both primary care providers and hospitals have invested heavily in information technology systems. Most of these investments have been devoted to support a single function, for example, management accounting or invoice preparation or patient database or laboratory testing. Recently, there has been a trend towards establishing electronic links between systems and experimenting with innovative telecommunications applications. Illustrative projects include:

Buffalo, New York

The University at Buffalo School of Medicine and Biomedical Sciences is planning a computer network to link hospitals and physicians in the western part of New York State. The network will allow physicians to tap into a patient's complete medical record, the latest scientific article or textbook, or colleagues for consultation. Doctors will also be able to transmit quickly images of x-rays, CRT screens and other tests to specialists for expert advice. The project is believed to be the most comprehensive of its kind in the United States.

Connecticut ProMed Project

SNET and ProMed Systems (a Blue Cross subsidiary) have a statewide electronic insurance claims and medical management network in Connecticut, claimed to be the first in the nation. The data network links hospitals, doctors and health care providers to facilitate, among other things, the processing of insurance claims. Blue Cross now receives 20% of its claims electronically, which has speeded processing times, reduced errors and saved the firm \$300,000 annually in administrative costs.

Lubbock, Texas

Three networks in Lubbock, Texas are being implemented to create a "medical telecommunity." The first network, Kellogg Affiliated Remote Environments Network (KareNet), established in 1985, is an on-line network designed to reduce the isolation of rural physicians in Western Texas by providing them with access to health care research, records, computer conferencing, and patient management protocols. KareNet will eventually contract with all rural hospitals in Texas.

The second network, currently in development, is MedNet, a two-way interactive video network which will interface with KareNet for visual training and diagnosis for rural physicians. It includes automated health care records, a menu-driven system to record patient information and patient management protocols which provide health care professionals with up-to-date treatment modules for treating specific emergencies.

The third network, InterNet, will be a satellite teleconferencing system to link rural hospitals to Texas Tech's four campuses.

BellSouth Project

BellSouth, one of three regional companies which have created videotex gateways, has made a health care database available on its gateway. This database is accessible by any subscriber who owns a personal computer. Specific information on Alzheimer's disease and AIDS is offered, in addition to a "Well Adult" program.

FIGURE 14

HEALTH CARE INFRASTRUCTURE: DISTRIBUTION OF BENEFITS

This exhibit illustrates that benefits are of many types: eight categories are shown. There are four major recipient groups -- individual patients, health care providers, insurers/payers and society at large. Each of these recipient groups can be further segmented. For example, individual patients can be further segmented based on such characteristics as:

- City, suburbs, rural
- Level of interest in being involved in decisions relating to his/her health care treatment
- Extent of travel
- Age, disabilities, serious illness and other factors leading to special needs

The eight categories of benefits are split differently among the four user groups. This is important in that it can provide some guidance as to which benefit categories to stress and in turn the corresponding functionality to invest in depending on which beneficiary groups are being favored.

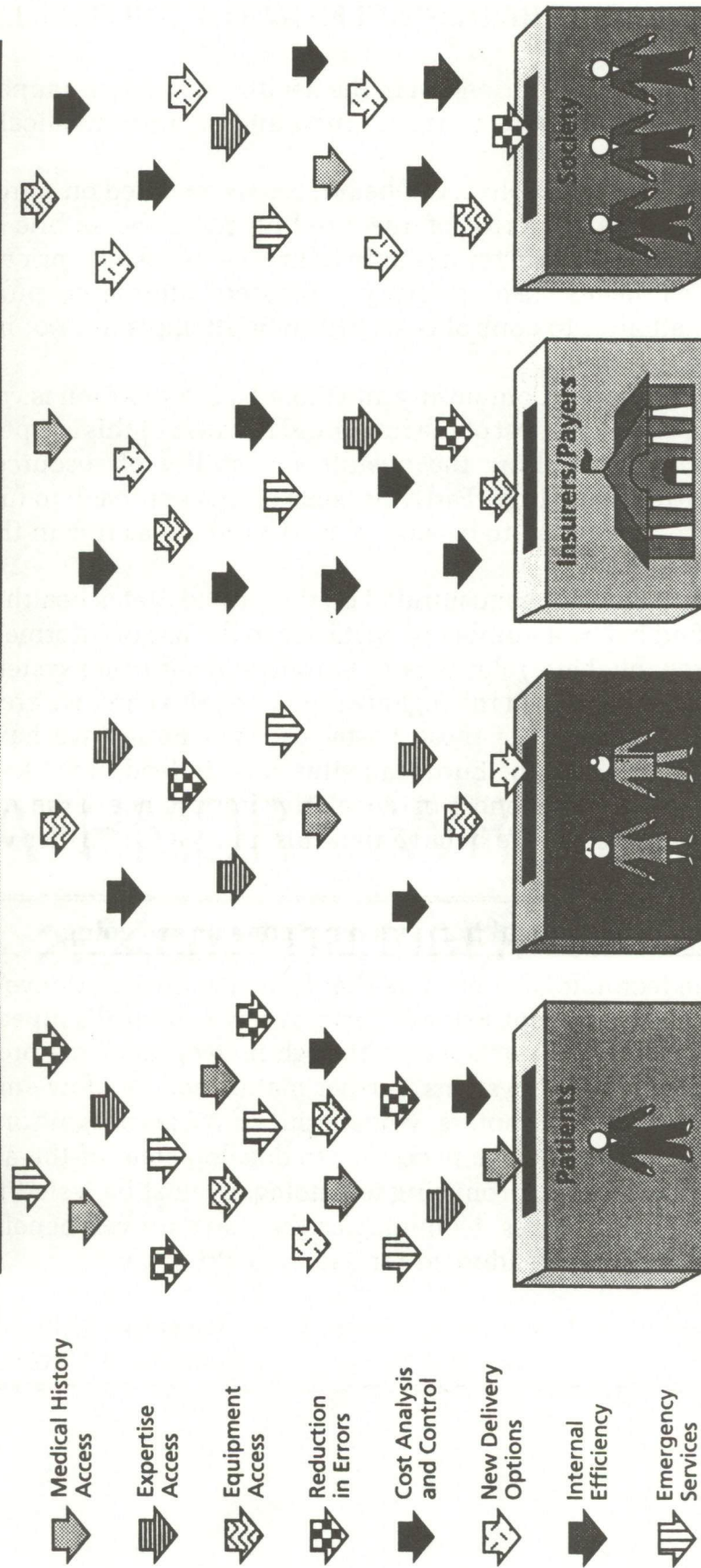
For example, cost analysis and control benefits are realized significantly by insurers but these are of even more importance to society at large as the overall cost of health care can be a destabilizing influence. Patients and providers cannot be expected to pay the full cost of services which benefit primarily insurers and society at large.

On the other hand, reductions in errors are important to patients and also to providers concerned about tort liability. Services which clearly result in error reduction might more easily be funded through non-reimbursable user fees than services which benefit primarily insurers and society at large.

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Health Care Infrastructure: Distribution of Benefits

Health Care



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D. THE OBSTACLES IN THE UNITED STATES

Addressing the use of information in the health care system cannot be entirely separated from the way that different countries fund and organize medical services.

In the United States the delivery of health care is operated on a professional/ commercial basis, with only a minority of the funding from the public sector (Medicare and Medicaid). The public sector has only indirect control over prices and resources for the larger part of health care delivery. Insurers and large purchasers of insurance (employers) attempt to control costs but their attempts are not highly coordinated.

In Japan, the European Community and Canada, the situation is very different. There the public sector supplies most of the funds and because of this adopts a very interventionist approach often controlling the overall availability of resources, setting prices and generally setting standards. Partly because of this approach to funding, the overall cost of health care is not seen to be such a great problem as it is in the United States.

Our analysis to date has concentrated on the United States health care system, where we have identified below a number of obstacles to the use of information. All the identified obstacles probably have relevance to European health care systems. However, because of the above differences in the organization of health care, we are unsure at this stage of the relative importance of these obstacles, or, whether we have identified the most important obstacles for the European situation. Indeed, it is likely there are significant country-by-country differences in the relative importance of these obstacles within in the European Community. We believe that this an area for further work.

Most of the technological barriers have gone or are going

Most of the technological barriers that formerly impeded development of CPR (Computer-based Patient Record) systems have either disappeared already or are about to dissolve. Nevertheless, although no technological breakthroughs are needed to realize CPR systems, further maturation of a few emerging technologies, such as hand-held computers, voice-input or voice-recognition systems, and text-processing systems may be necessary to develop state-of-the-art systems in the 1990s. In some cases, promising technologies must be tested further in "real-life" situations; in other cases, technologies that have proved beneficial in applications in other fields must be adopted for use in health care.

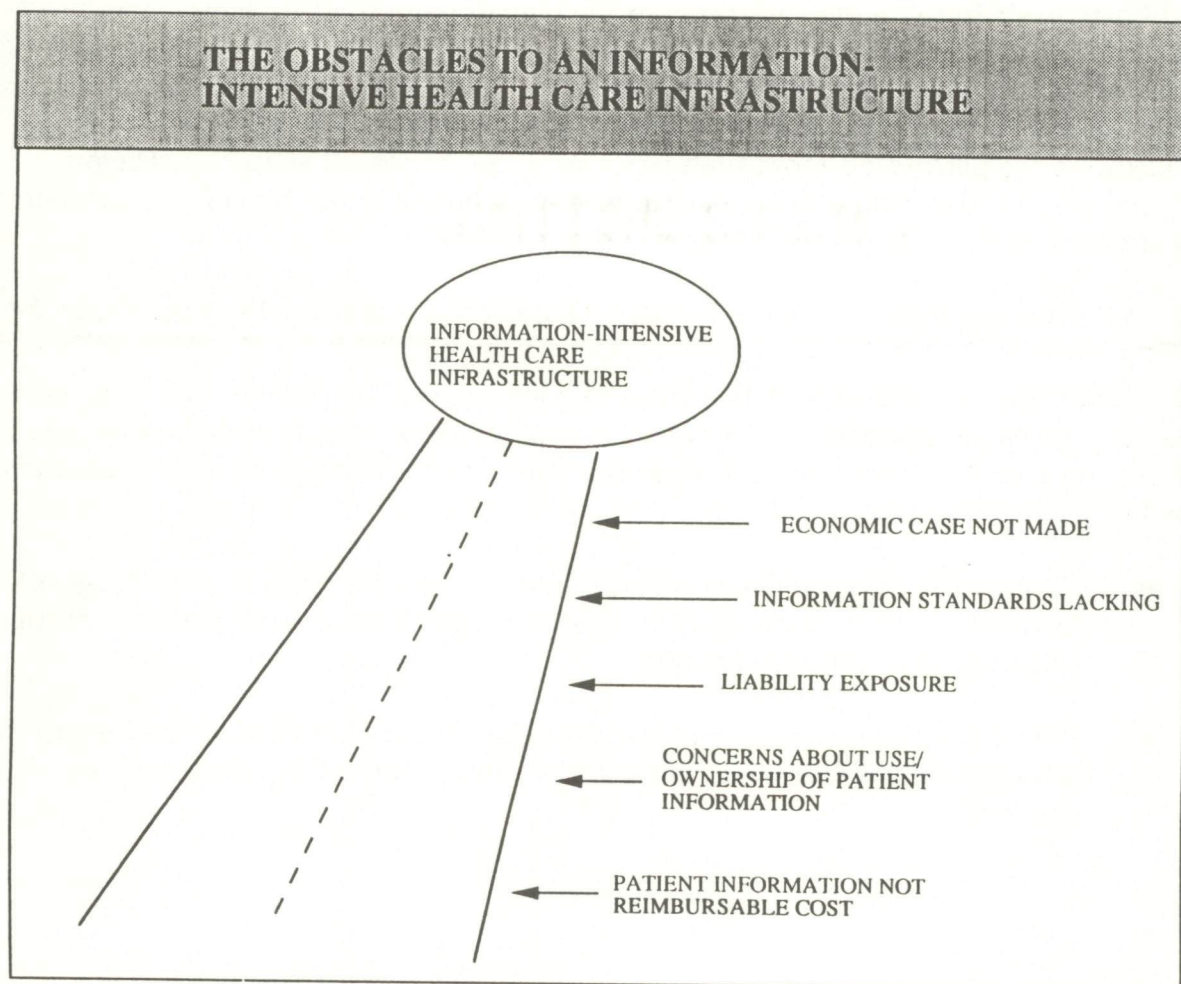
- The Computer-based Patient Record - An Essential Technology for Health Care,
Institute of Medicine, Washington, DC.

Despite considerable investments in the United States in the implementation of information technology within the health care sector, Stage II, the interconnection of islands of automation has yet to happen. This is not primarily because of technological obstacles - the required technology largely exists, with some areas needing greater maturity, for example, distributed databases. Rather, true information infrastructures have yet to be created because of a number of obstacles (see Figure 15) to the use of information within the sector. These are:

- Providing patient information electronically is not generally a reimbursable cost.
- The use and ownership of patient information is not clearly established.
- Liability exposure for information providers may be significant.
- Information standards are insufficiently developed
- The economic case for Stage II interconnectivity has not yet been made.

Each of these will now be considered in more detail.

FIGURE 15



1. Providing Patient Information Electronically is Not Generally a Reimbursable Cost

Where health care is provided on a pay-for-use basis, the collection and handling of patient data is not generally a costed service. For example, physicians are not directly compensated for computerizing patient information. In addition, physicians are not directly compensated for collecting historical patient information from other sources. Instead, whenever information is lacking they are motivated to carry out diagnostic procedures, even though these may duplicate information available elsewhere. Moreover, there are no mechanisms or incentives for submitting patient data to third party treatment assessment organizations. Finally, neither physicians nor potential patients are generally reimbursed for carrying out computer-based analyses or databases searches. An important beneficiary of many of these information handling activities will be the insurer/payer, while the decisions to utilize such information services will be made primarily by health care providers and patients who are understandably reluctant to incur the full cost of these services.

The failure of the health care market

The primary reason for market failure in health care is that we really don't know how the things we do to patients actually affect their health. This may seem hard to believe in today's hi-tech information setting, but it's true. This ignorance manifests itself in the wide variations in the way doctors treat patients, even without apparent differences in the characteristics of those patients, and without evidence that more intensive treatment produces any better results than less intensive treatment. For example, it has been documented that coronary bypass procedures are performed more than twice as often in Boston as in New Haven. Yet, there is no discernible difference in mortality between the two cities that can be ascribed to these disparate intervention rates.

- Paul Ellwood, MD, and Harry Wetzler, MD, Diebold Institute Working Paper #8

In summary, the collection and handling of patient data is viewed as a cost item - something to be minimized - rather than a process from which added-value can be derived. As a result, there are far fewer opportunities for third-party organizations to provide:

- Doctors with knowledge of treatment outcomes - this lack of knowledge often leads to the provision of more services than are needed and sub-optimal selection of treatment regimes.
- Patients with an adequate understanding of the effect of medical care on the whole quality of life - such knowledge often reduces the patient's demand for services.

- Insurance companies and the federal government with information on the cost effectiveness of treatment options - such knowledge would lead to more informed decisions on which forms of treatment are to be supported.

Where health care is provided by a single payer system, the single payer could easily establish a value for information and thus create a demand pull for health care-related information services. This then implies added importance for determining in some detail the benefits of Stage II interconnectivity within the health care infrastructure.

The mechanisms for reimbursement for high speed networks need to be fully explored

The costs of a teleradiology network vary depending on planned utilization, signalling speeds, access and carrier charges, and the number of peripheral sites. Yearly transmission charges for the use of a teleradiology network are estimated to be an additional 30 per cent over the hardware costs. To illustrate the relationship between transport bandwidth, transmission time and cost, consider that a set of four x-rays takes 78 minutes [to transmit] over ordinary (56 kilobits per second) lines, whereas on a high capacity (T3) line, the same images would be transmitted within six seconds, but at nearly 40 times the cost. The mechanisms by which hospitals can invest and be reimbursed for this type of network capability needs to be more fully explored.

- The Computer-based Patient Record - An Essential Technology for Health Care, Institute of Medicine, Washington, DC.

2. The Use and Ownership of Patient Information is Not Clearly Established

There is no consensus on the acceptable use of patient information beyond the use for treatment of a particular patient. Outside this, there are considerable concerns relating to privacy and misuse issues, about releasing patient information to other physicians, insurance companies, employers, lawyers, and drug companies. For example:

- Patients will not want details of their health and treatments made publicly available in such a way that the patient can be identified. Some patients may not even want any further disclosure of information beyond what is necessary for reimbursement purposes. Patients will also be particularly concerned about whether access to their records by insurance companies and by employers prejudices their continuing insurance coverage and their continuing employment.

- Physicians will be concerned about the information being used to audit their performance, to make unfavorable comparisons with the performance of other physicians, and to aid malpractice suits.

Moreover, if patient information is to be distributed more widely than at present and a monetary value is to be placed on it, then some determination needs to be made about whose permission needs to be sought. "Ownership" appears to be split among at least three parties:

- The information relates to the patient and so his/her permission needs to be sought. In some countries, for instance, the Netherlands patient data is owned by the patient.
- Physicians collect the information and add value to it, so their permission needs to be sought. In New Jersey, the physician is deemed to own the data.
- The insurance companies directly pay for patient treatment and indirectly pay for patient data collection and analysis, so they too have some claim on the ownership and use of the patient data.

In Europe, with its well-developed privacy laws, the situation is already more formalized than in the United States, with access to patient data carefully controlled.

What data can and will be made available to the public?

Koseisho (The Ministry of Health and Welfare) has been very protective of the information it has gathered. For bureaucrats, to control information is to control power. If information continues to be kept secret from health care researchers, a patient record database cannot be fully utilized.

The Japan Medical Association (JMA) is even more conservative concerning releasing information to the public. The doctor-patient relationship has traditionally been like a "God-Mortal" relationship. Notions such as peer-review and informed consent, have not yet been fully introduced to Japanese medicine. Releasing information could not only embarrass certain doctors, but also give "business opportunities" to other professionals.

- Aki Yoshikawa and Koichi Ishikawa, Diebold Institute Working Paper #10

3. Liability Exposure for Information Providers may be Significant

In the United States, liability concerns strongly influence the behavior of health care providers, leading in some cases to conservative treatment procedures and to an excessive number of diagnostic procedures. As physicians come to rely more on computerized information, the issue of liability relating to the use of information, becomes important both for the physician and the information provider. The main liability concerns are information errors, the spreading of liability, the visibility of the use of information, and using information technology to replace traditional methods of working.

Information errors range from simple data errors, to complex system faults which are difficult to identify. Examples of the latter include, program errors (for example, in drug interaction software) leading to incorrect interpretation of patient data, and erroneous treatment assessment analysis arising from an analysis of a biased sample of patients.

The spreading of liability arises because an information-based infrastructure draws information from several sources. For example, a comprehensive patient record will be built up from many encounters with the health care system with several physicians. A treatment assessment system will be built up from treatment results from many health care facilities.

Computer-based systems require a formal approach to the accessing and analysis of information. This together with the availability of audit trails, which can identify what and when data are accessed, makes the use of computerized information highly visible.

Using information technology to replace traditional methods of working can introduce liability concerns. For example, x-ray images have traditionally been captured on film. Currently there are a number of experiments being carried out which capture x-ray images in digital format, for transmitting across telecommunications networks and viewing on computer terminal screens at the remote end. There are concerns that the use of digital images might lead to errors which could have been avoided had films been used.

The above liability concerns relating to the use of information are incompletely understood, and until procedures are put in place to reduce or even eliminate these concerns, information providers will be wary about competing in health care in areas related to patient care.

4. Information Standards Are Insufficiently Developed

If health care information is to be more widely shared for treatment, outcome analysis and administration purposes, then standard approaches to patient record formats, treatment descriptors, outcome descriptors, vocabulary definitions, administrative documents, etc. are necessary.

The importance of standards is widely recognized, and as a result there are many groups working on their development. Examples of a number of U.S. initiatives include:

- Among several competing standards, the one that is likely to become the most comprehensive standard for patient computer records is Medix, currently being developed by the IEEE (Institute of Electrical and Electronic Engineers). Practical applications of this standard are, however, still some way off.
- With regard to existing standardized vocabulary definitions, there is no single vocabulary with adequate coverage of all aspects of health care. There are, however a number of promising developments - a new edition of SNOMED (the College of American Pathologists' Systemized Nomenclature of Medicine), the emergence of the Read Clinical Classification in the United Kingdom, the U.S. National Library of Medicine's Unified Medical Language System (UMLS) project.
- The InterStudy group in Montana, in collaboration with a number of other groups has developed standard ways of describing patients clinically, demographically, by type of lifestyle (smoker/non-smoker, amount of exercise, etc.), and by treatment outcomes, including quality of life. Minimum data sets for sixteen different conditions ranging from cataracts to depression are now in use (see Working Paper #8).
- In November 1991, at a forum on administrative health care costs, convened by Dr Louis Sullivan, Secretary of the U.S. Department of Health and Human Services, and attended by representatives of insurance companies, government, providers and business, it was agreed to use ANSI (American National Standards Institute) standards for communication. A working group was also established to develop common standards, formats and usage protocols for a variety of administration functions.

The overall picture is one of considerable effort. Nevertheless, many standards are lacking or incomplete. Many groups are working in isolation. No single group is responsible for taking an overall view of information standards in health care, with the result that there is no established set of priorities or certainty that the development of crucial standards are being overlooked or underfunded.

Without the implementation of information standards in the health system, the ability to interchange information will be significantly impaired and the benefits of an information-intensive health care infrastructure reduced. Moreover, in some instances information technology suppliers will be reluctant to develop products if the appropriate standards are not in place.

5. The Economic Case for Stage II Interconnectivity Has Not Yet Been Made

We have some understanding of the benefits which have been achieved through the application of information technology to administrative procedures, for example, the Connecticut ProMed application referred to earlier. However, we do not know the degree to which the greater use of computerized information and, in particular, whether the interconnection of sites where health care is provided, will deliver benefits in terms of improved care and cost reductions.

Of the various services which can be provided, we do not know which ones will produce the greater part of the benefits. Nor do we know what role the "smart" card containing patient information will play, or whether the electronic interconnection of the patient to the health care infrastructure will be beneficial.

Even if the beneficial aspects of the information-based infrastructure were known, further uncertainty surrounds how these benefits are to be funded. We do not yet know which sets of functionality (comprehensive patient record, treatment assessment system, remote care in the home, etc.) the various players involved (insurance companies, government, physicians, patients, etc.) will be prepared to pay for.

In summary, the economic case for interconnectivity has yet to be made. We anticipate that the evolution of interconnectivity within the health care infrastructure will parallel other societal infrastructures (see Figure 17, page 81). However, without a comprehensive and formal economic quantification neither the health care providers nor software and service providers will aggressively make the investments necessary to develop and install the appropriate systems, and the essential step of making information a reimbursable cost will have to be made on faith rather than hard facts.

E. CURRENT PUBLIC POLICY INITIATIVES - THE UNITED STATES LEADING IN THE DEPLOYMENT OF SYSTEMS

In health care, pressures on resources in Japan and Europe (fueled by rising expectations and the increased demands of an ageing population) and the impact of market forces in the United States, have forced health care providers to improve productivity, in many cases through the use of information technology. These market pressures have been the most important stimulant to the introduction of information technology to health care, significantly more important than supplier subsidies. Market pressures have had the most pronounced effect in the United States - a country where supplier subsidies are much less prevalent than in Japan or Europe. As a result of these market pressures, the United States leads in the deployment of information technology systems in health care.

The United States leads in the quantity of applications rather than scope of applications. In all three regions, information technology has been used to support stand-alone functions like invoice preparation. The linking of these systems, thereby creating true information-based infrastructures, has hardly begun.

More details about US/Japan/EC comparisons are given in Appendix III.

F. THE SOLUTIONS

A major obstacle in the United States to the implementation of an information-based health care infrastructure is the lack of explicit monetary value placed on health information. If health care information were regularly charged for and reimbursable under insurance coverage then we believe there would be any number of private sector systems available to supply added value, for example, to indicate procedures that are not appropriate, that are not successful, that have a low outcome of success, etc. Such information would help to identify the most appropriate type of care and to eliminate much wasted effort. The potential value-added chain is illustrated in Figure 18, page 83.

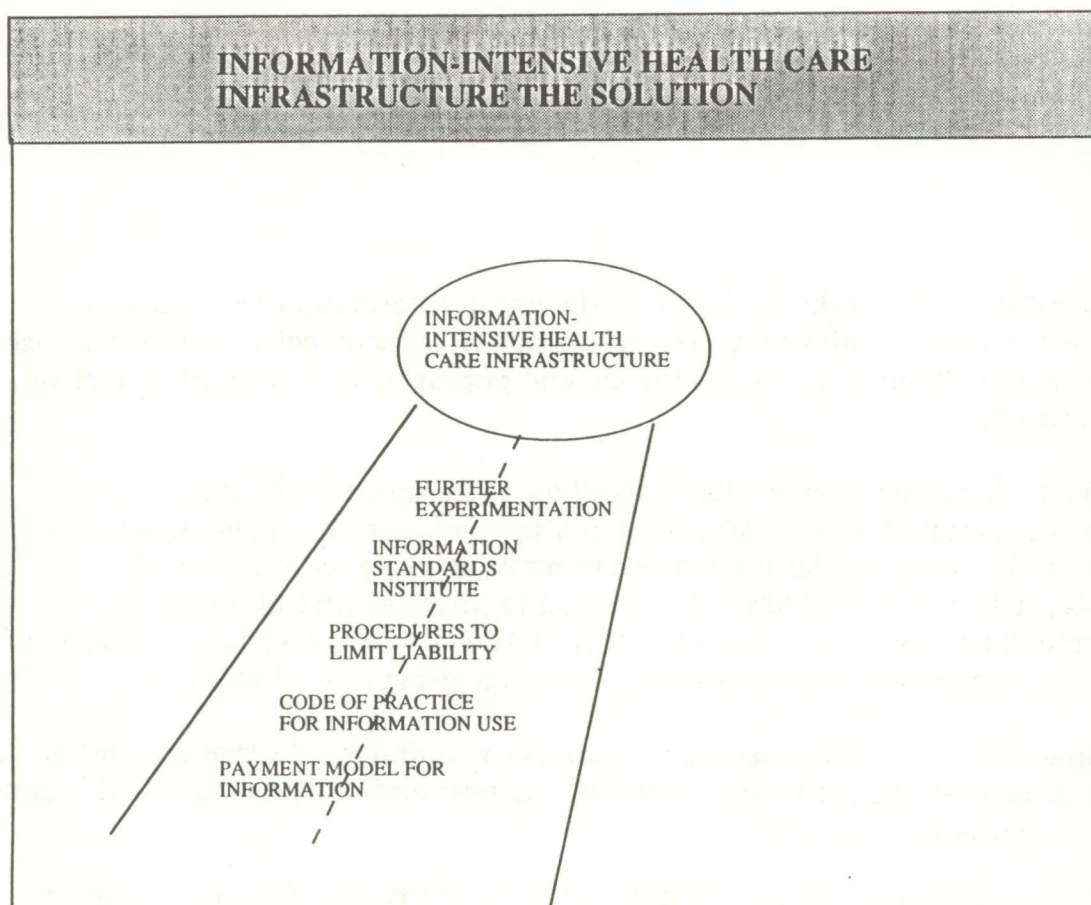
In order to facilitate this process **we recommend that serious consideration should be given to the development of a payment model for health care information be developed. This model should identify the information activities which are reimbursable and those which are not reimbursable, but for which a fee could be charged.** Once accepted this model should be implemented by the key players -- the providers, the major insurers including the Federal Government and pharmaceutical companies. We are in the process of outlining a model for discussions with interested parties.

Other preliminary recommendations (see Figure 16), are that:

- **A code of practice for handling patient information be established to minimize the privacy, misuse and ownership concerns about patient information.**
- **Procedures for handling and analyzing patient information be established in order to limit tort liability.**
- **An institution be identified to accelerate the development of information standards in health care.**
- **Further experimentation, funded by the Federal Government, be carried out to help develop a case for the creation of information-based health care infrastructures.**

We believe that when the program of work encompassed by these recommendations is carried out, the health care system will be able to exploit an information-intensive infrastructure, and the private sector will have the confidence to invest and develop the required systems. We are currently developing our recommendations in more detail prior to seeking their implementation.

FIGURE 16



1. Payment Models for Health Care Information

In order to encourage the greater use of information in health care by individuals, physicians and insurers, a payment model needs to be created to encompass the collection, storage, processing and exchange of patient information.

This model should identify in detail the information activities which are reimbursable and those which are not reimbursable, but for which a fee could be charged. These will include:

Activities related to patient records:

- The initial establishment of a computerized patient record.
- The amendment of the patient record following a consultation, the completion of diagnostic tests, during treatment, and at the end of a course of treatment.
- The building up of a complete historical patient record by transferring patient information from other physicians, clinics, hospitals, etc. here, the suppliers of the information will also need to be reimbursed.

FIGURE 17

STAGES OF DEVELOPMENT OF SOCIETAL INFRASTRUCTURE

This diagram shows the evolution of the use of information technology with respect to societal infrastructure. A distinction is made between business use of information technology, use by the general populace, and use within societal infrastructure.

The telephone has been available to all for some time but the direct interconnection of businesses, computer to computer, is a phenomena of the 1980's. We see a similar interconnection taking place within societal infrastructure in the 1990's. In addition to physical sites and people, interconnectivity within societal infrastructure also involves large numbers of sensors and devices often dispersed over large geographical areas.

Beyond the year 2000, these three networks will undergo further integration so that ultimately the distinction between business and infrastructure will become less important.

Stages of Development of Societal Infrastructure

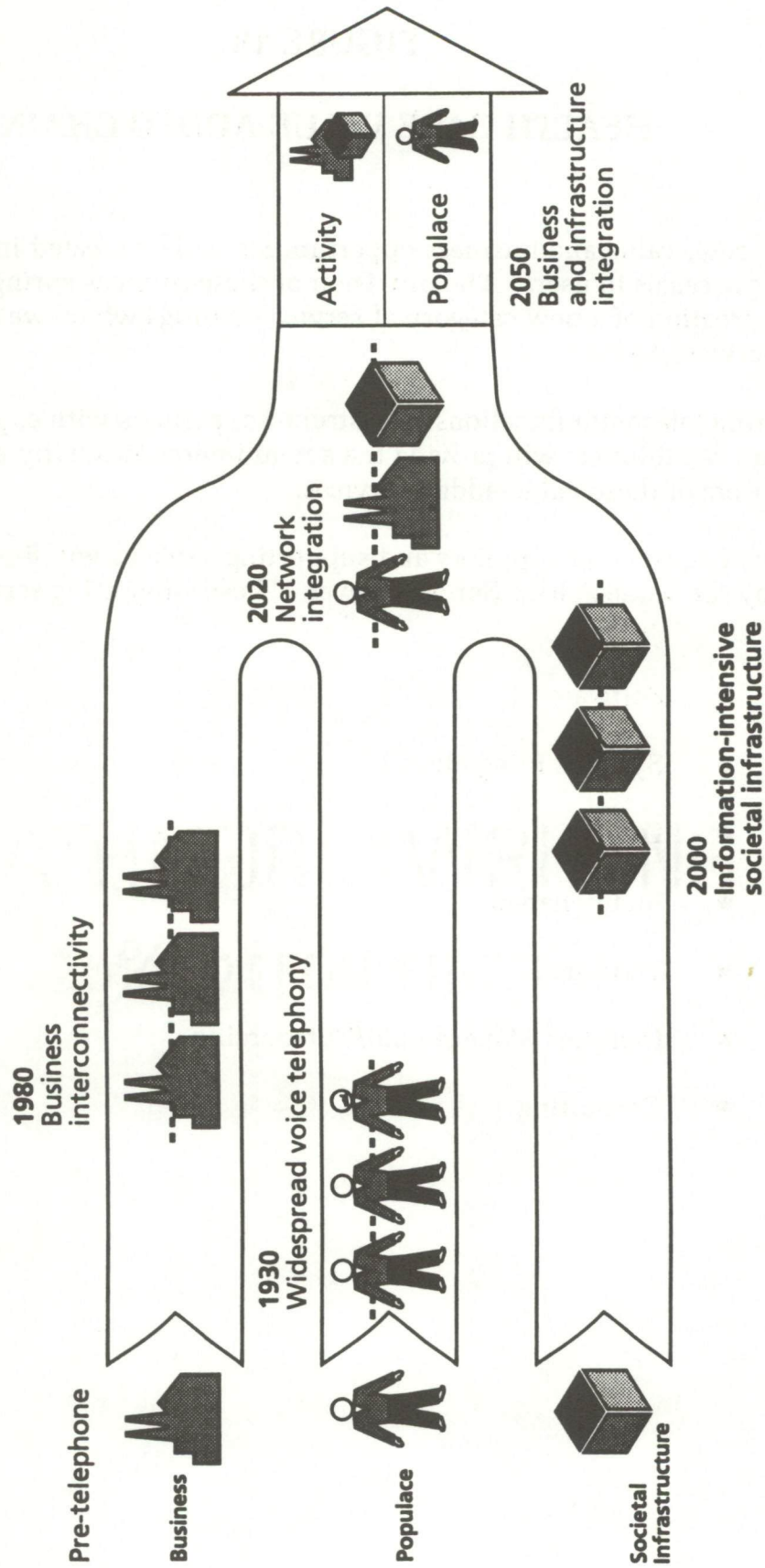


FIGURE 18

HEALTH CARE VALUE-ADDED CHAIN

In health care, value and business opportunities will be created in the process of providing services to users. The provision of these services springs most directly from the creation of a new category of service offerings which we call the "Value-Added Services Layer."

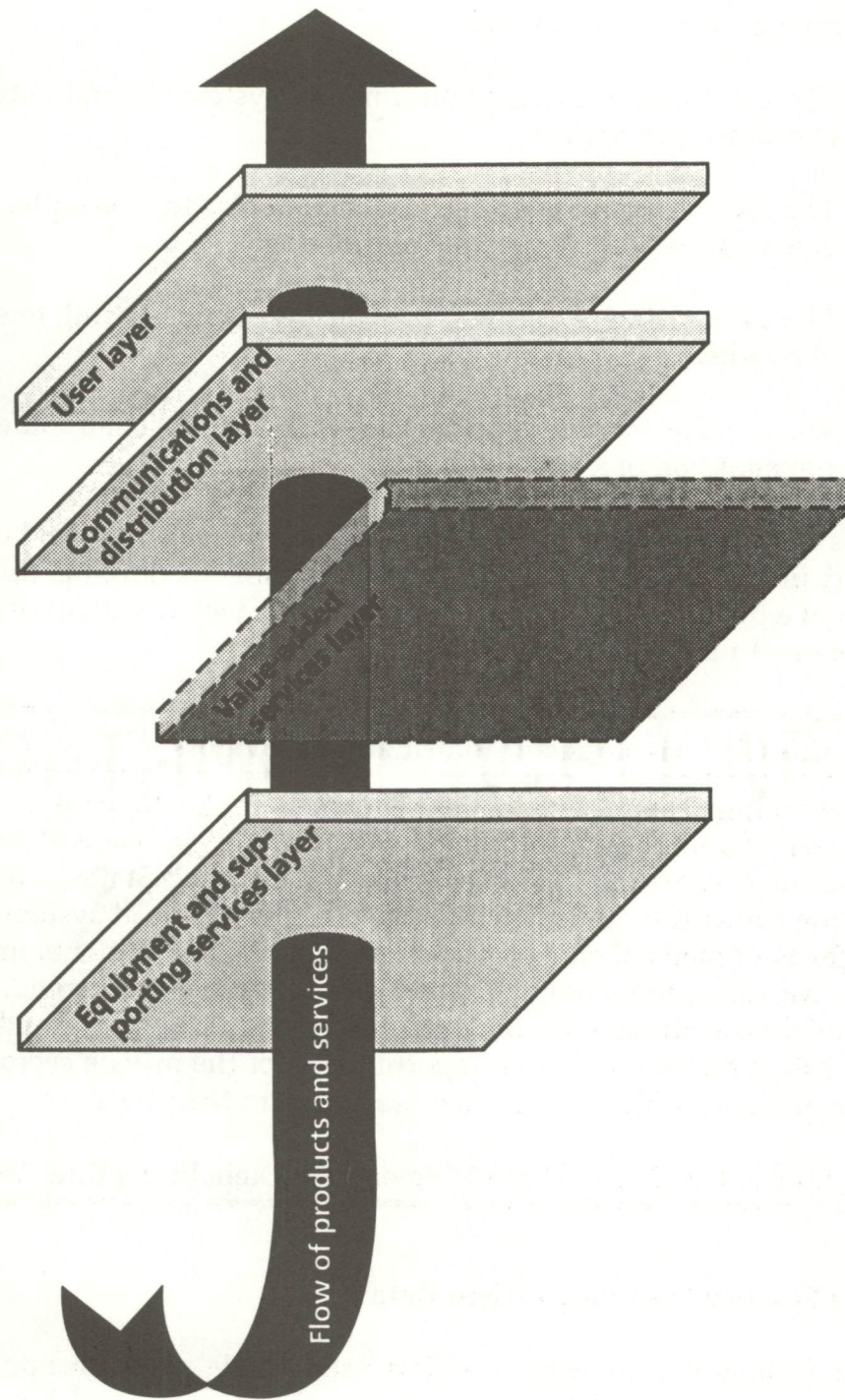
The existing telecommunications infrastructure, perhaps with expanded broadband capabilities, will provide the actual interconnectivity among the various users of these value-added services.

A variety of equipment suppliers and supporting services will find a new market created by the Value-Added Services Layer. These supporting services might include:

- Software
- Systems Integration
- Leasing
- Maintenance
- Training
- Facilities Management/Outsourcing
- Consulting

Competitive
Infrastructures for
Tomorrow

Health Care Value-Added Chain



The Diebold Institute for Public Policy Studies, Inc.

- The transfer of summaries of patient information to interested parties, for example, the patient, or third party organizations who will consolidate similar information from several sources and provide value-added information services.

Other information handling activities:

- The accessing of external information systems by patients, physicians and insurance companies.
- The use of computer-aided decision tools (for example, drug interaction analyses) to analyze patient information.
- The monitoring of patients in their own homes using telecommunications networks.
- The use of telecommunications networks for physician conferencing, the transmission of x-rays, etc.

The details of this model and a set of indicative fee levels need to be worked out, and then tested in pilot locations. It will be important to develop this model in close collaboration with physicians and insurers in order to generate commitment to the results of the developed model.

Opportunities for private sector information providers

The market failure that has characterized American health care, is to a great extent, due to a lack of appropriate information. Assuming that we will continue to have a market oriented approach to medical care in the United States, a better medical information infrastructure is needed. Specifically, we need systematic information on the effects of medical care on patients - in terms that patients understand. In addition, we need public policy that requires organizations providing medical care to be publicly accountable for the outcomes of the care they provide. These changes will spawn a number of opportunities for the private sector as well as providing patients with care that is more suited to their needs.

- Paul Ellwood, MD, and Harry Wetzler, MD, Diebold Institute Working Paper #8

2. Code of Practice For Using Patient Data

If patient information is to be more widely used a code of practice on the use of patient data needs to be developed to minimize the privacy, misuse and ownership concerns about patient information. This code of practice needs to cover:

- The generic types of data that can be released to other physicians for treatment purposes, to third party information companies for the provision of medical information services, to insurance companies for reimbursement purposes, and to employers for general information purposes. Figure 19, page 86, illustrates a possible set of access rights for hospital data.

A functional definition of patient privacy is needed

Consequences of disclosure of medical information can range from embarrassment, loss of self-esteem, financial loss, loss of employment, divorce or even the triggering of homicidal or suicidal impulses. "The goal of individuals in the area of information privacy is to preserve themselves from real or perceived adverse consequences of data becoming known."Based on experience in other areas, if the health care industry does not show adequate concern for patient privacy, legislation will be adopted that could produce very negative results. One solution is to recognize a functional definition of privacy and create representative consensus committees to articulate standards for privacy.

- Professor Vincent Brannigan, University of Maryland, "Privacy in the 1990s":
A national conference examining privacy issues,
held in 1990 and sponsored by the National Consumers League,
in cooperation with the U.S. Office of Consumer Affairs.

- The identification of who is required to authorize the release of the various types of information, and how this is to be achieved.
- The independent certification of the implementation of the code of practice, and how such certification should be carried out.

In developing this code of practice, it will be useful to draw on relevant experiences from Europe where formal procedures for handling patient information are already well-developed.

3. Procedures to Limit Liability

In order to reduce or even eliminate liability with regard to information handling by physicians and information providers, certain good practice procedures should be established. However, since liability cannot be completely eliminated, these procedures should be augmented by making provision for liability cases.

Good practice procedures seek to establish formal methods for handling and checking the quality of the data in order to minimize the effect of errors. Examples of such procedures include:

- Codes of practice for inputting, storing and transmitting patient data, including error checking systems.
- The establishment by the American Medical Association (AMA) of panels of medical practitioners to certify the quality of expert system software. A set of guidelines for such certification needs to be created.

FIGURE 19

ACCESS RIGHTS TO HOSPITAL DATA

User	Access to data category					
	Personal data	Social data	Clinical data	Health risk	Finan data	Statistical data
Physician	+	+	+	+	+	+
Head Nurse	+	(+)	(+)	(+)	+	+
Nurse	+	+	+	+	-	-
Physio-therapist	+	-	-	+	-	-
Secretary	+	+	+	+	-	-
Hospital manager	-	-	-	-	+	+
Admin personnel	+	+	-	-	+	+
EDP staff	(+)	-	-	-	+	+
	+ = unrestricted access (+) = restricted access - = no access					
	Source: Gerd Griesser, "Data Protection in Hospital Information Systems: 1. Definition and Overview", Implementing Health Care Systems.					

- For treatment assessment systems, standards (for each treatment condition) for data definition and presentation need to be established; assessment factors (for example, months without recurrence of the original condition, quality of life) need to be defined; and tests conducted to identify bias in samples of patients.

Since liability cannot be completely eradicated, a proportion of the information fees should be set aside to insure against liability, perhaps on an industry self-insurance basis. Part of these funds should be used to establish a team of legal experts to research liability issues and to handle liability cases for information companies.

Computer programs need evaluating

Pressure from legislative bodies, insurers, peer-review organizations, hospitals and physicians, and patients may lead to increasing use of automated review of patient records. As such technology is put in place, we must remember that computer systems are based on models, and that the models are limited in what they contain....Program writers may choose not to model certain aspects of medical care, and [not] to inform users of these limitations in the programs. Before any computer-based decision-support system is released, a formal evaluation with real patient data must be done so that the limitations of the system will be discovered.

- Prof Jan van Bemmelen, Diebold Institute Working Paper #9.

4. An Institution Is Needed To Accelerate the Development of Information Standards

Considerable effort has already been devoted to the development of information standards for the health care system, yet many crucial standards are still lacking. The work to date has been carried out in a fragmented way. There is much overlapping work. There is no single authority responsible for setting priorities or identifying important areas which are being neglected. We are, therefore, recommending the establishment of a health information standards institution to provide focus to and speed up the development of information standards in health care. This institution may be specially created or perhaps, more appropriately, be a part of an existing health care or standards organization.

The health information standards institution would be a public-private venture, funded by the major players in the health care industry - providers of health care, government, insurance companies, and suppliers of information systems. Its role would be to:

- Identify priorities and timescales through consultation with interested parties, for the development of health care information standards.
- Ensure that sufficient resources are available to meet the agreed timescales, and where necessary, arrange for extra funding and development.
- Review existing standards to determine whether they need updating following, for example, changes in medical knowledge or practice, and to instigate the appropriate changes.

A variety of standards must be developed

...a variety of standards must be developed, tested, and implemented before the CPR (computer-based patient record) can realize its full potential at both the macro (eg, epidemiological) and micro (eg, physician office) levels. Standards to facilitate the exchange of health care data are needed so that clinical data may be transmitted on networks or aggregated and analyzed to support improved decision making. Standards are also needed for the development of more secure systems. This effort should focus on ensuring the integrity of the clinical data in the CPR and protecting its confidentiality. It is crucial that confidentiality be maintained in CPR systems not only for the patient but also for health care professionals.

- The Computer-based Patient Record, An Essential Technology for Health Care,
Institute of Medicine, Washington, DC

5. Federal Funding of Further Experimentation in Stage II Interconnectivity is Required

Further experimentation should be carried out to help develop the economic case for increasing the information intensity of the health care infrastructure with emphasis on Stage II interconnectivity. There are already a number of relevant experimental projects, some examples of which are given earlier in this section. To build on what has already been achieved we believe that:

- A clearing house should be established to analyze the benefits of existing projects and to publicize the findings. For each project, the clearing house should seek to quantify the improvement in health care and the costs savings achieved and to identify the problems (and associated solutions) with introducing new technology, the opportunities for improving the information-based infrastructure and the opportunities for commercial information applications.
- A number of projects should be federally funded focusing on identifying the benefits of treatment assessment databases (initially for a limited number of important conditions) and health maintenance and education databases. We believe that these two applications hold considerable promise and are insufficiently represented among the existing projects.

Our understanding of the benefits is poor

Although increasing numbers of Dutch general practitioners are replacing paper-based medical records with computer-based records, little as yet is known about the influence of this trend on the quality and cost of health care. Research in coming years will have to evaluate changes in health care precipitated by the large-scale introduction of information technology in primary care.

- Prof Jan van Bemmell, Diebold Institute Working Paper #9.

6. Possibilities of U.S. - European Collaboration.

Despite the differences in the way the United States and Europe organize health care, most of the above areas would benefit from transatlantic collaboration. Even the work aimed at developing procedures for handling and analyzing patient information to limit liability in the United States, would be accepted in Europe as good practice procedures for handling health care information.

The areas we believe that would benefit most from transatlantic collaboration are:

- Developing the cost-benefit case for the creation of information-intensive health care infrastructures. On both sides of the Atlantic, this is key to the successful deployment of such information-intensive infrastructures.
- Development of health information standards. Standard setting is a slow process and building on existing work and experience is an important way to speed up the standard setting procedures.
- Codes of practice for handling information to minimize privacy, misuse and ownership concerns. Europe is already ahead in this area, so there are considerable opportunities for the United States to learn from European experiences.

APPENDIX I - LIST OF WORKING PAPERS

Throughout the project, we have sought the advice of many international experts on societal infrastructures. A number of working papers have been prepared by these experts. A full list of working papers is given below.

Working Paper #1

Base Paper on the current status of the IV/HS field
The Diebold Institute for Public Policy Studies, Inc.

Working Paper #2

Base Paper on the current status of the Health Care field
The Diebold Institute for Public Policy Studies, Inc.

Working Paper #3

Specifications for paper writers - IV/HS 1991
The Diebold Institute Public Policy Studies, Inc.

Working Paper #4

Specifications for paper writers - Health Care 1991
The Diebold Institute Public Policy Studies, Inc.

Working Paper #5

IV/HS Policy Analysis - United States
Prof. Robert D. Ervin
Head, Engineering Research Division
University of Michigan
Transportation Research Institute
Ann Arbor, Michigan

Working Paper #6

IV/HS Policy Analysis - Europe
Prof. Kan Chen
Co-Director, IV/HS Program
University of Michigan
Ann Arbor, Michigan

Working Paper #6a

IV/HS Policy Analysis - Europe
Willy Maes
Drive Central Office
Commission of the European Communities, DG XIII-F/5

Working Paper #7

IV/HS Policy Analysis - Japan
Hironao Kawashima
Keio University
Yokohama

Haruki Fujii
JSK (Assoc. of Electronic Technology for Automobile Traffic and Driving)
Tokyo

APPENDIX I - LIST OF WORKING PAPERS (continued)

Working Paper #8

Health Care Infrastructure Policy Analysis - United States

Dr. Paul M. Ellwood and Dr. Harry P. Wetzler

InterStudy

Excelsior, Montana

Working Paper #9

Health Care Infrastructure Policy Analysis - Europe

Prof. Jan H. Van Bommel

Erasmus Universiteit Rotterdam

Department of Medical Informatics

Rotterdam, Holland

Working Paper #10

Health Care Infrastructure Policy Analysis - Japan

Prof. Akihiro Yoshikawa

Comparative Health Care Policy Research Project

Northeast Asia-U.S. Forum on International Policy

Stanford University

Koichi B. Ishikawa

Hospital Computer Center

University of Tokyo

Working Paper #11

Summary of Information Infrastructure Issues

The Diebold Institute for Public Policy Studies, Inc.

Working Paper #12

Infrastructures for the 21st Century - A Report of Progress

The Diebold Institute for Public Policy Studies, Inc.

Working Paper #13

Presentation to the Council on Foreign Relations, February 27, 1992

The Diebold Institute for Public Policy Studies, Inc.

Working Paper #14

Presentation (on the health care work) to the New York Academy of Sciences,
March 11, 1992

The Diebold Institute for Public Policy Studies, Inc.

Working Paper #15

Presentation to the Centre For European Policy Studies, Brussels, Belgium, June 22,
1992

The Diebold Institute for Public Policy Studies, Inc.

APPENDIX II - INFORMATION-BASED INFRASTRUCTURE WORKSHOP IN WASHINGTON, DC

The project held a high-level, two-day workshop in Washington, D.C. in late January 1992. This workshop reviewed all the work to date and provided important feedback to help us plan the next steps. The main issues discussed at the workshop have been incorporated into the main body of this report.

The program for the workshop is given below.

January 20

Hay Adams Hotel 800 16th Street, N.W.

Introductory Comments

Goals of the Meeting

John Diebold

INTELLIGENT VEHICLE/HIGHWAY SYSTEMS (IV/HS)

2:00 - 2:45

IV/HS Policy in the United States

Prof. Robert D. Ervin

Head, Engineering Research Division

University of Michigan

Transportation Research Institute

Ann Arbor, Michigan

2:45 - 3:15

Discussion of the Policy Issues Surrounding the Development
of an IV/HS Infrastructure

Matthew Edelman

General Manager

Transcom

Jersey City, New Jersey

Linda Spock

Manager of Electronic Toll Collection for the Port

Authority of New York & New

Jersey

3:30 - 4:15

IV/HS Policy in Europe

Prof. Kan Chen

Co-Director, IV/HS Program

University of Michigan

Ann Arbor, Michigan

4:15 - 4:45

IV/HS Policy in Japan

Prof. Robert D. Ervin

Head, Engineering Research Division

University of Michigan

Transportation Research Institute

Ann Arbor, Michigan

4:45 - 5:15

Models of Public-Private Sector Relationships for IV/HS
Deployment

Stephen Lockwood
Associate Administrator for Policy
Federal Highway Administration
U.S. Department of Transportation
Washington, D.C.

Rapporteur for IV/HS Session

William Greenspan
The Diebold Institute for Public Policy Studies, Inc.

6:30

Several senior Washington-based policy figures joined the workshop for a general discussion of issues relating to the development of information-based infrastructures

January 21

Metropolitan Club 1700 H Street, N.W.

HEALTH CARE INFRASTRUCTURES

9:00 - 9:45

Health Care Infrastructure Policy in the United States

Dr. Paul M. Ellwood
Chairman of the Board
InterStudy
Excelsior, Montana

9:45 - 10:30

Health Care Infrastructure Policy in Europe

Prof. Jan H. Van Bommel
Erasmus Universiteit Rotterdam
Department of Medical Informatics
Rotterdam, Holland

10:45 - 11:30

Health Care Infrastructure Policy in Japan

Prof. Akihiro Yoshikawa
Comparative Health Care Policy Research
Project
Northeast Asia-U.S. Forum on
International Policy
Stanford University

11:30 - 12:30

A group presentation by: IBM and Western New York Health Sciences Consortium to discuss public-private initiatives in health care development and some of the obstacles in creating a community-wide and nationwide health care information network

Gary Johnson

Manager of Strategic Planning, Health Industry
IBM Corporation

Dr. Thomas Riemenschneider

Director of Western New York Care Consortium &
Associate Dean of Medical Affairs at State University of
New York/School of Medicine

2:00 - 3:00

Rapporteur for Health Care Session

Dr. Philip Aspden

The Diebold Institute for Public Policy Studies, Inc.

Review of plans for next stage of work aimed at creating the conditions conducive to encouragement of IV/HS and health care information-based infrastructures in the U.S.

Review of steps leading to an Agenda for Action

Possible policy recommendations for
IV/HS and health care infrastructures

APPENDIX III - COMPARISON OF US/JAPAN/EC PUBLIC POLICY INITIATIVES

Public policy towards the application of information technology within societal infrastructure has mostly been approached from a supplier subsidy standpoint. This is more pronounced in some countries than others. There is virtual unanimity of agreement that government should support basic research but beyond this, there is considerable divergence, with Europe and Japan heavily subsidizing the development of information technology, and with the United States adopting a much more fragmented and less committed approach.

Supplier subsidies have only had slight impact. In highway transportation, it was one of a number factors in Japan taking the lead in the deployment of information technology systems. In health care, pressures on resources and the consequent need to improve productivity, have been the most important stimulant to the introduction of information technology, and have been significantly more important than supplier subsidies.

A. INTELLIGENT VEHICLES/HIGHWAYS SYSTEMS (IV/HS) - JAPAN LEADING IN THE DEPLOYMENT OF SYSTEMS

Japan has achieved a significant lead over both the United States and the European Community in the deployment of IV/HS. The European Community may have a slight lead in research over the United States. No region has technological leadership.

Japan has achieved its leadership position through:

- Its ability to make public-private partnership work successfully to develop new products. Two central government bodies, the Ministry of Construction and the National Police Agency, are empowered with the resources and the authority to define and implement IV/HS policy throughout Japan. Local authorities, unlike their counterparts in the United States and Europe, have a subsidiary role to play.
- Special characteristics of highway transportation in Japan, where there are particularly pressing congestion problems, where concern over highway fatalities is a major political issue, and where the highway network is regarded as an important national asset (because of the shortage of land, particularly in urban areas) which must be actively managed.

The specific areas of leadership are traveler information systems (where, for example, over a 250,000 in-vehicle autonomous navigation system have been sold), highway communications infrastructure (where a major network of acoustic detectors exists for traffic surveillance, and modern two-way communications systems are in planning), and active safety measures.

Europe's slight lead over the United States in IV/HS research arises out of two pre-competitive consortia-based initiatives, PROMETHEUS and Drive:

- PROMETHEUS, a private sector initiative, launched in 1986 by a dozen European car companies, has focused on in-vehicle systems.
- Drive, a public sector initiative, established in 1989 by a number of European governments, has focused on the communications infrastructure side of IV/HS.

Europe's ability to build on its achievements to date is inhibited by the fragmentation of its market. Each national market has its own special requirements and its own group of suppliers for IV/HS systems. The European trucking industry, a major market for IV/HS, is particularly fragmented. Each country has its own trucking industry and its own set of regulations. Moreover, trucking industries in many countries consist of a large number of companies, most too small to invest in sophisticated IV/HS systems.

Following curtailment of federally funded research in the 1970s and 1980s, the U.S. Department of Transportation and Congress recognized the importance of IV/HS. Interest has been revived through Mobility 2000, an ad hoc association of individuals and organizations interested in IVHS, and its governmentally-authorized successor, IVHS America (Intelligent Vehicle Highway Society of America), which is now the focal point for the development of IV/HS in the United States. This latter program has built on the lessons of the two European programs. IVHS America has emphasized in-vehicle information technology and consortia-based projects. On the other hand, the United States has avoided the coordination problems between the private sector PROMETHEUS program and the public sector Drive program, by having a single coordination organization. Most recently the ISTEA highways act has made an increased level of funding available for IV/HS experimentation.

A particular strength of the United States is the number of large nationwide trucking companies which contrasts with the fragmentation of the trucking industries in Japan and Europe.

B. INFORMATION-BASED HEALTH CARE INFRASTRUCTURES - THE UNITED STATES LEADING IN THE DEPLOYMENT OF SYSTEMS

In health care, pressures on resources in Japan and Europe (fueled by rising expectations and the increased demands of an ageing population) and the impact of market forces in the United States, have forced health care providers to improve productivity, in many cases through the use of information technology. These market pressures have been the most important stimulant to the introduction of information technology to health care, significantly more important than supplier subsidies. They have had the most pronounced effect in the United States - a country where supplier subsidies are much less prevalent than in Japan or Europe. As a result, the United States leads in the deployment of information technology systems in health care.

The United States has achieved a lead over both Japan and the European Community in the deployment of information technology within individual institutions but the interconnection of these individual institutions to function as an infrastructure is embryonic in all three regions. No region has technological leadership.

In considering the deployment of information technology, it is important to recognize that unlike highway transportation where in all three regions the highway infrastructure is almost completely owned and operated by the public sector, health care is operated very differently in the United States from Japan and the European Community.

In the United States, the delivery of health care is operated on a professional commercial basis, with only a minority of the funding from the public sector (Medicare and Medicaid). The public sector has only indirect control over prices and resources for the larger part of health care delivery. Insurers and large purchasers of insurance (employers) attempt to control costs but their attempts are not highly coordinated.

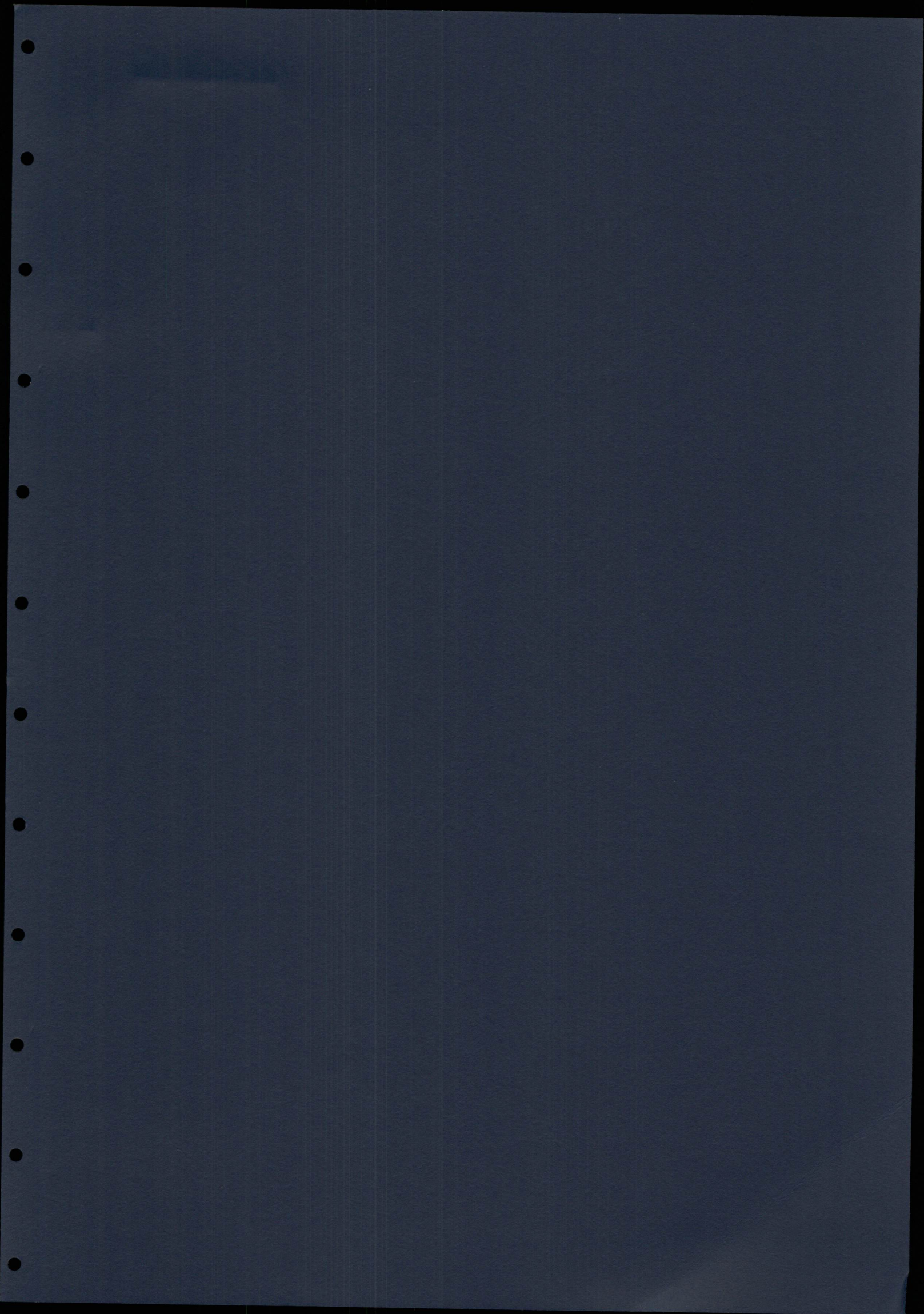
In Japan, the European Community and Canada, the situation is very different. There the public sector supplies most of the funds and because of this adopts a very interventionist approach often controlling the overall availability of resources, setting prices and generally setting standards. Partly because of this approach to funding, the overall cost of health care is not seen to be such a great problem as it is in the United States. Indeed in the United Kingdom there is considerable pressure from the public to spend more on health care.

Against this background, it is our view that the United States is in the lead in the implementation of information technology to health care because the system allows providers to adopt a commercial/entrepreneurial approach to the use of cost-saving technology in the delivery of health care. This has led, as in other commercial services and manufacturing industries, to the use of information technology to automate simple tasks such as invoice preparation. In addition, the general use of computers is higher in the United States than other regions, and we do not believe the health care sector is an exception to this general rule.

The United States' lead is in the quantity of implementations of information technology rather than the scope of implementation. In all three regions, information technology has been used to support stand-alone functions such as patient information or invoicing or drug inventory systems. The linking of these systems, thereby creating a true information-based infrastructure has hardly begun.

Japan and the European Community do have some strengths which the United States lacks:

- Central government has the authority to mandate new approaches.
- Moreover, it has the control of resources and hence the ability to channel funds into information technology applications.
- Thinking about privacy issues associated with the patient information is more advanced, particularly in the European Community.
- The private sector characteristics of the United States makes tort liability a more serious obstacle to increasing the viability of information technology in the care side as distinct from the administrative side of health care.



"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9202533

ORIGINATOR: 02

SPEECH: YES NO

FROM: SCHWITTERS, Roy F.: SUPERCONDUCTING SUPERCOLLIDER

DATE OF EVENT: 08/06/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: DALLAS, TEXAS

TIME OF EVENT:

SUBJECT: AN INVITATION TO DELIVER SOME REMARKS AT THE
INTERNATIONAL CONFERENCE ON HIGH ENERGY PHYSICS.

RSVP: 08/24/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES

NO *Conflict (PCAST by Erb)*

COPIES TO: Karl Erb

REMARKS: 7.22.92 — Regretted to Mary Pruitt!
mn

DATE OF LETTER: 07/16/92

DATE RECEIVED: 07/22/92

FILE: P-INVITATION-SPEECH

Superconducting
Super Collider

Office of the Director

RECEIVED

92 JUL 22 10:08

OSTP
MAIL ROOM

2550 Beckleymeade Avenue
Dallas, TX 75237-3997
214 708 1036

July 16, 1992

Dr. D. Allan Bromley
Science Advisor to the President
Old Executive Office Building, Room 360
17th & Pennsylvania Avenue, NW
Washington, D. C. 20506

Dear Allan:

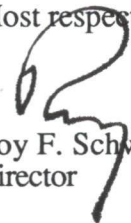
The understanding of the importance to the nation in investing in long-range basic research such as high energy physics that you and the President have demonstrated is greatly appreciated by those of us in the scientific community. Leadership by the administration is crucial in maintaining the worldwide scientific and technological preeminence of the United States. Nowhere is the proof of your unwavering commitment to the scientific health of the nation more evident than in the President's continuing support of the Superconducting Super Collider Laboratory.

It is my great pleasure to extend to you an invitation to join us at the XXVI International Conference on High Energy Physics that will take place in Dallas, Texas, this August. The 1992 meeting was originally scheduled to convene in Moscow, but in light of the great changes that have been occurring there, the Russians asked to be relieved of the responsibility. The amount of excitement that had already been generated by the Super Collider led the international conference committee to request that the 1992 meeting be held in Dallas with the SSC Laboratory acting as host. Some of the most important discoveries in physics were first announced at these meetings, and we anticipate an attendance of approximately 1200 physicists from the United States and 69 other countries.

On Thursday morning, August 6, 1992, the participants will gather in McFarlin Auditorium on the Southern Methodist University campus to be welcomed to the conference. We would be honored if you would agree to deliver some remarks at that time regarding the Superconducting Super Collider and the commitment of the United States to building a truly international laboratory.

Enclosed is the tentative program for your information. We hope that your schedule will allow your participation in this conference.

Most respectfully,


Roy F. Schwitters
Director

Enclosure: Mailing #2 with Conference Program



Bulletin No. 2

XXVI INTERNATIONAL CONFERENCE ON HIGH ENERGY PHYSICS

This is the Second Bulletin for The XXVI International Conference on High Energy Physics. The Conference will be held on the campus of Southern Methodist University in Dallas, Texas from 6 to 12 August 1992. This bulletin provides expanded information on the conference schedule, as well as detailed instructions for travelers. The Final Bulletin will be provided at registration.

If you have not already completed a registration form, another copy is provided with this bulletin. Please return this form, along with your payment, as soon as possible. The conference fee rate is US \$280 prior to 1 July 1992.

Tentative Schedule of Events

Date	Conference Program	Time	Scheduled Activities
Wed 5 Aug 92	Registration for pre-paid attendees	17.00 — 20.00	
Thu 6 Aug 92	General Registration Opening Session Parallel Sessions	07.00 — 09.00 09.00 — 10.30 11.00 — 18.00	Welcoming Reception*
Fri 7 Aug 92	Parallel Sessions	09.00 — 18.00	
Sat 8 Aug 92	Parallel Sessions	09.00 — 15.00	SSC Site Tour and An Evening in Ellis County*
Sun 9 Aug 92			A Day in Fort Worth — Cowboys and Culture
Mon 10 Aug 92	Plenary Sessions	09.00 — 18.00	Zukerman Concert*
Tue 11 Aug 92	Plenary Sessions	09.00 — 18.00	
Wed 12 Aug 92	Plenary Sessions	09.00 — 12.00	

**Sponsored activities are free of charge to conference participants.*

Optional activities for attendees and companions are described in the social program brochure accompanying this bulletin. An order form for additional tickets is enclosed.

Registration

To avoid having to queue on the morning of 6 August, attendees who have pre-paid the registration fee, may pick up registration materials between 17.00 – 20.00 on the evening of 5 August from hospitality suites located in their respective hotels. If staying on campus, materials may be picked up from the Secretariat in the Hughes-Trigg Center.

The hospitality suites will not be equipped to process payments. Other attendees may register in the Secretariat of the Hughes-Trigg Center on the morning of 6 August between 07.00 and 09.00 to pick up the conference materials and pay any outstanding fees prior to attendance at sessions. Conference badges will be required for admission to the sessions and sponsored social activities.

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*Deceased

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R. Stroynowski, SMU
V. Teplitz, SMU

Assisted by

C. Burns, Coordinator
K. Earley, Asst. Coordinator

Air Travel

The SSC Laboratory Travel Services department has negotiated special rates for this conference. The travel office may be contacted by phone at: (214) 708-1522 or (800) 852-1160, or by Fax at (214) 708-1585. The E-mail address is: TRAVELMAIL@sscvx1.ssc.gov. Please identify yourself as an attendee of ICHEP 92 when making reservations. Representatives from the travel office will be available during the conference to assist with ticket re-confirmation, post conference tours, and travel-related matters.

Airport Transfer

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The Hon. Tom Vandergriff

Visas

Please be sure that you acquire a valid visitor's stamp in your passport. It is recommended that you apply for a visa at least three months before beginning your travel to the United States.

Official Language

The official language of the conference is English.

General Information

Information kiosks will be located outside each main meeting area. Attendees will be able to check scheduled events and locate campus facilities.

Weather

Temperatures in August range from 74-95°F (24-35 °C), with moderate humidity. Dress in cool cottons, short sleeves, and comfortable walking shoes. Interiors of buildings and buses are heavily air conditioned. A light sweater is recommended for indoors.

Please address all correspondence to:

Catherine Burns
Conference Secretariat
SSC Laboratory MS-5555
2550 Beckleymeade Avenue
Dallas, TX 75237-3997

E-mail address:
xxviconf@ssc.vx1.ssc.gov

Tel: 214-708-1119
Fax: 214-708-4021
Telex: 49611634

Conference Services

Listed below are some of the general services available to conference attendees. More detailed information pertaining to these services along with locator maps and hours of operation will be provided in the Final Bulletin at registration.

Secretariat

General assistance is available from the Secretariat, located in the lower level of the Hughes-Trigg building. Booths for registration, information, ticket sales and cashiers will be staffed during regular conference hours. Message boards will be located in the Secretariat area. Information kiosks, payphones and self service copiers will be located in the vicinity of the conference activities.

Computing and Communications

Electronic mail and computing services will be available through the SMU Computing Department consisting of VM/CMS, Mac, DOS, VMS and UNIX platforms, including FORTRAN and C compilers, SAS, and various mathematical libraries. Software for word processing, spreadsheets, and graphics and CERNLIB will be available. All machines will be connected to the Internet for access to SMU and SSC computing services, or to other remote sites. Special e-mail addresses for each attendee will enable automatic routing of mail to home machines or to guest accounts provided by SMU. In most cases the address will be attendee@lchep.seas.smu.edu. More detailed information and instructions will be provided in the Final Bulletin.

Library

The conference library will be located adjacent to the exhibit area in the Secretariat. All contributed papers and speakers' transparencies will be on display. Photocopies of papers and transparencies will be available in sets at reasonable prices.

Publications Office

The editors of the proceedings will be available to accept papers in camera-ready form and to assist with questions related to the style and format required for the proceedings.

Exhibits

Exhibits will be located adjacent to the conference library and the Secretariat. Several publishers and computer companies will be represented. Special displays will also be on exhibit, and conference mementos will be available for purchase.

Travel Office

The SSC Travel Office will be located in the lobby area of the McFarlin Auditorium to assist attendees with ticket reconfirmation, post conference tours, and travel related matters.

SSC Users Collaboration Office

The SSC Users Collaboration Office will be located on the 3rd floor of the Hughes-Trigg building to provide limited secretarial assistance and to interface with the ICHEP 92 Secretariat for meeting or luncheon arrangements for the user collaborations held in conjunction with ICHEP 92.

Childrens Services

Several childcare options are available to attendees travelling with small children. ICHEP 92 provides a partial list for the convenience of our guests. It is suggested that arrangements be made prior to your arrival in the Dallas area, as many services are on a space-available basis:

AAA Babysitter Employment
3306 W. Walnut #308
Garland, TX 75042-0000
(214) 272-8556

Baby Sitters of Dallas, Inc.
PO Box 12534
Dallas, TX 75225-0000
(214) 692-1354

Cradle to Crayons
2020 N. Lamar #100
Dallas, TX 75202-0000
(214) 954-0100

Miscellaneous

Attendees will find an array of additional services and conveniences located on campus. These include: the campus bookstore, post office, variety/gift shops, The Market convenience store, and the Mane Course Food Court.

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T.D. Lee, USA
C. Llewellyn-Smith, UK
A. Logunov, Russia
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J. Peoples, USA
K.K. Phua, Singapore
B. Richter, USA
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The Hon. Lee Jackson
John R. Johnson
Jerry Junkins
Thomas W. Luce, III
Morton H. Meyerson
Joseph R. Musolino
Vin Prothro
Kenneth A. Pye
The Hon. Penelope Redington
Hugh Robinson
Annette Strauss
Liener Temerlin
The Hon. Tom Vandergriff

Visas

Please be sure that you acquire a valid visitor's stamp in your passport. It is recommended that you apply for a visa at least three months before beginning your travel to the United States.

Official Language

The official language of the conference is English.

General Information

Information kiosks will be located outside each main meeting area. Attendees will be able to check scheduled events and locate campus facilities.

Weather

Temperatures in August range from 74-95°F (24-35 °C), with moderate humidity. Dress in cool cottons, short sleeves, and comfortable walking shoes. Interiors of buildings and buses are heavily air conditioned. A light sweater is recommended for indoors.

Please address all correspondence to:

Catherine Burns
Conference Secretariat
SSC Laboratory MS-5555
2550 Beckleymeade Avenue
Dallas, TX 75237-3997

E-mail address:
xxviconf@ssc.vx1.ssc.gov

Tel: 214-708-1119
Fax: 214-708-4021
Telex: 49611634

Conference Services

Listed below are some of the general services available to conference attendees. More detailed information pertaining to these services along with locator maps and hours of operation will be provided in the Final Bulletin at registration.

Secretariat

General assistance is available from the Secretariat, located in the lower level of the Hughes-Trigg building. Booths for registration, information, ticket sales and cashiers will be staffed during regular conference hours. Message boards will be located in the Secretariat area. Information kiosks, payphones and self service copiers will be located in the vicinity of the conference activities.

Computing and Communications

Electronic mail and computing services will be available through the SMU Computing Department consisting of VM/CMS, Mac, DOS, VMS and UNIX platforms, including FORTRAN and C compilers, SAS, and various mathematical libraries. Software for word processing, spreadsheets, and graphics and CERNLIB will be available. All machines will be connected to the Internet for access to SMU and SSC computing services, or to other remote sites. Special e-mail addresses for each attendee will enable automatic routing of mail to home machines or to guest accounts provided by SMU. In most cases the address will be attendee@lchep.seas.smu.edu. More detailed information and instructions will be provided in the Final Bulletin.

Library

The conference library will be located adjacent to the exhibit area in the Secretariat. All contributed papers and speakers' transparencies will be on display. Photocopies of papers and transparencies will be available in sets at reasonable prices.

Publications Office

The editors of the proceedings will be available to accept papers in camera-ready form and to assist with questions related to the style and format required for the proceedings.

Exhibits

Exhibits will be located adjacent to the conference library and the Secretariat. Several publishers and computer companies will be represented. Special displays will also be on exhibit, and conference mementos will be available for purchase.

Travel Office

The SSC Travel Office will be located in the lobby area of the McFarlin Auditorium to assist attendees with ticket reconfirmation, post conference tours, and travel related matters.

SSC Users Collaboration Office

The SSC Users Collaboration Office will be located on the 3rd floor of the Hughes-Trigg building to provide limited secretarial assistance and to interface with the ICHEP 92 Secretariat for meeting or luncheon arrangements for the user collaborations held in conjunction with ICHEP 92.

Childrens Services

Several childcare options are available to attendees travelling with small children. ICHEP 92 provides a partial list for the convenience of our guests. It is suggested that arrangements be made prior to your arrival in the Dallas area, as many services are on a space-available basis:

AAA Babysitter Employment
3306 W. Walnut #308
Garland, TX 75042-0000
(214) 272-8556

Baby Sitters of Dallas, Inc.
PO Box 12534
Dallas, TX 75225-0000
(214) 692-1354

Cradle to Crayons
2020 N. Lamar #100
Dallas, TX 75202-0000
(214) 954-0100

Miscellaneous

Attendees will find an array of additional services and conveniences located on campus. These include: the campus bookstore, post office, variety/gift shops, The Market convenience store, and the Mane Course Food Court.

Abstracts and contributed papers are still being accepted for ICHEP 92. If you have already submitted an abstract or paper, it has been reproduced and submitted to the organizers of the parallel sessions and to the related plenary speakers. A list of names and addresses of the parallel session organizers and plenary speakers is included with this mailing.

The parallel session organizers will review all papers, determine which papers will be selected for presentation at the conference, and notify the author directly. Any questions regarding the status of your contribution should be directed to the appropriate parallel session organizers. All abstracts and papers submitted will be displayed in the conference library regardless of whether or not the papers were selected for presentation. Copies of any papers may be ordered by conference participants for a small fee.

If your paper is selected for presentation, you will be provided with an author's kit describing the preparation of a "camera-ready" manuscript for inclusion in the conference proceedings. There are two types of author kits. One consists of blue-line layout sheets and instructions for the preparation of your paper on a typewriter. The other kit, available on disk and electronically, provides instructions and templates for preparing your manuscript in TeX or Microsoft Word. If the kit sent to you does not fit your needs, you may contact the co-editor of the proceedings at the addresses shown below and you will receive the appropriate kit.

Ms. Valerie Kelly •SSC Laboratory •2550 Beckleymeade Avenue MS-2002 •Dallas, TX 75237

•Telephone (214) 708-6033 •Telefax (214) 708-6121

•E-mail: (Bitnet) kelly@sscvx1

(Decnet) sscvx1::kelly

(Internet) kelly@sscvx1.ssc.gov

Authors are encouraged to bring a finished paper to the conference since final, camera-ready manuscripts are to be sent to the publisher, The American Institute of Physics, by the 1 October.

ICHEP Program Plans

The overall schedule for the conference is summarized in the table below. The parallel sessions are on 6-8 August and the plenary sessions from 10-12 August. The detailed schedule will be determined after the papers and presenters have been selected. The final schedule will be included with the registration material to be distributed at the conference.

Date	Conference Program	Time
Wed 5 Aug 92	Registration for pre-paid attendees	17.00 — 20.00
Thu 6 Aug 92	General Registration Opening Session Parallel Sessions	07.00 — 09.00 09.00 — 10.30 11.00 — 18.00
Fri 7 Aug 92	Parallel Sessions	09.00 — 18.00
Sat 8 Aug 92	Parallel Sessions	09.00 — 15.00
Sun 9 Aug 92		
Mon 10 Aug 92	Plenary Sessions	09.00 — 18.00
Tue 11 Aug 92	Plenary Sessions	09.00 — 18.00
Wed 12 Aug 92	Plenary Sessions	09.00 — 12.00

The specific parallel and plenary sessions are listed on the following two pages along with the names of the convenors and plenary speakers. Each parallel session is divided into two to four 1.5 hour segments depending upon the subject matter to be covered. The convenors of the parallel sessions will select the papers to be presented within the allotted time including additional presenters, as desired. All papers submitted to the conference will be forwarded to the session convenors for their consideration. Since some conference attendees may wish to communicate with the convenors directly, their addresses and e-mail numbers are included. Room arrangements for the sessions will be provided in the Final Bulletin.

Dallas Fort Worth International Airport

Major Roadways



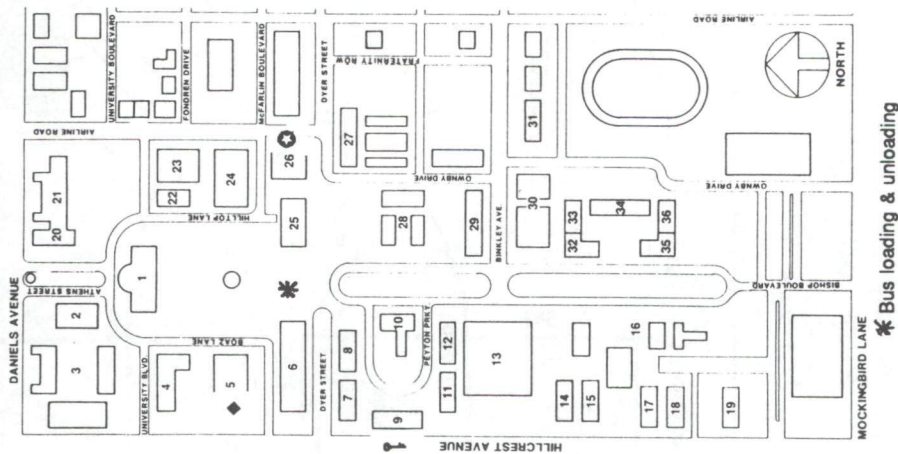
CP - Radisson Hotel Central Dallas
 DT - Doubletree Campbell Centre
 FH - Fairmont Hotel
 HR - Hyatt Regency

International Conference on High Energy Physics

Bus, limo and taxi services are provided at all terminals. Taxi service is available at the upper-level curbside. All other ground transportation, including hotel shuttles, is reached from the lower level. Ground transportation information is provided in the baggage claim area of each terminal.

Southern Methodist University

This map will help you with your arrival on campus. A more detailed map will be provided at registration.

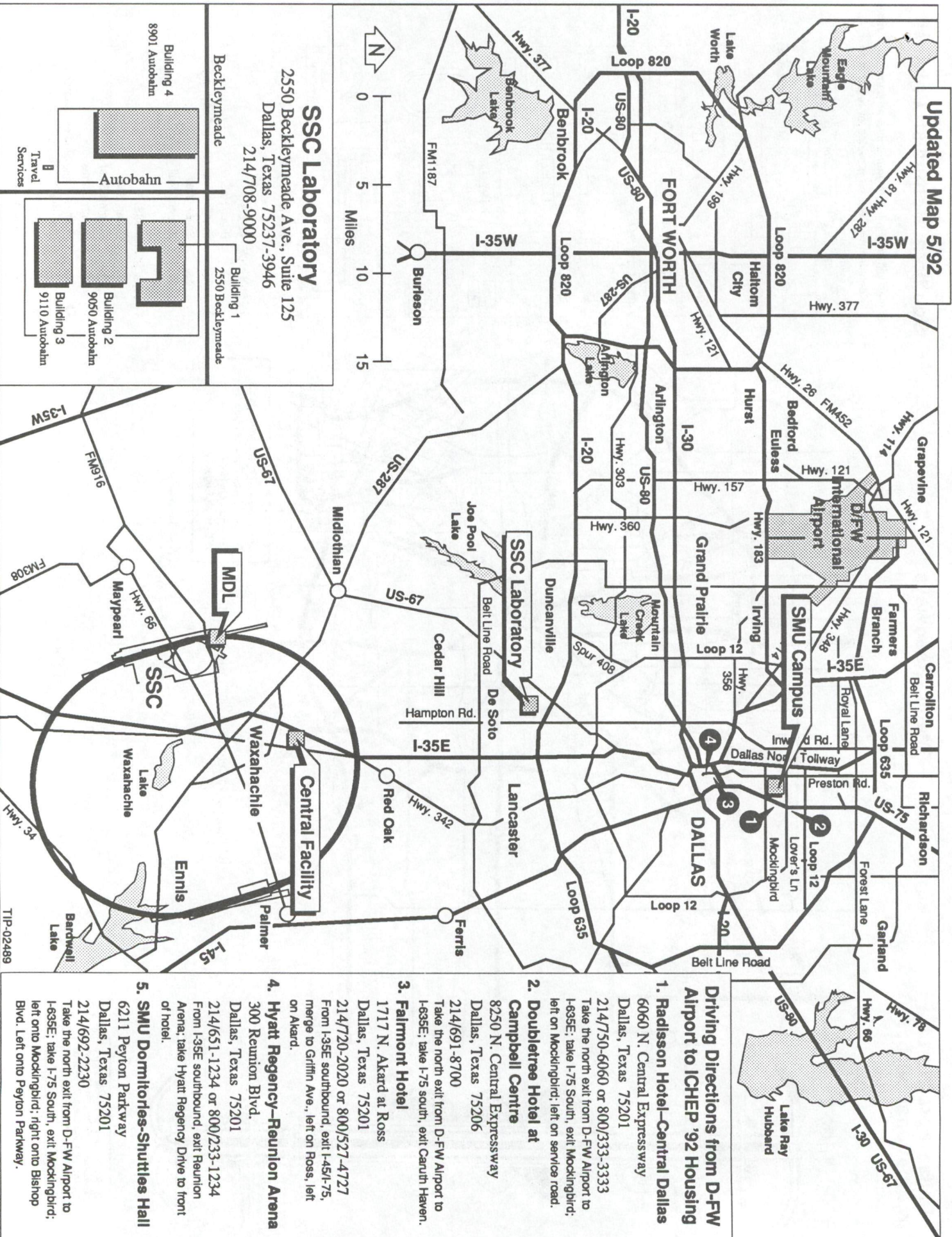


RESIDENCE HALLS

- 29. Boaz Hall
- 09. Shuttles Hall (Dorm Check In)
- 08. Snider Hall
- 07. Virginia Hall

OTHER BUILDINGS

- 01. Dallas Hall
- 21. Fondren Science
- 10. Health Center
- 26. Hughes-Trigg Student Center (Secretariat/Registration & Services)
- 05. McFarlin Auditorium (Opening Session)
- 30. Pool Area
- 06. Umphrey Lee Center (Cafeteria)



"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202500

ORIGINATOR: 02

SPEECH: YES NO

FROM: HOESS, Friedrich: THE AMBASSADOR OF AUSTRIA

DATE OF EVENT: 09/02/92

THRU:

TENTATIVE DATES:

LOCATION OF EVENT: THE NEW AUSTRIAN CHANCERY

TIME OF EVENT: 7:30 P.M.-9:00 P.M.

SUBJECT: AN INVITATION TO ATTEND A RECEPTION IN HONOR OF THE
WORLD SPACE CONFERENCE.

RSVP: 07/20/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO: INTERNATIONAL/POL

REMARKS:

DATE OF LETTER: 07/16/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION



In celebration of the World Space Congress

*The Ambassador of Austria
and Mrs. Friedrich Hoess
and*

*The Austrian Trade Commissioner
and Mrs. Josef Schwald*

request the honor of the company of

Dr. and Mrs. Browley

at a reception

*on Wednesday, September 2nd, 1992
from 7.30 to 9.30 p.m.*

*R.S.V.P.
with enclosed card
(by July 20, 1992)*

*at the New Austrian Chancery
3524 International Court, N.W.
Washington, D.C.*

*(Shuttle-Bus Transportation available from Convention Center to the Embassy.
Please check with World Space information desk.)*

Dr. D. Allan Bromley *Name*

XX will attend will not attend

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202503

ORIGINATOR: 02

SPEECH: YES NO

FROM: FRANKLIN, Barbara: U.S. SECRETARY OF COMMERCE

DATE OF EVENT: 07/22/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: HERBERT C. HOOVER BUILDING

TIME OF EVENT: 5:00 P.M.

SUBJECT: AN INVITATION TO THE SWEARING IN CEREMONY OF GREGORY
F. CHAPADOS AS THE ASSISTANT SECRETARY OF COMMERCE
FOR COMMUNICATIONS AND INFORMATION.

RSVP: 07/21/92

CONTACT PERSON:

CONTACT NUMBER: 202-377-1551

INVITATION ACCEPTED? YES NO

COPIES TO:

REMARKS:

*Invitation
accepted
DAB
office
day of
event.*



DATE OF LETTER: 07/14/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION



The Secretary of Commerce
Barbara Hackman Franklin
requests the pleasure of your company
at the Swearing-in Ceremony

for
Gregory F. Chapados
Assistant Secretary of Commerce for
Communications and Information
Wednesday, the Twenty-second of July at 5:00 p.m.

R.S.V.P.
(202) 377-1551

Herbert C. Hoover Building—Room 5855
14th & Constitution Avenue, N.W.
Washington, D.C. 20230

RECEIVED

SEP 20 1931

OSTP
MAIL ROOM

2503

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202505

ORIGINATOR: 02

SPEECH: YES NO

FROM: THE TELLER FOUNDATION

DATE OF EVENT: 09/21/92

THRU:

TENTATIVE DATES:

LOCATION OF EVENT: THE WALDORF ASTORIA HOTEL, NY, NY

TIME OF EVENT: 6:00 P.M.

SUBJECT: AN INVITATION TO ATTEND THE INTERNATIONAL TRIBUTE
DINNER IN HONOR OF DR. EDWARD TELLER.

RSVP: 08/03/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO:

REMARKS:

you can make it to NYC for this dinner, if you wish.
not at all!

DATE OF LETTER: 07/14/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION



*The President of the State of Israel
His Excellency Chaim Herzog*



and

*The Honorable Ronald W. Reagan
The Honorable Richard M. Nixon
The Honorable James E. Carter
The Honorable Gerald R. Ford*

*Under the Distinguished Patronage of
the former Presidents of the United States*



A Brief Biographical Sketch

Dr. Edward Teller is one of the most celebrated physicists of this century. His numerous scientific discoveries helped maintain a precarious peace for over thirty years and helped unleash the political forces which finally ended the cold war.

Born in Budapest in 1908, Dr. Teller received his Ph.D. in 1931 under Werner Heisenberg at the University of Leipzig. Faced with the rise of the Nazis, he left Germany for study in London and in Copenhagen with Niels Bohr. In 1935 he came to the United States as Professor of physics at The George Washington University.

The achievement of nuclear fission in Germany in 1939 engendered the U.S. Manhattan project at the now famous Los Alamos Laboratory. Dr. Teller joined this effort and while there focused much of his attention on the possibility of releasing energy through nuclear fusion.

Following World War II Dr. Teller moved to the University of Chicago, but with the emerging Soviet threat he returned to Los Alamos as Assistant Director. In 1952, at the time of the first test of the Teller-developed hydrogen bomb, he joined the University of California and the newly founded Lawrence Livermore Laboratory. He served as Assistant Director and Director, retiring in 1975. Currently he serves as Director Emeritus of Livermore Laboratory, senior research fellow at The Hoover Institution and Honorary Chairman of The Teller Foundation.

As a scientist and statesman, Dr. Teller has inspired three generations of researchers, serving as mentor to many. His legacy is their dedication to the understanding and use of science for technology development to improve the welfare of mankind and to promote freedom.

His honors include the Enrico Fermi Medal, the Albert Einstein Award, the National Medal of Science, and the Presidential Citizens Medal.

Edward Teller

The Teller Foundation
cordially invites you to attend the
International Tribute Dinner
in honor of

Dr. Edward Teller
University Professor and Nuclear Physicist

Monday, the twenty-first of September
Nineteen Hundred and Ninety Two
Six o'clock in the evening

Grand Ballroom
The Waldorf-Astoria Hotel, New York City

R.S.V.P.

Black Tie - Dinner Dance

Dietary Laws Observed

Co-hosted by
The American Israel Economic Corporation

Edward Teller Biographical Sketch

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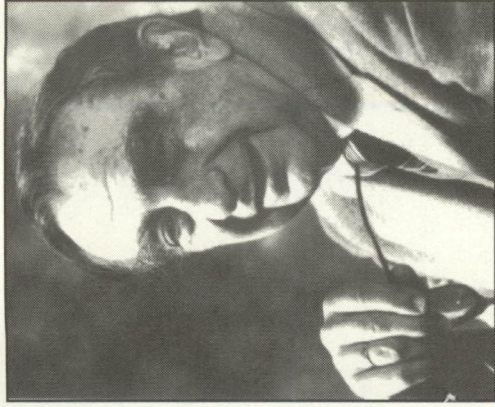
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EDWARD TELLER INSTITUTE OF TECHNOLOGY

For further information contact:

The Teller Foundation
11440 West Bernardo Court, Suite 300
San Diego, California 92127

(619) 674-6628

Fax: (619) 674-6629

June 1992

The Teller Foundation is establishing an international institute to perpetuate the goals of this great American scientist.



The Teller Foundation staff

The Edward Teller Institute will always symbolize the application of technology for the benefit of mankind.

The Teller Foundation

Purpose

The Edward Teller Institute of Technology is being established to provide a unique task force, one that will address the urgent issues of today, issues in which science and technology can indeed provide answers. The global impact of this activity will require the cooperation of the international community, for which the Institute embraces the concept of the 'world laboratory'. In all endeavors the Institute will be steadfast in its dedication to progress through the development and effective use of technology for the benefit of mankind.

Charter

At the national level, the Teller Institute will serve as a catalyst for cooperation, technology development and transfer among government, industry, and academia. It will conduct independent research projects, sponsor and lead combined efforts, and accomplish analyses to resolve the technical aspects of issues related to the environment, energy, sensor systems and information sharing. Increased economic strength and expansion of the nation's technology base will result from this process.

In the international arena, the Teller Institute will promote technical cooperation and concentrate on problems that transcend borders and affect large population segments, such as environmental monitoring and pollution control, food production and preservation. As an arm of the world laboratory, the Institute will encourage the exchange and transfer of needed scientific data. The primary beneficiary of this process will be an improvement in the well being of all people, worldwide, especially those in need.

Advisors

The Teller Institute has a very distinguished board of advisors. The members will share their individual expertise by participating in selected research projects:

David C. Acheson, Esq
The Atlantic Council
Dr. Martin Anderson
The Hoover Institution
Dr. John S. Foster, Jr.
Defense Science Board
General Andrew J. Goodpaster
The Atlantic Council
Dr. William R. Graham
Xstratus, Incorporated
Ambassador Chic Hecht
U. S. Embassy, Bahamas
Professor Arthur Kanuowitz
Dartmouth College
Dr. G. A. Keyworth, II
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Ambassador Jeane Kirkpatrick
American Enterprise Institute
Dr. Hans Mark
The University of Texas
Professor Yuval Ne'eman
Tel Aviv University
Dr. Dixy Lee Ray
Former Governor, Washington State
Dr. Frederick Seitz
The Rockefeller University
Professor Chen Ning Yang
SUNY at Stony Brook
Dr. Antonio Zichichi
World Laboratory ICSC
Admiral E. R. Zumwalt
Zumwalt & Consultants

Staff

Located in Palo Alto, California with offices in Washington, DC the Institute will operate under the guidance of its board of advisors and will be managed by a full time staff consisting of a director, assistant director for Washington operations, financial administrator, and three senior fellows. Research projects will be organized in three areas: environmental sciences; energy and cryoelectronics; international security and technology initiatives.

Agenda

Four high priority projects are being initiated:

- The first involves the steadily decreasing supply of marine life as a food source and the possibility of fish-farming to reverse the trend; the construction of fish ponds is planned, first in Israel, utilizing the labor support available from the many highly skilled emigres.
- The second project covers two related but separate topics: energy independence with emphasis on the enhanced safety and reliability of small underground nuclear reactors; and the potentially economical and practical uses of reactor waste products, especially for pollution clean-up and food preservation.
- Third, technical assessments of on-orbit sensor systems and international protocol design efforts are underway regarding the uses and benefits of distributed remote sensing, with the primary objective being the provision of a more factual basis for effective environmental monitoring and control.
- The fourth project involves policy formulation to effect control of nuclear energy, to establish the condition of international stability and safety.

Financials

The Institute is being established as a non-profit tax exempt organization. Endowment funding, program related grants from public and private sources, and contracts which further the goals and objectives of the Institute are solicited.

Board of Trustees



Dr. C. Neil Beer
President
The Teller Foundation



Dr. Harold Liebowitz
L. Stanley Crane Professor
The George Washington University



Dr. Dixy Lee Ray
Former Governor
Washington State



Dr. Edward Teller
Honorary Chairman
Director Emeritus
Lawrence Livermore National Laboratory



B. General Wilma Vaught
President
WTMISA Memorial Foundation

Tribute Dinner

IN HONOR OF

DR. EDWARD TELLER

DINNER COMMITTEE

(as of July 1st, 1992)

**The Waldorf-Astoria
New York City
September 21, 1992**

PATRONS

The Honorable Ronald W. Reagan

The Honorable James E. Carter

The Honorable Gerald R. Ford

The Honorable Richard M. Nixon

The Honorable Jack F. Kemp

U.S. Secretary of HUD

His Excellency Chaim Herzog

President of the State of Israel

Professor Ephraim Katzir

Former President of the State of Israel

His Excellency Yitzhak Shamir

Prime Minister of the State of Israel

The Honorable Yitzhak Rabin

Prime Minister Elect of the State of Israel

The Honorable Moshe Arens

Israel Minister of Defense

Hon. Melvin R. Laird

Former U.S. Secretary of Defense

Professor Ksenia Landa

Techion Inst. of Technology

Ms. Sherry Lansing

Paramount Pictures

Dov Lautman

Manufacturers Assn. of Israel

James Leader, Esq.

Leader & Berkon

Gabriel Levy, Esq.

Former Israeli Economic Minister

Rabbi Pinchas Lipner

Hebrew Academy of San Francisco

Ambassador John L. Loeb, Jr.

Former U.S. Ambassador to Denmark

Professor Moshe Mandelbaum

Bar-Ilan University

Dr. Hans Mark

University of Texas

Hon. Richard T. McCormack

Former Under Secretary of State

Benjamin Meed

Jewish Holocaust Survivors

Irwin S. Meltzer

Rogosin Industries

Frank & Lucille Milano

Industrialists

Lt. Gen. George Monahan

Loral Corporation

John C. Moore III

Ledenburg, Thalman & Co.

Alfred H. Moses

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Chairman, Zionist Delegation, N.America

Professor Yuval Ne'eman

Tel Aviv University

Hon. Gerald C. Newman

Washington, D.C.

Gabor Newmark

World Fed. Hungarian Jews

Ivan J. Novick

Zionist Organization of America

John Nuckolls

Livermore National Laboratory

Gwinn Owens

Author

David Packard

Hewlett-Packard

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American Enterprise Institute

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Editor-in-Chief, Commentary

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Jewish National Fund

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Former Ch. Sci., Nuc. Propln.

Dr. John Raisian

Hoover Institution

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Horowitz & Reiser

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Nixon, Hargrave, Devans & Doyle

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Banque Rothschild

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Consul General of Israel, N.Y.

Rabbi Herschel Schacter

Mosholu Jewish Center N.Y.

Rabbi Arthur Schneier

Appeal of Conscience Foundation

Rabbi Marc Schneier

Park East Synagogue, New York

Rabbi Fabian Schonfeld

Young Israel of Kew Garden Hills

Melvin S. Schwechter

Coopers & Lybrand

Dr. Hillel Seidman

Author

Dr. Frederick Seitz

The Rockefeller University

Milton S. Shapiro, Esq.

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Former U.S. Secretary of State

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Weizmann Inst. of Science

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Dr. Arthur Spitzer

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Hon. Andrew J. Stein

New York City Council President

Dr. Herbert Stein

American Enterprise Institute

Hon. Jacob Stein

Member, U.S. Delegation to U.N.

Jeffrey Steiner

Fairchild Corporation

Professor Zehev Tadmor

Technion-Israel Inst. of Technology

Herbert Tenzer, Esq.

America-Israel Friendship League

Steven G. Tepper

Arnold & Porter

Dr. Al Trivelpiece

Oak Ridge National Laboratory

Professor David M. Vofsi

Weizmann Institute of Science

Lord Weidenfeld

London, England

Ms. Annabelle Whitestone

London, England

Hon. William A. Wilson

Former Ambassador to the Vatican

Dr. Chen Ning Yang

SUNY at Stony Brook

Hon. Clayton Yeutter

Former Secretary of Agriculture

Dr. Laszlo Zeley

Hungarian Radio

Dr. Antonino Zichichi

ICSC World Laboratory

Admiral E. R. Zumwalt

Former Chief of U. S. Naval Operations

Herbert Zweibon

A.F.S.I.

(Committee in formation.)

NATIONAL TRIBUTE COMMITTEE

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N.J. Marine Sciences Consortium

Lt. Gen. Jim Abrahamson
Hughes Aircraft

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Arnold Forster, Esq.
Shea & Gould

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Abraham H. Foxman
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Tulsa, Oklahoma

Brig. General (Res.) Yehuda Halevy
Bar-Ilan University

Hon. Shlomo Harel
Economic Mission of Israel to N.A.

Gen. James V. Hartinger
Space Mark, Inc.

Hart N. Hasten
Hasten Bancorp

Dr. George N. Hatsopoulos
Thermo Electron

Ambassador Chic Hecht
U.S. Embassy Bahamas

Dr. Reuben Hecht
DAGON, Haifa

Dr. Siegfried Hecker
Los Alamos National Laboratory

Dr. Gerhard Herzberg
National Research Council of Canada

Professor Arye Hillman
Bar-Ilan University

Ambassador Carla Hills
U.S. Trade Representative

Malcolm Hoenlein
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Former S.A. Consul General, N.Y.

David Horowitz
World Union Press

Eric M. Javits, Esq.
Attorney

Professor Arthur Kantrowitz
Dartmouth College

Leslie Keller
World Fdr. Hungarian Jews

Lt. Gen. Thomas Kelly
George Washington University

Dr. G.A. Keyworth, II
Hudson Institute

Ambassador Jeane Kirkpatrick
American Enterprise Institute

Dr. Henry Kissinger
Former U.S. Secretary of State

Rabbi Sholom Klass
Publisher - The Jewish Press

George Klein
Park Tower Realty

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His Excellency Hans Meesman
Netherlands

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South Africa

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His Excellency Pal Tar
Hungary

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Permanent Representative of Israel to the United Nations

Representative Mou-Shih Ding
Taiwan

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Laurance S. Rockefeller
Mrs. Nelson A. Rockefeller
B. General Wilma Vaught

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South Dakota
Senator Bob Dole
Kansas
Senator Jake Garn
Utah
Senator Charles E. Grassley
Iowa
Senator Orrin Hatch
Utah
Senator Howell Heflin
Alabama
Senator Ernest F. Hollings
South Carolina
Senator J. Bennett Johnston
Louisiana
Senator Don Nickles
Oklahoma
Senator William V. Roth, Jr.
Delaware
Senator Ted Stevens
Alaska
Senator John Warner
Virginia
Congressman Bill Archer
Texas
Congressman Joe Barton
Texas
Congressman Charles Bennett
Florida
Congressman Robert Borski
Pennsylvania
Congressman Terry L. Bruce
Illinois
Congresswoman Beverly Byron
Maryland
Congressman Ben Nighthorse
Campbell
Colorado
Congressman William Clinger
Pennsylvania
Congressman Bud Cramer
Alabama
Congressman Philip M. Crane
Illinois
Congressman Tom DeLay
Texas
Congressman William Dickinson
Alabama
Congressman John Doolittle
California
Congressman Robert K. Dornan
California
Congressman David Dreier
California
Congressman Floyd Flake
New York

Congressman Benjamin Gilman
New York
Congressman Newt Gingrich
Georgia
Congressman Steve Gunderson
Wisconsin
Congressman Lee Hamilton
Indiana
Congressman Mel Hancock
Missouri
Congressman Frank Horton
New York
Congressman Duncan Hunter
California
Congressman Joseph P.
Kennedy, II
Massachusetts
Congressman Jon Kyl
Arizona
Congressman Robert
Lagomarsino
California
Congressman John Lewis
Georgia
Congressman Bob Livingstone
Louisiana
Congresswoman Marilyn Lloyd
Tennessee
Congressman Nicholas Mavroules
Massachusetts
Congressman Bob McEwen
Ohio
Congressman John Miller
Washington
Congressman Carlos J. Moorhead
California
Congresswoman Constance
Morella
Maryland
Congressman John Myers
Indiana
Congressman Stephen Neal
North Carolina
Congressman Thomas Petri
Wisconsin
Congressman John Porter
Illinois
Congressman Bill Richardson
New Mexico
Congressman Rick Santorum
Pennsylvania
Congressman Joe Skeen
New Mexico
Congressman Floyd D. Spence
South Carolina
Congressman Louis Stokes
Ohio
Congressman John Tanner
Tennessee
Congresswoman Barbara
Vucanovich
Nevada
Congressman Robert S. Walker
Pennsylvania

I will be pleased to attend the International Tribute Dinner in honor of Dr. Edward Teller on Monday, September 21, 1992, at The Waldorf-Astoria Hotel in New York City.

☐ Enclosed is my check for \$10,000 for a table of ten, or for _____ reservations at \$1,000 per person.

☒ I regret I cannot attend. Please accept my donation of \$ _____ to The Teller Foundation.

Name Dr. D. Allan Bromley

Company Assistant to the President for Science & Technology

Address 17th St. & Penna. Avenue, NW - Suite 358

City/State/Zip Washington, D.C. Phone _____

Checks payable to the Teller Foundation are tax-deductible to the extent allowable by law.

(Please list guests on reverse side)

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202563

ORIGINATOR: 02

SPEECH: YES NO

FROM: MALONE, Thomas F.: SIGMA XI

DATE OF EVENT:

THRU:

TENTATIVE DATES: 09/25/92 OR 09/26/92

LOCATION OF EVENT: RALEIGH, NC

TIME OF EVENT:

SUBJECT: AN INVITATION TO ATTEND THEIR COLLOQUIUM TO DISCUSS
THE ISSUE OF NOURISHING INTERDISCIPLINARY RESEARCH
AND EDUCATION TO ENHANCE ITS EFFECTIVENESS WITHIN
THE DEPARTMENTAL STRUCTURE OF MOST UNIVERSITIES.

RSVP: 08/07/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES

NO

COPIES TO: PCAST

REMARKS:



*But appropriate
for OSTP
to support
@ AD
or Assistant Dir.
level.*

DATE OF LETTER: 07/13/92

DATE RECEIVED: 07/27/92

FILE: P-INVITATION



Sigma Xi, The Scientific Research Society

July 13, 1992

2563
RECEIVED

92 JUL 27 AIO 05

OSIP
MAIL ROOM

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology

Dear Allan:

The heartening initiatives with respect to higher education being mounted at federal levels prompt me to suggest interaction with a grass-roots movement.

It is likely that we are entering an era when the activities of the research-intensive universities will be more intimately interwoven with society than has been the case during the past several decades. One implication of this transition is that relatively greater attention will be required to interdisciplinary research and education -- firmly grounded on disciplinary excellence.

The issue of nourishing interdisciplinary research and education to enhance its effectiveness within the departmental structure of most universities will be explored by using environmental studies as a case in point in the University Colloquium on Environmental Research and Education at the McKimmon Center in Raleigh, NC, September 24-26. The Colloquium is sponsored by Duke University, North Carolina State University, The University of Michigan, the University of North Carolina, and Sigma Xi, under the auspices of an advisory committee of senior officers from these institutions.

More than one hundred program directors -- accompanied by senior administrative officers from their institutions -- will (1) review the track record of approaches that have been initiated over the past two decades, (2) examine the needs in industry, government and the scholarly community, and (3) explore strategical approaches that emerge from this review and examination. Three plenary panel sessions will be augmented by detailed discussions in a number of small breakout groups. The emphasis is on exchange of experience and views, rather than major presentations.

In addition to participation by most of the major research-intensive universities, a substantial number of comprehensive colleges will share their experience and outlook on this matter. From the discussions at the Colloquium, and the background materials circulated in advance, a summary report of the Colloquium will be prepared.

Dr. D. Allan Bromley
Page 2
July 13, 1992

In light of the PCAST project and the FCCST project on the health of research-intensive universities and the associated regional meetings this summer and fall, it would seem highly appropriate to provide an opportunity for senior individuals from OSTP, as well as NSF, to share their outlook at a special panel discussion on Friday afternoon (September 25th) or Saturday morning (September 26th). What do you think? Consider this note to be an invitation to you or one of your colleagues. Would a session at dinner Friday evening be of interest? I have sent an almost identical letter to Dr. Massey.

As the Convener of the Colloquium, I would be pleased to provide more detailed information concerning participation, agenda, etc. We will be sending out more information to participants in the next week or two.

With every good wish.

Sincerely,



Thomas F. Malone
Director
the Sigma Xi Center

THE WHITE HOUSE
WASHINGTON

August 10, 1992

Dear Tom:

Thank you for your letter of July 13 inviting me to attend the Colloquium on Environmental Research and Education scheduled on September 24-26 to be held in Raleigh. I apologize for the much belated response.

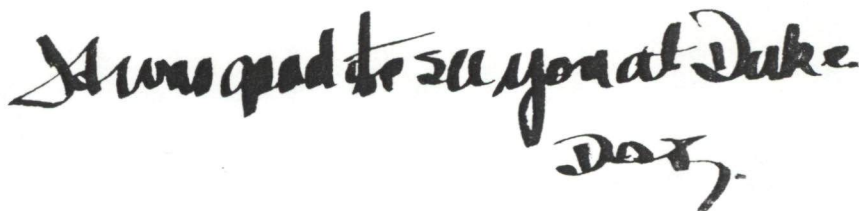
Because my schedule has become increasingly consumed with election year activities as well as my regular duties, I must regretfully decline. However, I will pass the invitation to my staff. Hopefully, one of them may be available to participate.

Thank you for thinking of me. With warmest best wishes,

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology



Dr. Thomas F. Malone, Director
Sigma Xi Center
99 Alexander Drive
Post Office Box 13975
Research Triangle Park, North Carolina 27709

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202504

ORIGINATOR: 02

SPEECH: YES NO

FROM: BANCROFT, James R.

DATE OF EVENT: 07/25/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: BOHEMIAN GROVE

TIME OF EVENT:

SUBJECT: AN INVITATION TO DR. BROMLEY TO ATTEND A WINE
TASTING EVENT DURING HIS VISIT TO THE GROVE.

RSVP: 07/24/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

COPIES TO:

REMARKS:

DATE OF LETTER: 07/07/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION



JAMES R. BANCROFT
601 MONTGOMERY STREET
SAN FRANCISCO 94111

2504
RECEIVED

92 JUL 20 13:09

July 7, 1992

OSTP
MAIL ROOM

Fax to 202/395-3261

The Honorable D. Allan Bromley
Assistant to the President for
Science and Technology
The White House
Washington, D.C. 20500

Dear Allan:

I was very pleased to open my Bohemian Grove program of events to find that you (or perhaps an imposter) will be speaking at the Grove Museum on Saturday, July 25, on the topic "Where Goes U.S. Technology." If anyone can swing a few votes away from Ross Perot and back to George Bush, you are probably the one.

I hope you will actually be able to spend some time at the Grove. At your convenience, please send via fax your Grove schedule. If your visit turns out to be just a cameo appearance with no time to relax and enjoy the redwoods, you will feel cheated the rest of your days.

If your time permits, I would like to host the first semi-occasional D. Allan Bromley Memorial Wine Tasting at our camp. Even if your time does not permit this, I would like to put together at least an easily carried 6-pack of first magnitude wines. If you can bring an extra suitcase, I can put a whole case in a flat-pack 12-bottle case which fits easily into a standard rectangular suitcase.

Our vineyard is slightly more than an hour's drive from the Grove. You probably would not regret, if your time permits, making a quick visit to the vineyard and also making a quick stop to meet the head winemaker at Beringer. Any invitation you accept automatically includes anyone serving as your host. If you are officially a guest of the Board of Directors, then you can designate an accomplice or not, as you wish.

If you will be in the Grove Thursday, July 23, and if your schedule permits, I will ask John Bryan to include you in a luncheon that day at his estate near St. Helena. John is a camp mate of George Bush (Hillbillies Camp).

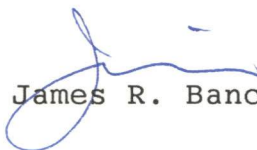
The Honorable D. Allan Bromley
Page 2
July 7, 1992

I realize that you have been effectively running your own life without advice from me, but old lawyers never die--they just keep on advising.

Jane, our children, and our grandchildren are all well, for which we are truly grateful.

Looking forward to seeing you at the Grove and with warmest regards, as always

Sincerely,



James R. Bancroft

P.S. Our fax number here is 415/397-1925.

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9202507

ORIGINATOR: 02

SPEECH: YES NO

FROM: BELTZ, Cynthia A.: AMERICAN ENTERPRISE INSTITUTE

DATE OF EVENT: 07/28/92

THRU:

TENTATIVE DATES:

LOCATION OF EVENT: THE AMERICAN ENTERPRISE INSTITUTE

TIME OF EVENT:

SUBJECT: AN INVITATION TO ATTEND A SYMPOSIUM TO EXPLORE THE
POLICY IMPLICATIONS OF THE CHANGING RELATIONSHIP
BETWEEN DEFENSE R & D, THE TECHNOLOGY BASE AND U.S.
COMPETITIVENESS IN THE 1990'S.

RSVP: 07/24/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED?

YES

NO

COPIES TO: INDUSTRIAL

REMARKS:

*Regretted to Hilary Laythorne
7/23/92.*



DATE OF LETTER: 07/06/92

DATE RECEIVED: 07/20/92

FILE: P-INVITATION



July 6, 1992

2507
RECEIVED

92 JUL 20 P4:02

Dear Colleague,

You are cordially invited to attend on Tuesday, July 28, a symposium at the American Enterprise Institute to explore the policy implications of the changing relationship between defense R&D, the technology base, and U.S. competitiveness in the 1990s.

OSTP
MAIL ROOM

As you may know, the U.S. is looking to technology policy as a means not only to promote defense capabilities but also to promote productivity and economic growth. Although there is a broad consensus on the strong links between R&D, national security, and economic health, there is little agreement on the institutional and long-term implications of the changed technological circumstances of the post-cold war period. The AEI symposium will direct attention to the defense side of this important issue of institutional reform and focus on what, if any, changes are needed for the Defense Advanced Research Projects Agency to adapt to the new national security and economic environment.

In the past, DARPA has served as the venture capitalist for the Armed Forces that has developed potentially revolutionary technologies in an effort to prevent another Sputnik or technological surprise. The civilian sector has also benefitted from DARPA-generated spillovers embodied in industries such as computers and information processing. The future role and responsibilities of DARPA are, however, uncertain. In an apparent reversal of the flow of technology, DOD increasingly is dependent on civilian and global high tech markets. To adapt, some have called for the DARPA mandate to be extended to include the economic health of the technology base and the active support of technologies with both civilian and military applications, also known as "dual-use" technologies.

The push for a civilian DARPA in the Defense Department gained national recognition in November 1991 when the Carnegie Commission called for DARPA to become the National Advanced Research Projects Agency. More recently, Senator Jeff Bingaman (D-NM) has introduced legislation to implement a modified version of the NARPA proposal. The legislation is now moving through the Senate Armed Services committee and is expected to reach the Senate floor in early August. Proponents argue that the extension of DARPA's responsibilities is necessary for the promotion of military and economic security. Critics fear that the NARPA extension will divert DARPA from its military mission and diminish its effectiveness. Others question the capability of DARPA to make economic judgements and to promote technologies whose primary customers may be in the commercial sector.

Senator Bingaman will open the symposium with a keynote address that will be followed by a roundtable discussion of technology policy experts representing a wide spectrum of views. They will debate three sets of issues:

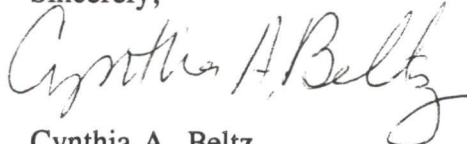
First, what are the implications for defense R&D and national competitiveness of the convergence in military and civilian technologies? To what extent should DOD move beyond the spin-off paradigm to rely more on the private commercial sector to supply its needs for cutting-edge technologies?

Second, what changes, if any, are needed for DARPA to be equipped to pursue American military interests and to maintain access to advanced technologies in the 1990s? Does the past DARPA role as a "technology incubator" need to be modified to adapt to the changing economic and technological environment? What should be the limits, if any, on DARPA's responsibility for the development of technologies with civilian applications? What are the implications of shrinking Defense procurement budgets for the future DARPA mission and for defense spillovers to the civilian economy?

Third, do we need a civilian DARPA in the Defense Department to fund the development of dual-use technologies? Is NARPA the type of change that is needed for DARPA and the nation to adapt to the national security and competitiveness challenges of the 1990s? To what extent would a NARPA extend DARPA beyond its area of expertise and risk breaking the successful DARPA model?

To help discuss these key cross-cutting issues, this AEI symposium will bring together members of the business and defense communities, media, and key members and staff of the administration and Congress. Please reserve Tuesday, July 28 on your calendar so that you may join in the discussion. Let us know if you plan to attend the symposium by returning the enclosed registration form by July 24, 1992.

Sincerely,



Cynthia A. Beltz
Technology Policy Studies

encl.

Registration Form

Defense R&D and Competitiveness Symposium

Caught in the Crossroads: Do We Need a Civilian DARPA in the Defense Department?

AEI's Charles Wohlsetter Conference Center
Tuesday, July 28, 1992

Send this form to :

Seminars and Conferences
American Enterprise Institute
1150 17th Street, N.W.
Washington, D.C. 20036

Or FAX to Seminars and Conferences at 202/862-7178.

Name _____

Title _____

Affiliation _____

Address _____

City/State/Zip _____

Telephone _____



Defense R&D and Competitiveness Symposium

**Caught in the Crossroads: Do We Need
a Civilian DARPA in the Defense Department?**

AEI's Charles Wohlstetter Conference Center
Tuesday, July 28, 1992

9:00 a.m. Keynote Address: Senator JEFF BINGAMAN

9:45 Coffee break

10:00 Roundtable Discussion

Chairman: CLAUDE BARFIELD, American Enterprise Institute

RAYMOND COLLADAY, Vice President for Strategic Defense Systems,
Martin Marietta; former DARPA Director

DANIEL BURTON, Carnegie Commission; Council on Competitiveness

EDWARD MCGAFFIGAN, Senior Policy Advisor, Office of
Senator Bingaman

DAVID MOWERY, Haas School of Business at University of California at
Berkeley; National Academies of Sciences Civilian Technology Panel

THEODORE MORAN, Landegger Professor, Georgetown University

CYNTHIA BELTZ, American Enterprise Institute

For more information, call Hilary Laytham at 202/862-5830.

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9202568

ORIGINATOR: 02

SPEECH: YES NO

FROM: LINDGREN, Richard A.: UNIVERSITY OF VIRGINIA

DATE OF EVENT: 07/30/92

THRU:

TENTATIVE DATES:

LOCATION OF EVENT: UNIVERSITY OF VIRGINIA

TIME OF EVENT:

SUBJECT: AN INVITATION TO DELIVER THE KEYNOTE ADDRESS AT
THEIR SUMMER BANQUET.

RSVP: 07/27/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

COPIES TO: PHYSICAL SCIENCES

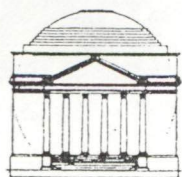
REMARKS: ORIGINAL WAS FAXED 7/3/92

DATE OF LETTER: 07/03/92

DATE RECEIVED: 07/27/92

FILE: P-INVITATION

*Rescheduled
per
telephone
call
from
Lindgren
to RPB.*
*Never
heard
from him
again.
RPB
11/30. Lindgren will
advise
as to
new
date.*



*Commonwealth Center
for Nuclear and High Energy
Physics*

RECEIVED

JUL 24 12 08

MAIL ROOM

July 3, 1992

2568
University of Virginia
Jesse W. Beams Laboratory
McCormick Road
Charlottesville, Virginia 22901
Telephone: (804) 924-6577
Telex: 9102500352
Facsimile: (804) 924-4576
V/TDD: (804) 982-HEAR

Dr. D. Allan Bromley
Executive Office Building
Office of Science of Technology Policy
Old Executive Office Building
Room 360
Washington, DC 20506

Dear Dr. Bromley,

We are all aware of your efforts and dedication to improve the quality of science and education in this country. Your accomplishments are well known and respected at the University of Virginia. I have been very much involved in establishing new hands-on science and education programs at UVA for science and physics teachers and also in helping to obtain approval for the establishment of a Science and Technology Education Center (STEC) at UVA. I would like to invite you to be the keynote speaker at our summer banquet, which is being planned to highlight these activities.

It would be a great honor to us if you could accept this invitation to return to Charlottesville, where, you, President Bush, and the Governors held the 1989 Education summit. Clearly, your presence would make a strong statement in support of our activities and that we are moving in the right direction.

As I discussed earlier with you, we have been developing at the University of Virginia a hands-on physics summer research experience program for bright undergraduates (REU), a hands-on science summer research experience and curriculum enhancement program for in-service high school physics teachers (RECET), and an integrated physical science program for K-8 elementary teachers (IPSET). The latter two are jointly operated by the Department of Physics and the School of Education. We have support from the Commonwealth Center for Nuclear and High Energy Physics, the National Science Foundation, and the State Council of Higher Education.

In addition we are trying to establish a Science and Technology Education Center. This would be a facility that would centralize outreach science and mathematics programs for recertifying K-12 science and mathematics teachers. It would also coordinate undergraduate research programs, and be a showcase for science in general including scientific exhibits and artifacts. A brief summary of the center concept is included. Such a center has strong support from the Department Heads, the Deans of Engineering and Applied Science, College of Arts and Sciences and the Curry School of Education. We are presently awaiting the Provost and President to approve the establishment of the Center. Ultimately, it must be approved by the Board of Visitors.

In anticipation of approval we are planning a banquet at the Boars Head Inn in Charlottesville on Thursday, July 30 while our summer undergraduate physics students and high school physics teachers programs are still in session. Astronaut Kathryn Thornton, who holds a Ph.D. in Nuclear Physics from the University of Virginia, will also be present to show highlights of her recent flight in the Challenger. Representatives from the National Science Foundation, from the State Council of Higher Education, and from the University of Virginia will also be present.

I realize that this is rather short notice, but if your schedule permits, it would be beneficial to have you here when the students and high school teachers in our summer programs have the opportunity to hear your talk.

Sincerely,



Richard A. Lindgren, Director
REU/RECET Programs
Research Professor of Physics

SCIENCE AND TECHNOLOGY EDUCATION CENTER (STEC)

A Cooperative Effort of the University of Virginia
College of Arts and Sciences, School of Education, and
School of Engineering and Applied Science

(Revised from 9/27/92 document)

June 22, 1992

1. Philosophy and Purpose of the Center

Science, engineering, and science education are rapidly moving towards a crisis in the United States because insufficient numbers of young Americans are opting for careers in these fields. Improvement of science teaching is needed at all levels from kindergarten through college to promote greater interest in science and technology-related careers among students. The Science and Technology Education Center (STEC) is proposed to focus the research and teaching resources of the various divisions, schools, and academic departments of the University on the resolution of this important issue. This is also a challenge that will require the cooperation of leaders from business, industry, and government and other schools and universities across the nation.

The programs of the Center would address: the school's curriculum and instruction; research and development of programs for the education, certification, and enhancement of preservice and inservice teachers; and other science and mathematics related problems. Over the last five years faculty members of the UVa Department of Physics and School of Education have taken the initiative in offering professional growth and retraining opportunities for school teachers in the Commonwealth. Program initiatives to date include the following:

- Satellite Courses for Teachers and Distance Learning
- Research Experiences for Undergraduates
- Curriculum Enhancement for High School Teachers
- School-College Partnership for Elementary Science Teachers
- Integrated Physical Science for Elementary Teachers
- Science, Computers, and Mathematics Professions

These projects have been judged as successful and effective. Building on the knowledge gained from these programs and from a broad review of research in science education, the UVa Department of Physics and School of Education have designed a program to focus the scientific resources of higher education on the problems facing school and college science teachers today.

Since the beginning of planning for the Center, the scope of the project has expanded to include: the School of Engineering and Applied Science; additional departments of the College of Arts and Sciences including Chemistry, Astronomy, Environmental Sciences, Biology, and Mathematics; and the Virginia Museum of Natural History. The Center will include scientific exhibits, a planetarium, and a Museum of Natural History.

Through the Center, scientists and engineers and educators will be able to work together with teachers to develop near and long-term goals and objectives dedicated to maintaining the nation's position of leadership in science and technology.

The STEC will enable scientists, engineers, science educators, school science teachers, and undergraduate science students to work together to conduct scientific research, examine options for improved science teaching and teacher preparation, develop and validate models for reform of school and college science education, and disseminate information. By working together in the Center programs, university science and engineering faculty and school science teachers will formulate and test new or improved teaching methods and curricular concepts and develop programs that are more applicable to the nature, needs, and interests of the students we aspire to teach. It is anticipated that, as a result of the work of the Center, substantially increased numbers of students will perceive science and technology as interesting and attainable career arenas and opt for additional studies in those fields.

2. Goals and Objectives

The University of Virginia has the potential to make a much greater contribution toward meeting the challenge in science education through teaching, research and leadership; and this is the primary goal of the STEC. The following initial objectives of the STEC were formulated through conferences of scientists and science educators, following a review of literature on research and public expectations of science education:

1. Provide a central facility designed to meet the needs for faculty and school science teacher enhancement and science curriculum enrichment.
2. Develop and disseminate research-based model programs for college and school science teacher preparation and enhancement.
3. Promote the involvement of women, minorities, and other underrepresented groups in science and science education.
4. Review and describe current needs and trends in science teaching, and develop a research agenda to examine options for improvement of science education.
5. Assess and validate the effects of different teaching strategies over
6. Develop, validate, and disseminate effective instructional models for use in school and college science classrooms.
7. Develop, validate, and disseminate models for school and college science curriculum assessment and revision.
8. Develop and disseminate models for science program evaluations.
9. Provide school science teachers with intensive research experiences of a type that they would not be likely to obtain in regular science courses and teacher preparation programs.
10. Provide leadership training to prepare teams of school teachers and administrators for local leadership in the reform of science education.
11. Disseminate information and provide services to college and school science teachers through materials distribution and consultations, to be handled through a STEC Service Office.
12. Operate an equipment loan/rental facility to make specialized, expensive, and occasionally needed scientific equipment available to local school systems.
13. Contribute to the realization of the President's goal that our children will be number one in science.
14. Perform other services appropriate to the development of a scientifically literate society.

Programs developed and offered through the STEC would directly serve college faculty and undergraduates in the northeastern, mid-Atlantic, and southeastern states; elementary, middle school, and secondary science teachers and students throughout the region; and leading science teachers, supervisors and school administrators throughout the nation. Moreover, it is anticipated that the Center's work will encourage the establishment and expansion of similar centers at other major universities. Once established, the STEC will collaborate with similar centers to form a national **Science Education Network** for sharing information and models for effective science teaching.

Center programs and services will be characterized by opportunities for "hands-on-science" learning experiences through programs that provide a level of research and laboratory activity appropriate to the preparation level of elementary, middle school, high school, or college participants. During the academic year most of the participants will be college science students and preservice science teachers, with evening and weekend programs for inservice teacher enhancement and special short courses for high school and college students. In the summer, the Center will continue to provide programs for teacher preparation and enhancement and will expand its agenda to include programs in science for middle school and high school students.

3. Operation, Support, and Estimated Cost

After consideration of several alternatives, it was determined that a maximum level of success for such a program may be attained by establishing a **Science and Technology Education Center (STEC)** at the University of Virginia. Provisions for the development, operations, and support of the proposed Science and Technology Education Center include the following:

1. The Center will be an independent agency operated in cooperation with the College of Arts and Sciences, School of Education, and the School of Engineering.
2. The Center will seek to establish and nurture a tradition of cooperation among institutions of higher education, local school systems, state and federal education agencies, business and industry, and government in the quest for excellence in science and technology education.
3. Funding for the building and equipment is expected to be obtained from a combination of state, federal, and private sources.
4. Management of the Center will reside in an Acting Director and two Associate Directors for science and education respectively, with assistance of a full-time executive program administrator and support staff as indicated in Figure 1: STEC Organization and Program Structure.
5. Support of specific projects may come from grant funds, state and federal government, business and industry, and participant fees.

A. The Physical Facility

Initially, the STEC will continue to function in existing areas related to participating program sponsors. Eventually, the Center will need new space and facilities to provide a centralized area for operations and central program staff. It has been suggested that a building joining the the new addition of the Physics Building to Ruffner Hall would be appropriate to emphasize the cooperation of science and education in the conduct of the Center's educational activities. The new, multi-story parking garage to be constructed on Emmett Street will facilitate parking for teachers and others coming in from other areas for science education activities.

The design and size of the STEC building will be determined, on the basis of need as determined by Center operations and anticipated program growth, in consultation with architectural advisors with experience in design of educational facilities of the type needed for the Center. Preliminary estimates of accessible program space needs range from 48,000 to 60,000 square feet, and cost estimates for construction and furnishing the facility range from 9.6 to 12 million dollars. In addition, approximately two (2) million dollars will be needed for scientific equipment, computers, and related supplies.

B. Operation and Support

The annual operating costs is estimated at approximately \$500,000 per year. Funds to cover the \$550,000 operating cost are expected to come from a variety of state, federal, and private sources and participant fees from projects such as National Science Foundation and U.S. Department of Education teacher education projects. Income from academic year and summer courses and workshops conducted at the Center will generate additional funds through participant fees, tuition, and tuition scholarships from grant programs.

C. Program Areas

The improvement of science education is a major national concern that challenges the scientific and educational communities. Effective response to the challenge will require a coordinated variety of program initiatives, including but not limited to the following:

- Teacher Preparation and Enhancement
- Promotion Of Interest In Science Among Minorities And Women
- Hands-On-Science Teaching Methods
- Constructivist Learning Theory
- Museum Education
- Interdisciplinary Science Curricular Options
- Knowledge Base For Teachers
- Integrated Science for Inservice Teachers.
- Interdisciplinary College Science for Preservice Teachers.
- Research Experiences for Selected Student Groups
- Research Experiences for Inservice Teachers
- Topical Workshops For Science Teachers
- Instructional Self-Assessment Program For College Science Faculty
- Integration of Computers into Science Education
- Science Education Network

4. BUDGET

Detailed budget projections are premature at this time. The following summary includes the preliminary estimates discussed above:

A.	Annual personnel and operating costs	\$550,000
B.	Facilities and equipment	
1.	Estimated cost of the Building	\$9,600,000-12,000,000
2.	Scientific equipment and materials	\$2,000,000

STEC ORGANIZATION AND PROGRAM STRUCTURE

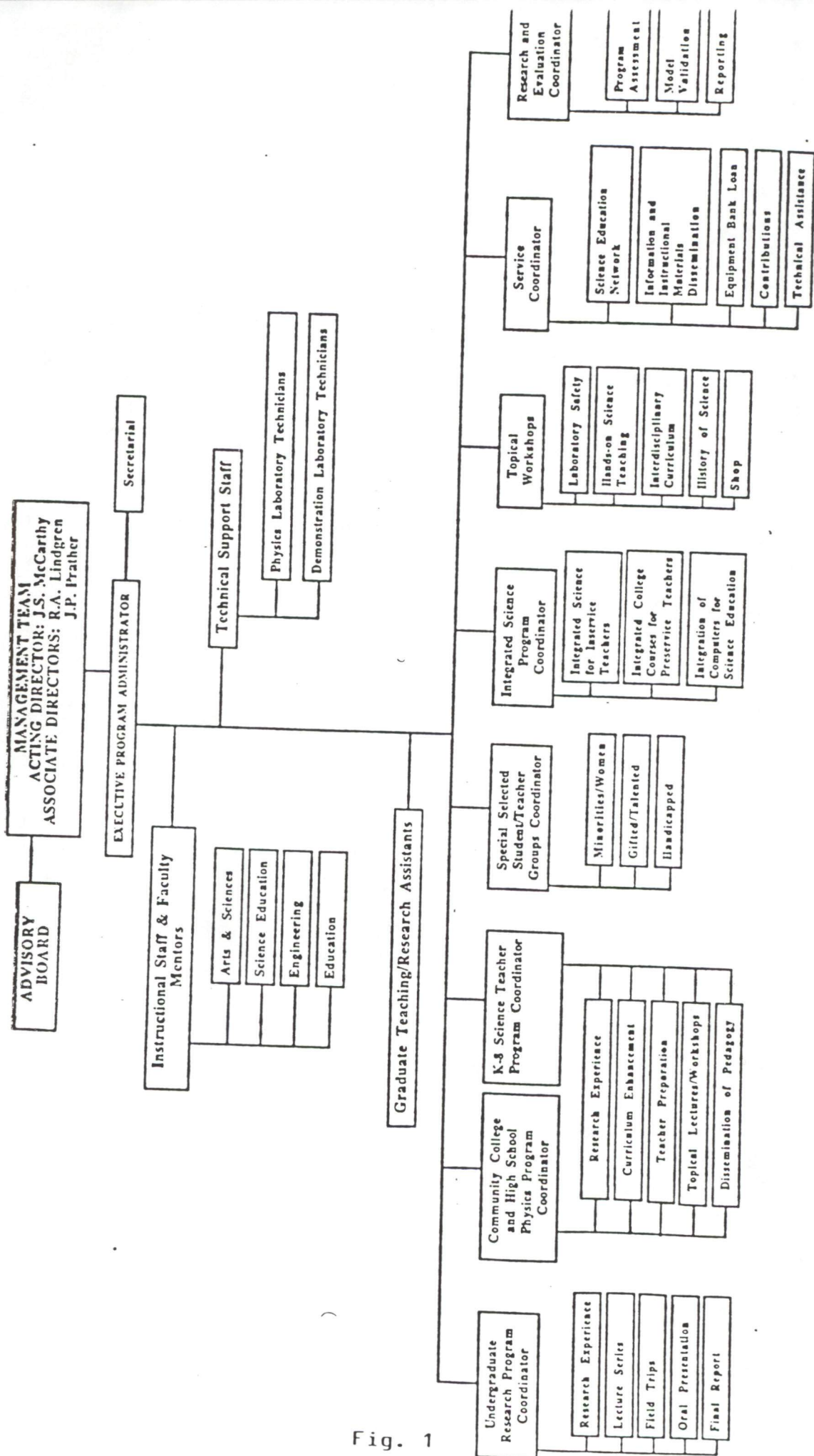


Fig. 1

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH

DOCUMENT NUMBER: 9202568

ORIGINATOR: 02

SPEECH: YES NO

FROM: LINDGREN, Richard A.: UNIVERSITY OF VIRGINIA

DATE OF EVENT: 07/30/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: UNIVERSITY OF VIRGINIA

TIME OF EVENT:

SUBJECT: AN INVITATION TO DELIVER THE KEYNOTE ADDRESS AT
THEIR SUMMER BANQUET.

RSVP: 07/27/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

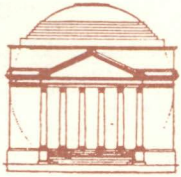
COPIES TO: PHYSICAL SCIENCES

REMARKS: ORIGINAL WAS FAXED 7/3/92

DATE OF LETTER: 07/03/92

DATE RECEIVED: 07/27/92

FILE: P-INVITATION



*Commonwealth Center
for Nuclear and High Energy
Physics*

RECEIVED

92 JUL 24 P 2: 08

OSTP
MAIL ROOM

July 3, 1992

2568
University of Virginia
Jesse W. Beams Laboratory
McCormick Road
Charlottesville, Virginia 22901
Telephone: (804) 924-6577
Telex: 9102500352
Facsimile: (804) 924-4576
V/TDD: (804) 982-HEAR

Dr. D. Allan Bromley
Executive Office Building
Office of Science of Technology Policy
Old Executive Office Building
Room 360
Washington, DC 20506

Dear Dr. Bromley,

We are all aware of your efforts and dedication to improve the quality of science and education in this country. Your accomplishments are well known and respected at the University of Virginia. I have been very much involved in establishing new hands-on science and education programs at UVA for science and physics teachers and also in helping to obtain approval for the establishment of a Science and Technology Education Center (STEC) at UVA. I would like to invite you to be the keynote speaker at our summer banquet, which is being planned to highlight these activities.

It would be a great honor to us if you could accept this invitation to return to Charlottesville, where, you, President Bush, and the Governors held the 1989 Education summit. Clearly, your presence would make a strong statement in support of our activities and that we are moving in the right direction.

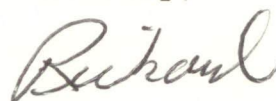
As I discussed earlier with you, we have been developing at the University of Virginia a hands-on physics summer research experience program for bright undergraduates (REU), a hands-on science summer research experience and curriculum enhancement program for in-service high school physics teachers (RECET), and an integrated physical science program for K-8 elementary teachers (IPSET). The latter two are jointly operated by the Department of Physics and the School of Education. We have support from the Commonwealth Center for Nuclear and High Energy Physics, the National Science Foundation, and the State Council of Higher Education.

In addition we are trying to establish a Science and Technology Education Center. This would be a facility that would centralize outreach science and mathematics programs for recertifying K-12 science and mathematics teachers. It would also coordinate undergraduate research programs, and be a showcase for science in general including scientific exhibits and artifacts. A brief summary of the center concept is included. Such a center has strong support from the Department Heads, the Deans of Engineering and Applied Science, College of Arts and Sciences and the Curry School of Education. We are presently awaiting the Provost and President to approve the establishment of the Center. Ultimately, it must be approved by the Board of Visitors.

In anticipation of approval we are planning a banquet at the Boars Head Inn in Charlottesville on Thursday, July 30 while our summer undergraduate physics students and high school physics teachers programs are still in session. Astronaut Kathryn Thornton, who holds a Ph.D. in Nuclear Physics from the University of Virginia, will also be present to show highlights of her recent flight in the Challenger. Representatives from the National Science Foundation, from the State Council of Higher Education, and from the University of Virginia will also be present.

I realize that this is rather short notice, but if your schedule permits, it would be beneficial to have you here when the students and high school teachers in our summer programs have the opportunity to hear your talk.

Sincerely,

A handwritten signature in cursive script, appearing to read "Richard".

Richard A. Lindgren, Director
REU/RECET Programs
Research Professor of Physics

SCIENCE AND TECHNOLOGY EDUCATION CENTER (STEC)

A Cooperative Effort of the University of Virginia
College of Arts and Sciences, School of Education, and
School of Engineering and Applied Science
(Revised from 9/27/92 document)

June 22, 1992

1. Philosophy and Purpose of the Center

Science, engineering, and science education are rapidly moving towards a crisis in the United States because insufficient numbers of young Americans are opting for careers in these fields. Improvement of science teaching is needed at all levels from kindergarten through college to promote greater interest in science and technology-related careers among students. The Science and Technology Education Center (STEC) is proposed to focus the research and teaching resources of the various divisions, schools, and academic departments of the University on the resolution of this important issue. This is also a challenge that will require the cooperation of leaders from business, industry, and government and other schools and universities across the nation.

The programs of the Center would address: the school's curriculum and instruction; research and development of programs for the education, certification, and enhancement of preservice and inservice teachers; and other science and mathematics related problems. Over the last five years faculty members of the UVa Department of Physics and School of Education have taken the initiative in offering professional growth and retraining opportunities for school teachers in the Commonwealth. Program initiatives to date include the following:

- Satellite Courses for Teachers and Distance Learning
- Research Experiences for Undergraduates
- Curriculum Enhancement for High School Teachers
- School-College Partnership for Elementary Science Teachers
- Integrated Physical Science for Elementary Teachers
- Science, Computers, and Mathematics Professions

These projects have been judged as successful and effective. Building on the knowledge gained from these programs and from a broad review of research in science education, the UVa Department of Physics and School of Education have designed a program to focus the scientific resources of higher education on the problems facing school and college science teachers today.

Since the beginning of planning for the Center, the scope of the project has expanded to include: the School of Engineering and Applied Science; additional departments of the College of Arts and Sciences including Chemistry, Astronomy, Environmental Sciences, Biology, and Mathematics; and the Virginia Museum of Natural History. The Center will include scientific exhibits, a planetarium, and a Museum of Natural History.

Through the Center, scientists and engineers and educators will be able to work together with teachers to develop near and long-term goals and objectives dedicated to maintaining the nation's position of leadership in science and technology.

The STEC will enable scientists, engineers, science educators, school science teachers, and undergraduate science students to work together to conduct scientific research, examine options for improved science teaching and teacher preparation, develop and validate models for reform of school and college science education, and disseminate information. By working together in the Center programs, university science and engineering faculty and school science teachers will formulate and test new or improved teaching methods and curricular concepts and develop programs that are more applicable to the nature, needs, and interests of the students we aspire to teach. It is anticipated that, as a result of the work of the Center, substantially increased numbers of students will perceive science and technology as interesting and attainable career arenas and opt for additional studies in those fields.

2. Goals and Objectives

The University of Virginia has the potential to make a much greater contribution toward meeting the challenge in science education through teaching, research and leadership; and this is the primary goal of the STEC. The following initial objectives of the STEC were formulated through conferences of scientists and science educators, following a review of literature on research and public expectations of science education:

1. Provide a central facility designed to meet the needs for faculty and school science teacher enhancement and science curriculum enrichment.
2. Develop and disseminate research-based model programs for college and school science teacher preparation and enhancement.
3. Promote the involvement of women, minorities, and other underrepresented groups in science and science education.
4. Review and describe current needs and trends in science teaching, and develop a research agenda to examine options for improvement of science education.
5. Assess and validate the effects of different teaching strategies over
6. Develop, validate, and disseminate effective instructional models for use in school and college science classrooms.
7. Develop, validate, and disseminate models for school and college science curriculum assessment and revision.
8. Develop and disseminate models for science program evaluations.
9. Provide school science teachers with intensive research experiences of a type that they would not be likely to obtain in regular science courses and teacher preparation programs.
10. Provide leadership training to prepare teams of school teachers and administrators for local leadership in the reform of science education.
11. Disseminate information and provide services to college and school science teachers through materials distribution and consultations, to be handled through a STEC Service Office.
12. Operate an equipment loan/rental facility to make specialized, expensive, and occasionally needed scientific equipment available to local school systems.
13. Contribute to the realization of the President's goal that our children will be number one in science.
14. Perform other services appropriate to the development of a scientifically literate society.

Programs developed and offered through the STEC would directly serve college faculty and undergraduates in the northeastern, mid-Atlantic, and southeastern states; elementary, middle school, and secondary science teachers and students throughout the region; and leading science teachers, supervisors and school administrators throughout the nation. Moreover, it is anticipated that the Center's work will encourage the establishment and expansion of similar centers at other major universities. Once established, the STEC will collaborate with similar centers to form a national **Science Education Network** for sharing information and models for effective science teaching.

Center programs and services will be characterized by opportunities for "hands-on-science" learning experiences through programs that provide a level of research and laboratory activity appropriate to the preparation level of elementary, middle school, high school, or college participants. During the academic year most of the participants will be college science students and preservice science teachers, with evening and weekend programs for inservice teacher enhancement and special short courses for high school and college students. In the summer, the Center will continue to provide programs for teacher preparation and enhancement and will expand its agenda to include programs in science for middle school and high school students.

3. Operation, Support, and Estimated Cost

After consideration of several alternatives, it was determined that a maximum level of success for such a program may be attained by establishing a **Science and Technology Education Center (STEC)** at the University of Virginia. Provisions for the development, operations, and support of the proposed Science and Technology Education Center include the following:

1. The Center will be an independent agency operated in cooperation with the College of Arts and Sciences, School of Education, and the School of Engineering.
2. The Center will seek to establish and nurture a tradition of cooperation among institutions of higher education, local school systems, state and federal education agencies, business and industry, and government in the quest for excellence in science and technology education.
3. Funding for the building and equipment is expected to be obtained from a combination of state, federal, and private sources.
4. Management of the Center will reside in an Acting Director and two Associate Directors for science and education respectively, with assistance of a full-time executive program administrator and support staff as indicated in Figure 1: STEC Organization and Program Structure.
5. Support of specific projects may come from grant funds, state and federal government, business and industry, and participant fees.

A. The Physical Facility

Initially, the STEC will continue to function in existing areas related to participating program sponsors. Eventually, the Center will need new space and facilities to provide a centralized area for operations and central program staff. It has been suggested that a building joining the the new addition of the Physics Building to Ruffner Hall would be appropriate to emphasize the cooperation of science and education in the conduct of the Center's educational activities. The new, multi-story parking garage to be constructed on Emmett Street will facilitate parking for teachers and others coming in from other areas for science education activities.

The design and size of the STEC building will be determined, on the basis of need as determined by Center operations and anticipated program growth, in consultation with architectural advisors with experience in design of educational facilities of the type needed for the Center. Preliminary estimates of accessible program space needs range from 48,000 to 60,000 square feet, and cost estimates for construction and furnishing the facility range from 9.6 to 12 million dollars. In addition, approximately two (2) million dollars will be needed for scientific equipment, computers, and related supplies.

B. Operation and Support

The annual operating costs is estimated at approximately \$500,000 per year. Funds to cover the \$550,000 operating cost are expected to come from a variety of state, federal, and private sources and participant fees from projects such as National Science Foundation and U.S. Department of Education teacher education projects. Income from academic year and summer courses and workshops conducted at the Center will generate additional funds through participant fees, tuition, and tuition scholarships from grant programs.

C. Program Areas

The improvement of science education is a major national concern that challenges the scientific and educational communities. Effective response to the challenge will require a coordinated variety of program initiatives, including but not limited to the following:

- Teacher Preparation and Enhancement
- Promotion Of Interest In Science Among Minorities And Women
- Hands-On-Science Teaching Methods
- Constructivist Learning Theory
- Museum Education
- Interdisciplinary Science Curricular Options
- Knowledge Base For Teachers
- Integrated Science for Inservice Teachers.
- Interdisciplinary College Science for Preservice Teachers.
- Research Experiences for Selected Student Groups
- Research Experiences for Inservice Teachers
- Topical Workshops For Science Teachers
- Instructional Self-Assessment Program For College Science Faculty
- Integration of Computers into Science Education
- Science Education Network

4. BUDGET

Detailed budget projections are premature at this time. The following summary includes the preliminary estimates discussed above:

- A. Annual personnel and operating costs \$550,000
- B. Facilities and equipment
 - 1. Estimated cost of the Building \$9,600,000-12,000,000
 - 2. Scientific equipment and materials \$2,000,000

STEC ORGANIZATION AND PROGRAM STRUCTURE

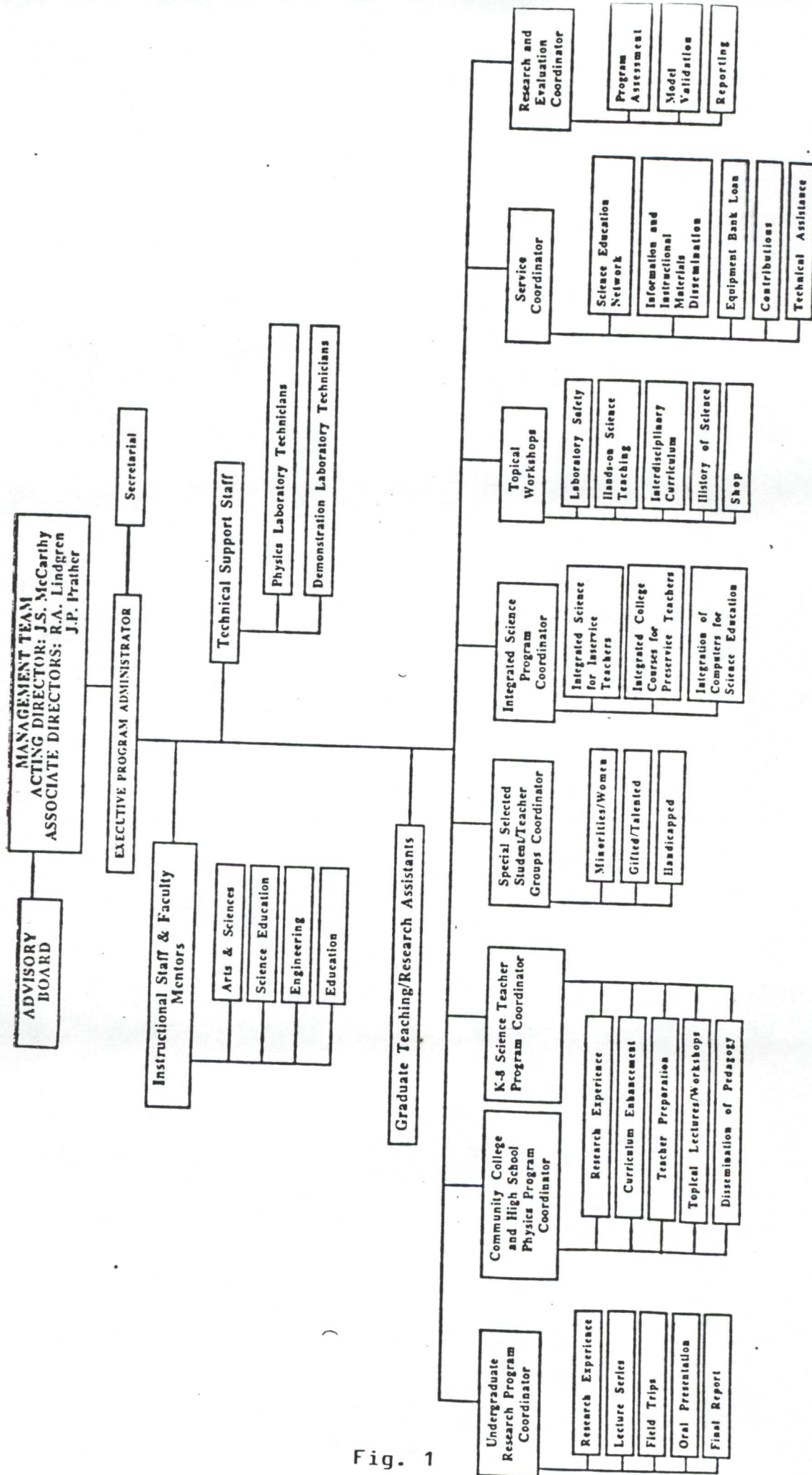


Fig. 1

"Document Control"

TYPE: MEETING REQUEST DOCUMENT NUMBER: 9202512
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: ROSE, Peter: EATON

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 07/01/92

SUBJECT: HE IS WRITING TO ASK DR. BROMLEY IF HE WOULD LIKE A
BRIEFING REGARDING THE UPCOMING IIT-92
CONFERENCE AT WHICH DR. BROMLEY HAS AGREED TO SPEAK.
HE ALSO NOTES THAT HE NEEDS VERIFICATION OF DR.
BROMLEY'S TRAVEL PLANS.

DIRECTORATE STAFF
ASSIGNED: DIRECTOR'S OFFICE ASSIGNED:

ACTION STAFF
REQUIRED: AS NECESSARY ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 08/04/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 07/21/92 DEPT RECEIVED:
FILE: P-DAB-INVITATION
CENTRAL FILES:

Peter H. Rose
Senior Director

Eaton Corporation
Semiconductor Equipment Division
108 Cherry Hill Drive
Beverly, Massachusetts 01915
(508) 921-0750
FAX: (508) 927-3652
Telex 174193

920 2512
RECEIVED

92 JUL 21 AIO: 31

July 1, 1992

OSTP
MAIL ROOM

Professor D. A. Bromley
Assistant to the President
Science and Technology
The White House
Washington, D. C. 20506

Dear Allan:

The abstracts of all the papers which will be presented at the Ion Implantation Technology Conference are now in. From these papers and from inputs for others like John Poate, AT&T and Nathan Cheung, Berkeley, I've prepared a briefing for you. I can bring this material to you in Washington and take advantage of your offer to join you for lunch or send it on to you. Knowing how pressed for time you must be, I can be available at anytime from now on given a day or so's notice.

The Conference Secretary sent me this message:

"I would like to confirm that Dr. Alan Bromley is still scheduled to be our keynote speaker for IIT-92. If so, we would prefer to have him arrive in Gainesville during the early part of the evening on Sunday, September 20th, as we have him scheduled to speak on Monday morning between 8:30 and 10:00. Also, please inquire as to whether he would like to attend the Conference's welcoming dinner on Sunday evening (scheduled for 6:30 p.m.) or if he would prefer a private VIP function in his honor."

Please let me know what you would like to do. I hope you will have time to see me. It would be an experience to see the great man in his lair and I can fill you in with what some of your old (not a joke any more!) friends are up to.

With best regards,



PHR:dcM

EATON

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION

DOCUMENT NUMBER: 9207842

ORIGINATOR: 02

SPEECH: YES NO

FROM: FISK, L.A.: NASA

DATE OF EVENT: 07/24/92

THRU:

TENTATIVE DATES:

LOCATION OF EVENT: CAPE CANAVERAL AFB, FLORIDA

TIME OF EVENT: 10:30 A.M

SUBJECT: AN INVITATION TO ATTEND THE LAUNCH OF THE GEOTAIL
SATELLITE.

RSVP: 07/14/92

CONTACT PERSON: MARIANETTI, Eugene

CONTACT NUMBER: 202-453-8315

INVITATION ACCEPTED? YES NO

COPIES TO: PHYSICAL SCIENCES
INTERNATIONAL/POL

REMARKS:

DATE OF LETTER: 06/30/92

DATE RECEIVED: 07/07/92

FILE: P-DAB-INVITATION



National Aeronautics and
Space Administration

Washington, D.C.
20546

7842
✓
RECEIVED

92 JUL 7 12:25
JUN 30 1992

OSTP
MAIL ROOM

Reply to Attn of: SPS

Dr. D. Allan Bromley
Science Advisor to the President
Office of Science and Technology Policy
New Executive Office Building
Washington, DC 20506

Dear Dr. Bromley:

On behalf of the Office of Space Science and Applications, I am pleased to invite you to be our guest at the launch of the Geotail satellite scheduled for Friday, July 24, 1992, at about 10:30 a.m. EDT.

Geotail is a joint mission between NASA and the Japanese Institute of Space and Astronautical Science (ISAS) to be launched aboard a Delta II expendable launch vehicle from the Cape Canaveral Air Force Station (CCAFS), Florida. Geotail will study the mechanisms of input, transport, storage, release, and conversion of energy in the magnetotail region of the Earth's space environment. The Geotail satellite is the first in the International Solar Terrestrial Physics Program, a multi-spacecraft, international effort to make a concentrated and coordinated study of the interactions in the Sun-Earth system.

As our guest, you are invited to attend a special science briefing, receive a tour of the Kennedy Space Center, and witness the launch. I have enclosed material which details scheduled guest activities. Current information on the launch status and the Geotail mission readiness will be available at least two weeks prior to the scheduled launch date on NASA's 24-hour nationwide hotline number: (202) 755-8363.

To indicate that you plan to attend, please call Mr. Eugene Marianetti, Chief, Special Events Branch, (202) 453-8315 no later than July 14, 1992. If you need further information, you may call Ms. Leslie Bermann of my staff on (202) 453-1630.

I hope that it will be possible for you to join us.

Sincerely,

L. A. Fisk
Associate Administrator for
Space Science and Applications

Enclosure



Geotail Mission

Guest Information

Launch Day

The Geotail launch is currently scheduled for Friday, July 24, 1992, at 10:30 a.m. (EDT).

You are urged to monitor the news daily for any changes in the schedule, which will also be announced and updated on NASA's 24-hour information service beginning two weeks before the scheduled launch date. The telephone number is (202) 755-8363. In the Kennedy Space Center area, you may obtain the latest Geotail launch information by calling (407) 867-2314.

Schedule of Events

On the day of launch, NASA-sponsored guest activities have been scheduled from early morning through the launch event. A Geotail mission briefing will be presented at Spaceport USA, followed by a bus tour of Kennedy Space Center enroute to the launch viewing site. Please observe the following schedule.

6:30 a.m. Buses depart from Holiday Inn
11300 N Atlantic Avenue
Cocoa Beach

6:45 a.m. Buses depart from Howard
Johnson Plaza Hotel
2080 N Atlantic Avenue
Cocoa Beach

Note: If you are not staying in Cocoa Beach, or otherwise wish to provide your own transportation, you may proceed directly to Spaceport USA and follow the remainder of the schedule.

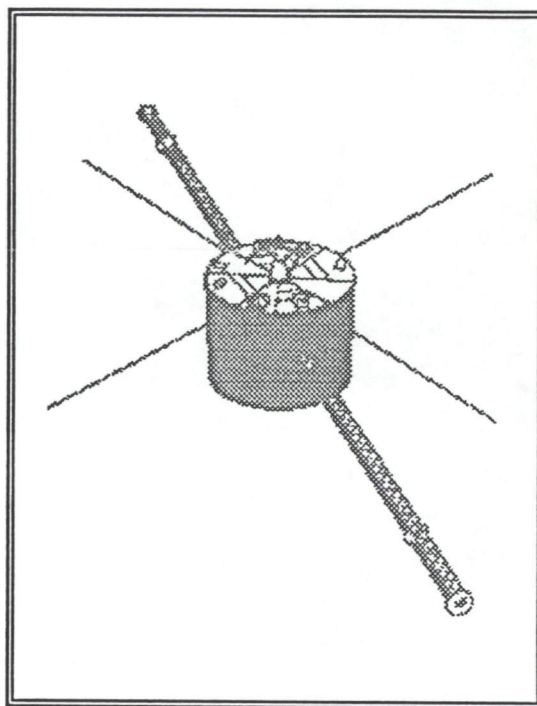
7:00-7:45 a.m. Guests Check in at Visitors
Center Room 2001
Spaceport USA

8:00-8:45 a.m. Geotail Mission Briefing
Galaxy Theater
Spaceport USA

9:15-10:15 a.m. Bus Tour of Kennedy Space
Center enroute to the Launch
viewing site

10:30 a.m. Scheduled Launch Time
(Launch window extends for
one minute)

Launch + 20 min Buses will depart for
Spaceport USA
and Cocoa Beach



Transportation/Accommodations

Guests are responsible for their own lodging accommodations and for transportation to Florida. Buses to launch day events are provided by NASA. Three major hotels in Cocoa Beach, Florida are:

Howard Johnson Plaza Hotel	407/783-9222
Hilton Hotel	407/799-0003
Holiday Inn	407/783-2271

These hotels are on the beach on North Atlantic Avenue and are less than one mile apart. Additional accommodations may be available through your travel agent.

Launch Postponement

The Geotail launch is subject to postponement due to adverse weather, upper atmospheric winds exceeding safety limits, or various equipment problems. An advisory will be put on the Kennedy Space Center Public Affairs recording as soon as possible for your benefit (407) 867-2525. If the postponement should occur after you have reached the viewing area, appropriate instructions will be provided. In any event, your invitation is valid for the next scheduled NASA launch date for the Geotail mission.

7837



NEW JERSEY MARINE SCIENCES CONSORTIUM

RE

Reply to Executive Office

92

24

MAIL ROOM

June 24, 1992

Are you interested in this?

The Honorable D. Allan Bromley
Assistant to the President for
Science and Technology
Old Executive Office Bldg. Rm. 358
17th St. & Pennsylvania Ave., N.W.
Washington, DC 20506

Dear Dr. Bromley:

As you know from our earlier correspondence the U. S. National Science Foundation, Tinker Foundation and CONICET (Argentinian National Council for Science & Technology) have been sponsoring a workshop series between the United States and Argentina, respecting cooperative research and development in use of ocean and coastal space.

As I reported to you on March 20, the first meeting was held in Buenos Aires in December, 1991. The second event is scheduled for Miami on January 18-21, 1992. 93?

Owing to the coincidence of this project's following immediately behind Presidents Bush's and Menem's visits, the project has received gratifying attention in both countries, and some of the finest coastal engineering talent in both countries has, and will continue to participate

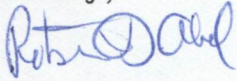
Owing to your position as the President's Science Advisor and the Scientific Theme of the conference series, i.e. Ocean and Coastal Space Utilization, the conference sponsors and organizers would be greatly honored by your willingness to either keynote the workshop personally or send a representative.

Depending on your personal schedule, you will be very welcome at any point in the proceedings. If you are interested -- without commitment -- we would greatly appreciate your designating a staff assistant with whom we could work out arrangements for a proper reception and background for you.

Page (2)

Your enormous prestige and history of activities in behalf of inter-American cooperation underscore my fervent hope that you will give our invitation your favorable consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read "Robert B. Abel". The signature is stylized with a large, looped "A" and a cursive "B".

ROBERT B. ABEL
President
For The Workshop Management

CC: A. Lara
R. Rennie
N. Caplan

1f

TYPE: INVITATION

DOCUMENT NUMBER: 9207827

ORIGINATOR: 02

SPEECH: YES NO

FROM: CHASMAN, Chellis, THIEBERGER, Peter and HANSEN,
Ole: BROOKHAVEN NATIONAL LABORATORY

DATE OF EVENT: THRU:
TENTATIVE DATES:

LOCATION OF EVENT:

TIME OF EVENT:

SUBJECT: AN INVITATION TO ATTEND A SYMPOSIUM IN HONOR
"HARVEY'S" RETIREMENT.

RSVP: 07/15/92

CONTACT PERSON:

CONTACT NUMBER:

INVITATION ACCEPTED? YES NO

COPIES TO:

REMARKS:



DATE OF LETTER: 06/23/92

DATE RECEIVED: 06/30/92

FILE: P-DAB-INVITATION



BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.

Upton, Long Island, New York 11973

Department of Physics

(516) 282-4581
FTS 666

June 23, 1992

Dear Colleague:

For reasons unknown Harvey has decided (or maybe it was Sally) to retire by the end of the present fiscal year, September 30, 1992. For reasons obvious we have decided to celebrate Harvey and his accomplishments in physics and thus turn a basically sad moment into a brighter one.

On Tuesday, September 15, a symposium has been arranged in the Physics Large Seminar Room at BNL from 2:00 p.m. to 5:30 p.m. with four distinguished speakers, followed by cocktails at 6:00 p.m. (courtesy of AUI) and a banquet (7:00 p.m.) at the Brookhaven Center.

We cordially invite you and your spouse to participate in the celebrations. The symposium is physics, the rest is social, so pick what parts of the program you like. The dinner, unfortunately, is not free, a contribution of \$35 per person will cover it as well as a farewell gift.

We would appreciate if you returned the enclosed registration form by July 15. Checks should be made out to AUI or Associated Universities, Inc. and marked "Wegner Symposium". Please mail everything to:

Mrs. Cora Feliciano
Brookhaven National Laboratory
Physics Dept., Bldg. 901A
Upton, NY 11973

Cora is the secretary for the symposium. Inquiries may also be directed to Ole Hansen, same address. Telephone and E-mail information is given below and the symposium program is enclosed.

We look forward to hearing from you.

With our warmest greetings,

Chellis Chasman

Peter Thieberger

Ole Hansen

Telephone: (516) 282-4581
FAX: (516) 282-4583
E-mail: FELICIANO@HI0.HIRG.BNL.GOV
HANSEN@HI0.HIRG.BNL.GOV
HANSEN@BNLDAG.BITNET

/cf

SYMPOSIUM TO HONOR HARVEY WEGNER

*Brookhaven National Laboratory,
Physics Large Seminar Room, Building 510*

at 2:00 p.m.

September 15, 1992

- 2:00 p.m. Nuclear Physics Seminar
H.C. Britt, Lawrence Livermore National Laboratory
"Nuclear Fission as a Tool for Studying Nuclear Reactions"
- 3:00 Coffee in the Physics Lounge
- 3:30 Physics Department Colloquium
W. Gibson, SUNY-Albany
"Ion Channeling: A Scientific Odyssey"
- 4:45 **E. Cosman**, MIT (retired) and Radionics, Inc.
**"Applications of Accelerators from Nuclear Structure to
Neurosurgery"**
- 5:10 **M. Barton**, BNL and IBM Watson Research Center (retired)
"The Beginning of RHIC"

Chairman of the Session: **P.D. Bond**, BNL

NAME: _____

ADDRESS: _____

TELEPHONE: _____

I would like to attend the Wegner Symposium ☐ yes ☐ no

and the Cocktails and Banquet ☐ yes ☐ no

My spouse will also participate in the Symposium ☐ yes ☐ no

and in the Banquet ☐ yes ☐ no

I enclose my check for \$35 ☐ \$70 ☐.

If you need overnight accommodations, please indicate ☐ yes, for one ☐ or two ☐ persons, and we will contact you about the possible arrangements.

Please return by July 15 to:

Mrs. Cora Feliciano
Brookhaven National Laboratory
Physics Dept., Bldg. 901A
Upton, NY 11973

TYPE: INVITATION

DOCUMENT NUMBER: 9202222

ORIGINATOR: 02

SPEECH: YES NO

FROM: DYVIG, Peter P.: AMBASSADOR OF DENMARK

DATE OF EVENT: 07/09/92 THRU:
TENTATIVE DATES:

LOCATION OF EVENT: WASHINGTON, DC

TIME OF EVENT: 8:00 P.M.

SUBJECT: AN INVITATION TO ATTEND A DINNER.

RSVP: 07/02/92

CONTACT PERSON:

CONTACT NUMBER: 202-234-4300

INVITATION ACCEPTED? YES

NO

COPIES TO: INTERNATIONAL/POL

*Conflicts with
PCAST
Dinner*

REMARKS: 6.30.92 Regretted to Hanna Hanson.
mn

DATE OF LETTER: 06/22/92

DATE RECEIVED: 06/22/92

FILE: P-INVITATION



To say goodbye to
Ambassador  and Mrs. Lukfus

The Ambassador of Denmark
and Mrs. Peter P. Dyvig

request the pleasure of the company of

Professor and Mrs. Bromley
at a dinner

on Thursday, July 9 at 8 o'clock p.m.

R.S.V.P.

(202) 234-4300, ext. 320 3200 Whitehaven Street, N.W.
Black tie

Massachusetts Avenue
Traffic light

Whitehaven St

Sheridan Circle

Chancery and residence

Danish Ambassador
3200 Whitehaven St., N.W.
Tel. 234-4300

U.S.
Naval
Observatory

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