

HC 85-302
23 August 1985

MEMORANDUM FOR THE RECORD

STAT FROM: Executive Secretary
Executive Steering Group for the Exploitation
of Overt S&T Information

SUBJECT: Conference of Executives from the Private Sector under the
Sponsorship of the Department of Commerce, 14 August 1985

SUMMARY: On 14 August 1985, a half-day conference of twelve executives from the R&D and strategic levels of industry met under the auspices of Dr. D. Bruce Merrifield, Assistant Secretary of Commerce for Productivity, Technology, and Innovation at the Community Headquarters Building. The private sector representatives gave insights into their concerns regarding foreign technologies and permitted both the government and private sector participants to assess future means for exchange of information on subjects of high interest.

1. Dr. Merrifield opened the intensely interactive session with an assessment that the US portion of world technology is dropping relative to that of other countries. This is occurring despite tremendous capabilities on the part of US industry to gather and analyze information, increase its knowledge base, transfer knowledge into applications, and take advantage of its entrepreneurial culture. As competition gets tougher, the life cycle for technological innovation is collapsing. US industry must develop a better ability to appreciate and act on what it sees happening. Information is available in the private sector which is of great value to government as well as to industry itself.

2. Throughout the conference, Dr. Merrifield stimulated the thinking of the private sector participants with his emphasis on the value of collaboration through R&D limited partnerships, which generate money, share risks, and reduce the developmental time frame. He has been able to encourage the development of consortia within industrial sectors for action on mutual problems. In addition to these vehicles for joint solutions, industry must be encouraged to take advantage of new, innovative, efficient manufacturing processes, search the world technological literature to stay abreast of new developments, and take advantage synergistically of what is happening in foreign countries. He cited the binational industrial R&D groups in existence and being formed as prototypes of international collaboration. Dr. Merrifield noted that carefully prepared and presented initiatives have changed the attitudes in the legislative and executive branches, brought changes in legislation and governmental regulations which had acted as barriers to innovation, and supported cooperation between government and industry in selected sectors. He sees the governmental role not as directive, or managerial, but rather as non-interventionist, catalytic, proactive, and supportive in making relevant information available

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3. Industrial representatives spoke to their concerns about the decline in the material data base, the disappearance of solid infrastructure and laboratory facilities for research, and the loss of corporate technology and culture. They assess much of US business as risk-averse, geared to slow change and hierarchical management, when these approaches are outmoded. Their contributions to the discussion brought out the financial pressures caused by governmental requirements dealing with environment and safety factors, testing and control regulations, disparate foreign laws and regulations, inequitable international agreements, and legal procedures which impinge on R&D by requiring capitalizing R&D costs and warranting R&D data. They noted that time lags between initial R&D work and the ultimate commercialization are too long for an individual firm to undertake the costly risks involved. At the same time, foreign competition is increasing, often with foreign governmental support, from Japan (innovative applications, robotics, and pricing structures), Germany, and France.

4. At the same time, private sector participants have had experience with the benefits of bringing virtually all the leading firms in a given industrial sector together for sharing and the success of joint activities, such as oil operating groups. They see a role for a partnership between all the firms in an industrial sector and government, a benefit from mutual education and motivation, and a role for government-academic collaboration and industrial consortia with due regard for the principles of the American private enterprise system. US technology has the lead in computer-integrated manufacturing, integrated data bases, and manufacturing automation protocols, and can still sell CAD, lasers, vision systems, and software to the Japanese. Structured relationships with the Japanese in military-related industry received support. Previous government leads and support as seen in the Apollo and Viking programs, were viewed favorably and the SDI captures and stimulates the vision. On the other side, the US has been able to react well if scared enough. The participants thanked Dr. Merrifield for his insights and his skill in presenting a forceful, cogent argument.

5. Other government discussants referred to concern over the loss of technologies relating to national security. The depth of knowledge in various technology sectors held by industry is of great value to the government. A concern expressed regarding the flow of information outside the classified defense sector brought a number of responses that the flow is critical for US industry, which is also on the receiving end of information. Commerce Department representatives pointed to the value of competitive assessments of several industrial sectors including those involving serious threats in individual sectors and across several areas.

6. The private sector participants agreed to give serious attention to the matters raised in the questionnaire received and the issues identified in the conference. Further discussions in a smaller or full-scale group were welcomed.

* * * END OF SUMMARY * * *

1. On 14 August 1985, Dr. D. Bruce Merrifield, Assistant Secretary of Commerce for Productivity, Technology and Innovation, sponsored a half-day conference to which he invited twelve executives as representatives from private industry. (The private sector participants are identified fully in Attachment A.) Representatives of the government, both Commerce Department and the Intelligence Community, also participated as discussants. (Principal government participants are listed in Attachment B.)

2. The purpose of the Conference of Executives was to give private sector representatives an opportunity to provide the government insights into their concerns regarding foreign technologies of high interest to them and to the government. In addition, the discussion was to help both government and private sector participants assess the utility of creating a forum or other means for the appropriate exchange of information about foreign technologies which will benefit American enterprise. The private sector participants hold responsibilities for R&D, technology development, strategic planning, or corporate management in firms engaged in technological applications. Their positions permit them to address the international implications of foreign technological progress and the impact on their firms, which represented a mix of small, medium, and large companies.

3. Dr. Merrifield opened the Conference with a description of his concerns in holding the Conference.

a. He noted that capabilities are in place to gather and analyze information within the private sector and in government, but he has not seen much evidence of them in effect in providing information in either direction. He observed that the US, with 5% of the world population, has seen its technology increasing in absolute terms, but dropping as a percentage of the world total as other countries do more. This trend has occurred despite the greater expenditure in the US to increase knowledge, the greatest base for the translation of knowledge to applications, and an established entrepreneurial culture. Barriers are in the way of capitalizing on these advantages.

b. The Japanese are targeting on individual industries, coordinating their approach within industries, leveraging the results, and closing their domestic markets to imports with devices such as two-tier pricing which favors exports. No individual US company can stand up to this targeting practice, which can undercut not only US but also European industries.

c. In addition, the life cycles of technological innovations are collapsing from five to three to even one-and-one-half years. To compete within these shortened periods, companies are encouraged to overbuild, often with government subsidies, with a resultant overcapacity that destroys the industry. This is seen in the development of steel plants in Brazil.

d. US industry often foresees developments coming long in advance, but does not appreciate what it sees. As much as three years ago, the US Semi-conductor Research Center wanted to develop a four-megabyte chip, but

did not. Industry needs to improve its intelligence functions. Commerce Department has developed competitive assessments of sectors of industry which point to impending problems. For example, in the petro-chemical sector, feedstocks are the key economic factor; since gas is now flared at the wellhead in many countries, it is essentially free to gas and oil producing countries which are now entering the market with refined products. Trends can already be seen which are driving labor-intensive industry offshore.

e. Incredible information is available in the government but the intelligence community needs to know what each industry knows about its own field. This information is of tremendous help to the government. A lot of open source information is available to the private sector which is not used, for example, translations of Japanese information. The government should not be interventionist, but can be proactive and catalytic.

f. Dr. Merrifield reminded the participants that the Conference is off the record. Statements made by government representatives are not for attribution to them or their agencies. Observing this groundrule is essential for a successful discussion.

2. Mr. Thomas Murrin (Westinghouse) complemented Dr. Merrifield on his excellent overview. In commenting on the reference to the superchip, he noted that the implication was that the previous period was opportune for action but that we now cannot get our act together.

3. Dr. Merrifield noted that with the change in anti-trust legislation, collaboration on R&D is now permitted. If any firm should have contrary experiences, he will personally intervene with the Department of Justice. This new development is significant for R&D, because no one firm can undertake a 7-10 year risk alone. Together, they can collapse this time frame. He has been working to improve tax incentives and to promote the use of R&D limited partnerships (RDLP's), which have been legally possible since 1954. The RDLP permits removing R&D from the profit-and-loss balance sheet of the firm. Even with these arrangements, there are still risk factors and still the high cost of capital, e.g., 15% vs. 5% in Japan. Moreover, this year is not favorable for increasing tax benefits for industry. Nonetheless, RDLP's have generated several billions of dollars and brokerage houses have pools of several hundreds of billions. He is encouraging investment into broad portfolios to spread the risk further. Base technology needs to be exploited without competitiveness. Moreover, new developments must be used in imaginative ways; e.g., the 4Mb chip should not be used in a dedicated plant but in a flexible automated complex.

4. Dr. Stanley L. Abramson (Westinghouse) pointed to underlying problems which he observes as an adjunct professor at Carnegie-Mellon. The US management paradigm is built upon the premise of no change or only slow change. Graduate students are currently being trained for hierarchical management structures which no longer exist. Both government and academia are also saturated with the hierarchical approach. Dr. Merrifield commented that a hierarchy loses sight of the mission for which it was established. Industry needs structures to manage change, such as matrix and task force approaches.

5. Dr. M. A. Morrie Steinberg (Lockheed) referred to a wide range of open source material that he has used in DoD study teams, in working on Japanese electronics and living in Japan, in using the Lockheed Dialog data base, and through excellent unclassified studies by the Office of Naval Research in London and Japan (particularly one on welding).

a. He noted in reference to the comment about declining opportunities, that the US steel industry is no longer able to produce oxygen-melt steel efficiently; only Japanese firms were willing to manufacture to his specifications. Over 90% of the papers before the American Institute for Mining and Metallurgy Engineering are from Japan.

b. His experience in governmental, including White House, committees in electronics, cruisers, and trans-atmospheric vehicles (particularly his involvement with reentry vehicles) confirm the lack of a material data base. New requirements force the use of materials never developed before which require testing. When the SR-71 was to be tested, many locations had wind tunnels. Now the corporate technology and culture are gone. We need to examine where we are coming from and assess the technology base. If both were done, it may be possible to avoid unnecessary competition; perhaps there should be one high-temperature materials testing site rather than several as existed before. Now the data base is not available for testing and design and no one wants to create it. Seventy percent of the information on materials properties is not available in the US on-line, though it is on-line in Japan and Germany. On the other hand, through his work with the National Academy of Engineering he knows that the information available on computer-integrated manufacturing (CIM), integrated data bases, and manufacturing automation protocols (MAP) boggles the mind and is probably not available overseas.

c. He has chaired meetings on net shape technology, which entails precision forging without further tooling. He brought in all the US forgers to the meeting. Similarly, he has held a meeting on emerging technologies, and will hold one on automation of composites technology. All who work on these subjects in both classified and unclassified projects can be brought together to talk with each other. Dr. Merrifield noted that this points out a mechanism for communication processes in the context of single initiatives; he hopes that consortia will develop from conferences on advanced ceramics. Dr. Steinberg noted that consortia are needed in manufacturing technology, when one realizes that the management information system (MIS) for a single weapon system costs \$80 million.

6. Dr. Robert W. Baeder (General Electric) agreed with the need for integrated data bases, CIM, and MAP. He noted that it is often not a question of base technology, but rather application and integration, both of which are difficult even with money available. US industry is not used to working together in consortia. Because this has not been successful, we must find one that can serve as a good demonstration. Other issues, such as currency and trade, need attention, especially if this is economic warfare. Information exchange is good, but it may just tell us what has happened after we get killed.

7. Dr. Merrifield noted that in testifying on anti-trust legislation before the Rodino committee he used case histories which convinced the chairman of the problem of foreign competitive practices. But Chairman Rodino stated that Dr. Merrifield was the only one who had told him of these cases. The Department of Justice was also astounded. There are now 25 consortia and two or three are being formed each month. He brought together 94% of the pump manufacturers. He can do this, kick people in the shins, and keep the process open. The critical element is the data going into the process. Dr. Steinberg commented that consortia need either government as a partner or all firms of the industry together because the results lie too far in the future. No one is willing to consort on things that can be seen coming into manufacture in a short period. Dr. Merrifield noted that DARPA and the DoD can also be brought into the picture.

8. Mr. Richard E. Spatz (Koppers) expressed his pleasure with the tone of the introductory remarks. From the viewpoint of the small (\$2 billion) company with little defense or even government business, the problem with consortia is the potential problem of conflict with the private enterprise system, which needs to be addressed philosophically. A consortium is good if you are in it. Anti-trust exemptions are excellent as one goes down the road. However, some in the private sector will scream if they sense a conspiracy between government and big business. One must address: How to distribute the information? What does government give? How? To what firms? Only those working on weapons systems?

9. Dr. Robert B. Isaacson (Celanese) observed that the Japanese targeting approach has its successes, but it stifles initiative within Japanese industry. "The nail that stands up gets hammered down." Japanese are now looking at the way little ideas can arise in the US and how information is shared.

10. Dr. Merrifield referred to his earlier remarks that a non-interventionist approach, preferably through tax measures, is best. The RDLP is available to all firms because it is off the corporate balance sheet. The global market is tough and "you either tweet or get off the perch." "Integrate, automate, or evaporate" is another way of saying it. There is incredible diversity in the US. Recent Treasury proposals for tax reform have been improved for industry. Growth is taking place at the same rate as the growth of the labor force. There is an explosion in new business. Lots of interest centers on high-tech, but this sector accounts for only 10% of the jobs. The support category provides 70% of GNP. This phenomenon has never happened before. But life cycle problems are made even worse by foreign reverse engineering of US products. Section 7 of the Clayton Act, which permits stopping an action now if it appears to inhibit trade in the future, must be changed. No company can survive without flexible, automated manufacturing; with it, the US can reclaim industries, such as shoe manufacture, lost to overseas competitors.

11. Dr. Gilbert V. Levin (Biospherics) asked for further elaboration on the consequences of the inevitability of the loss of US leadership because others are growing even as we expand in technology. Dr. Merrifield responded that this loss is not inevitable unless the US does not get its act together and take advantage of efficient processes such as continuous casting of

steel. We must not fail to take advantage of the technology we have and are developing. For example, because of work by DARPA an electrically powered vehicle is more likely to emerge. The lack of real information is a barrier. But often intelligence is available, e.g., we knew the Japanese were targeting on semi-conductors, but we did not act on what we knew. Other examples are the cheap petrochemical feedstocks and excess capacity in copper production in light of substitute products.

STAT 12. [redacted] (OGI) noted the government's concern with the loss of of technologies related to national defense. While we cannot know how far developments will go, one of the purposes in the Intelligence Community in following the situation is the national security implication. Economically, a small number of facilities in materials could supply the world needs. We worry about jobs, but still more about national security implications, e.g., the oil issue in the 1970's. Some of the discussion here implies a loss of know-how. There is a community of interest between government and industry: government can piece together information from overseas better than industry, but the Community is not as good as industry in technologies. Dr. Steinberg injected that this observation applies as well to common technologies such as forging. [redacted] commented that the US does not know what lines of industry we are dependent upon.

STAT 13. Dr. Steinberg raised his concern over the disappearance of previously existing laboratories for research: the Bethlehem steel laboratory, the national nickel laboratory, ARCO laboratories. He is disturbed by such statements as "mining is dead in the US" and such phenomena as the disappearing infrastructure.

14. Dr. Abramson noted that the graduate students he encounters are 80% of foreign origin and are not of the traditional US quality. American students say there is no opportunity in US laboratories in the face of these closings.

15. Dr. Baeder recognized the validity of the national security argument, but noted that industry is saying that if we cannot beat Japan and Korea, we should join them. This approach may give the DoD fits because of the flow of information across national lines. However, the flow will really be in both directions, with the US continuing to do some, possibly less, research while obtaining research from other countries.

16. Dr. Ira Kohlberg (GTE) noted the cultural change taking place in the US. American companies want to be the first and best, but profits do not follow. The example of fiber optics shows that the issue is not dollars but the absolute time needed to develop the field. Can the US catch up at 40 hours a week? Assuming the correctness of Dr. Steinberg's statement that the US has the technology, how can we get going before being overtaken? He is enthusiastic regarding the SDI, because he sees in the genius of this proposal exciting technological possibilities in many fields.

17. Dr. Levin commented on the data needs and problems confronting a small (\$7 million) firm.

a. In carbohydrates, such as the development of left-hand sugar, the cost factors involved in assuring the safety of the product which is made in only a few companies are heavy. The pressure on a small firm is seen also in the use of chemical analysis systems, which cost \$200,000 per system, two of which are required for each EPA project to examine infinitesimal traces of chemicals.

b. In competing with Japan and dealing with Japanese firms, one must be aware that patenting a product in Japan, as Japanese firms want, makes the patent public property; he asks the Japanese to give a non-disclosure agreement before discussing products with them.

c. US industry targets its government. The Apollo program was good. The Viking mission to Mars developed a team which cost a billion dollars to put together, but which was dissolved by TRW as soon as the mission was over. He favors getting behind SDI initiatives and the development of Viking mission-type efforts.

d. In the arena of legal constraints, R&D costs cannot be capitalized. The Federal Standards Board has ruled that R&D must be expended.

e. As to joint ventures, no one wants a five-year venture, especially if something has to go before the FDA. Companies want a return in two years, even if it is off the balance sheet.

f. Commerce Department doesn't always help. Oil spill monitoring instruments are not approved under reciprocity with the United Kingdom, while under the terms of the Marpole agreement, British instruments are accepted here.

18. Dr. Merrifield urged that automated searches of the world's S&T literature be made routinely. If this is not done, other countries will get ahead of the US. Some changes in previously harmful governmental regulations have been beneficial: the government used to require non-exclusive licensing, but under new legislation US laboratories may work with individual firms in industry. We need to be alert to changes that should be made.

19. Dr. Kenneth L. Rose (Ford Aerospace and Communications), speaking for a firm that is primarily a defense contractor except for telecommunications satellites in the private sector, has observed how the Japanese gradually transfer technology from the US. These transfers have not always been the state of the US art, but have been ahead of current Japanese developments; as a result of their efforts they have cut US profits by one-third. Partnerships can now share technological contributions. Competition involves foreign governments as well, as seen in European, particularly French, support for its industry competing in Brazil. Of course, European monopolies in PTT have no counterpart in the US. Software is another area of competition. In many

sectors, industry needs to put technology to use in more ways than in the original application. Legislation based on concern for waste, fraud, and abuse, which have existed, requires warranting of data, which is not possible in R&D contracts; the pendulum has swung too far. Dr. Merrifield observed that software is a stunning opportunity for the US. Dr. Rose commented that his firm is able to give to the government useful information on satellite technology.

20. Mr. Thomas Murrin (Westinghouse) alerted the conference that his comments should be taken as personal observations which may be rather dogmatic and assertive.

a. With regard to factory automation, he noted that in all areas in which the Japanese have targeted US industry, they are ahead of us. The US and Europe have know-how and are innovative. Without getting into the issue of whether the Japanese are basically creative, they are doing things which are being done nowhere else in the world. At Matsushita, five humans and a factory of robots are turning out 10,000 VCR's per day, the world's finest product, and the firm is thinking of cutting the number of people. IBM is just starting in factory automation.

b. In nuclear power generating equipment, the US has taught others, the French, Germans, and now Japanese, too well. French power is now 40% nuclear and the intention is to become self-sufficient. The US has 12% of its power from nuclear sources. The French are formidable competitors, as seen in the three years of negotiating with the PRC, during a time when the US had no opportunity. Germany is making export of nuclear equipment a top priority; in competition with the US in Egypt the Germans are likely to win with a new design. The new design would not be approved in an NRC-type review, which costs \$100 million to conduct. Probably the German government helped in this competition. Even if a bilateral NPT is approved, Germany will already be entrenched. Among the short list of US high-tech incumbencies, the US may lose its lead in nuclear power with implications for both the economy and security. When PRC Vice Premier Li Peng, a Soviet trained electrical engineer, visited the US recently, he commented that the Commonwealth Edison nuclear facility he saw was too costly for the PRC because it was over-designed. It took great efforts, including those of the Secretary of Energy, to explain to him why this engineering is done in the US but not for overseas sales.

c. Mr. Murrin spoke on military electronics from his experience as chairman of the Defense Policy Committee on Japan. In the first study done on fiber optics by DoD, it was learned that only ten US scientists in this field had ever been to Japan. Japanese commercial competence in electronics is transferable to the military arena, in a reverse of the US practice to transfer in the other direction. The Japanese have thought of all the spinoffs with industries tied to defense companies. The issue is how to structure relationships with the Japanese to be teamed with them against the Soviets. Such a relationship could tip the balance against the USSR. If this is not done, there will be a new group and dimension of competitors.

d. We have known these things for six years. He has recognized that "a fool on a mountain top can see more than a wise man in a valley." He feels that his testimony before Congress did not have any impact, but education and motivation are necessary. If the US is scared enough, we can beat anyone. It probably cannot be felt within Washington, but from his vantage point it seems that top people in Washington are insightful and that there is the possibility of doing great things in a hurry. There should be dozens of initiatives like the VSIC effort which Dr. Ruth Davis mothered into being. He commends Dr. Merrifield for what he is doing, because the band of Indians is getting closer.

21. Dr. Baeder pointed out the two tiers of production in Japan: one high level, including factory automation for export, one inferior level for domestic consumption. The US still has the lead in several areas, in which the US can sell in Japan: CAD, lasers, vision systems, but the Japanese are coming on strong. Dr. Merrifield added software to the list. Dr. Steinberg noted that in dealing with Fujitsu, IBM World is selling the Westinghouse CADM system. [redacted] asked why the US is helping Japan. Dr. Steinberg replied that this is not helping them, but is marketing. Dr. Baeder noted that the Japanese see defense marketing as big business which they have been looking into for five years.

22. Dr. Merrifield described a pattern of bilateral relationships which are bearing fruit. The first Binational Industrial Research and Development (BIRD) group with Israel has been a successful model for replication in thirty countries. Three professionals with assistants in Israel search out all opportunities there for developing technologies. US opportunities are searched out, e.g., by the Industrial Research Institute. The companies are then matched. The key is a proactive office in both countries. The Israeli effort, supported by a foundation, is a small office which has access to funds which do not go through parliament. India is the first new effort he has been working on. If successful, it will help India to pay back its debt and to build a middle class. The French, British, and Swedes are also interested; the Japanese have asked six times to join in such efforts. There are open opportunities between US and foreign firms, formed around commercial efforts with payouts. Commerce Department is proactive in the interface with industry; the former adversarial relationship has to go. The government can serve as an agent of change, but should not try to manage. The issue is focusing the efforts.

23. Dr. Abramson noted that the flow of the cutting edge of technology is rarely where it is expected. It has rarely occurred from the military to the private sector, the exception being electronics. In artificial intelligence and software, the basic work has been done in the universities and DoD has been remiss. [Ed. note: much of the academic AI research is funded by the government.] We often forget, in our concern about speeding up the move from the laboratory to a commercial success, that the time lag of nineteen years, identified in 1962 studies, still exists; the shift cannot take place in three years. The question is how to manage fundamental change over twenty years on the average. Biotechnology has been under development for thirteen years and

there was no payoff for the first nine. Management's perspective is short-term; as long as they are fat, dumb, and happy, they are not willing to take risks. Individual graduate students in a recent poll showed that they and their companies are overwhelmingly risk-averse. Companies are not able to manage risk involving great amounts of resources. The front end costs are the cheapest and what we are doing is the best in the world. But we are not taking the necessary risks in the next pilot stage (where costs are 100 to 10,000 times the R&D costs), or in the application phase (where costs are 100 to 10,000 times the pilot stage).

24. Mr. Karl Kiefer (FMC) described his company as a big manufacturing company. He agreed with the comments regarding risks, but noted that oil companies regularly take great risks by sharing them through operating groups which act as consortia. They are sensitive to anti-trust considerations, but they are working. There needs to be the assurance that there is a profit-making engine out there and there may need to be vision and dedication. The government can perform a useful service by simplifying the picture as Dr. Merrifield did in his opening presentation.

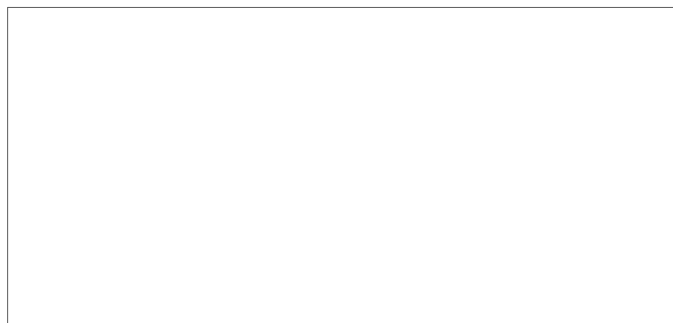
25. [redacted] (DIA) expressed his concern regarding the flow of US information out of the US, since there is no system to control this flow outside of the defense sector. This was of little concern in the early post-World War II period, but how can we absorb the effects now that other countries are active in R&D? Dr. Merrifield commented that our information is one part of the world pool of information. Legislation is now being developed to license information exclusively from US laboratories to private companies and the RDLP's capture information for the general partner. The US should build on the synergism of what is available elsewhere. There is a danger in closing down information; classified information should be protected, but the flow of other information is critical. [redacted] noted that the issue is how to restrict information which a company or the US is not ready to share. Mr. Murrin noted that hitherto foreigners have gone to US laboratories.

26. Dr. Steinberg commented that the risk is not in research, but in going into the next steps, the pilot and breadboard stages. In these, Dr. Merrifield noted, Japan is ahead of us. Dr. Abramson, in commenting on Dr. Rose's question whether it takes less time now to get into commercial production, noted that it took Japan twenty years to bring out the Betamax after the R&D had been done. Japan did, however, reduce the cost from \$50,000 to \$500. Dr. Baeder identified the different equations involved in dealing with capital costs. Dr. Rose, referring to the earlier point about information flow noted that the flow of technology cannot be stopped, even if we want to. The US needs to get the lead and refresh its lead. The long-term perspective being discussed here for R&D breaks down if the product can be commercialized in three years. Dr. Abramson noted that R&D is not a product on the shelf. Dr. Philip Berman (DIA) noted that the US scientist in dealing with foreigners tends to give him the whole data dump and does not get much in return. The Soviets are covering the whole industrial base in the US like termites.

27. Mr. Spatz welcomed this helpful dialog and hoped for a pragmatic approach to what to do next. This is a gigantic problem which the conference participants should think about for the next two weeks and then get together in the next two months. Dr. Steinberg noted that the government-university consortium needs to do more, because this interaction is worth a lot. He is trying to encourage more work at the basic level, for example in dealing with heat generated in returns from space. This question can turn the universities on since it is new to them. Dr. Abramson expressed his view that the freedom which permits the student to tell the professor he is full of b.....t is what makes fundamental research possible (even though the students are foreigners).

28. Dr. Kohlberg suggested that there should be realtime market evaluations of key technologies, for example, the impact of the Japanese Fifth Generation computers on IBM, Japanese machine intelligence, and high-speed chips. The findings should not be classified, but should be kept under wraps and there should be target programs to keep industry informed. Mr. Leslie Smith (National Bureau of Standards) commented that Commerce Department has published competitive assessments in an ongoing program; a current study deals with microsystems; copies of the assessments are on display in the conference room. In commenting on Dr. Kohlberg's question of how to disseminate these studies, Dr. Merrifield noted that Commerce needs to be more proactive than NTIS has been in the past, should hold conferences in various subject areas, and should foment consortia. Dr. Baeder suggested that in addition to looking at individual subject areas, the interrelationships should be shown to help make the point that the sky is falling. Mr. William Sullivan (Commerce/ITA) referred forcefully to the trade deficit as a diagnostic of the problem. The fiber optic study taught the government that there was no trade association for the industry; now there is one. We see evidence of the sky falling and economic warfare in packet switching, cellular radios, and other products which we developed first but have not pursued overseas because of lack of access. NEC will sell over \$1 billion in the US through a subsidiary; Fujitsu will sell \$700 million this year. Moreover, they join professional and trade associations in the electronics fields. Mr. Frederick L. Hayes (Commerce/PTI) reported that the Industrial Research Institute has done a series of studies on ceramics, composites, and flexible manufacturing. These were then brought together to reveal a whole new scope of business, which will be presented to industries in a seminar mode. Mr. Murrin stated that the concern is appreciated and we should pick up on it, answer the questionnaire provided to record observations on the Conference and leave to Dr. Merrifield whether the participants should get together again.

29. Dr. Merrifield suggested that he might first get a small group together and then the plenary group. In any case, views will be shared by mail in the interim.



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Final Listing

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Mr. Don William FLORA	COMSAT
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Mr. Karl S. KIEFER	FMC Corporation
Dr. Ira KOHLBERG	GTE
Dr. Gilbert V. LEVIN	Biospherics, Inc.
Mr. Robert G. MORRA	Martin Marietta
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