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STAFF SUMMARY REPORT:

THIRD ANNUAL MEETING

KOREA - U.S. COMMITTEE ON

SCIENTIFIC COOPERATION

Seoul, Korea

10-11 October 1975

Sponsored by

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Republic of Korea

and

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This report is a staff-prepared summary of the third annual meeting of the Korea - U.S. Joint Committee on Scientific Cooperation. The meeting was held in Seoul, October 10-11, 1975, under the joint sponsorship of the Ministry of Science and Technology (MOST), Republic of Korea, and the National Academy of Sciences (NAS) of the United States. Participation by the NAS was made possible through funds provided by the Office of Science and Technology, Bureau for Technical Assistance, Agency for International Development under contract AID/csd-2584, Task Order 1. Funds for the daily expenses and travel within Korea of NAS participants was provided by MOST.

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INTRODUCTION

Since 1972, the National Academy of Sciences (NAS) has maintained a cooperative relationship with the Korean Ministry of Science and Technology (MOST). In that year, a three-man NAS advisory group visited Korea for two weeks to consult on the structure and functions of MOST.

Pleased with the utility of the advisory group, the Minister of Science and Technology asked the NAS to join with the ministry in establishing a Korea - U.S. Joint Committee on Scientific Cooperation. The first general meeting and a workshop of the Joint Committee took place in Seoul, 13 - 16 November 1973. The second annual meeting of the Joint Committee was held in Washington, D.C. 15 - 16 September, 1974.

The main purpose of the program of scientific cooperation is to provide recommendations on specific applications of science and technology to Korea's economic and social development. The kinds of issues considered are:

- the development of long-range policy for science and technology;
- the governmental structure for science and technology;
- national needs and priorities for research and development in specific economic sectors; and

- policy and educational issues related to scientific and technical manpower needs.

In addition to consideration of the overall prospects and plans for science and technology, MOST also likes to have outside views on institutional needs and the application of science and technology to development of particular sectors. In this regard, one function of the Joint Committee is to recommend topics or problem areas that seem to call for the kind of in-depth scrutiny possible through workshops or advisory groups. These specific, intensive activities are held as needed and as possible, complementing the annual meetings of the Joint Committee. A joint seminar on two energy-related topics -- industrial energy conservation and solar space heating and cooling -- was held in Seoul in November, 1974. In December, 1974, an advisory team visited Korea to discuss research and higher education in the marine sciences, and another advisory team visited the country in April, 1975, to discuss the planning of the Dea Duk Science Town and the development of specific research institutes there.

The broad purposes of the third annual meeting of the Joint Committee were to: provide a useful updating on scientific and technological development in Korea; give MOST and the representatives of other Korean scientific and technical institutions a chance for an exchange of ideas and information

with American colleagues; suggest a program plan for specific Joint Committee activities and consider possible sources of funding for those activities during the next 12 - 18 months. Prior to the meeting MOST and NAS representatives agreed that the major specific topics for consideration would be:

1. current status and future plans for Dae Duk Science Town;

2. proposal for a binational science foundation in Korea;

3. applications of systems analysis to Korean development problems and the formation of a new systems development bureau in MOST.

OBSERVATIONS AND RECOMMENDATIONS

Following is a statment of the Joint Committee resulting from the discussions at the annual meeting:

The annual meeting of the Korea - U.S. Joint Continuing Committee for Scientific Cooperation was held October 10 and 11 in Seoul, Korea. Continuing a cooperative program organized by the Korean Ministry of Science and Technology and the National Academy of Sciences of the United States, this was the third in an annual series of joint consultations between Korean and American scientists and research administrators. The Joint Committee concurred in the following major points:

1. There is an urgent need to create new mechanisms to stimulate and support scientific and technological research in Korea. The Committee strongly endorses the importance of establishing a national science foundation in Korea. The support which can be provided by the foundation to universities and other research institutions, is greatly needed as a means for strengthening Korean scientific education and research, thereby increasing the capability to address important problems of national developmemt. Because of the importance of the foundation to Korea's continuing scientific and technological growth, the Committee urges that it be established promptly. Both the Korean and United States Governments are urged to give serious consideration to procedures by which the purposes of the foundation can be financially supported at a meaningful level. Financial assistance also should be sought from other sources, including the private sector of Korea.

2. The objectives and functioning of a national science foundation will require careful continuing examination and consideration, especially in the formative stages. The Joint Committee believes, therefore, that the science foundation should be

a key topic for future Committee deliberations and for specific advisory activities that it sponsors. An intensive joint consultation group, such as the one that operated prior to the establishment of KAIS, may be especially appropriate.

3. Since Korea has made significant strides in its economic development, it is likely that U.S. AID technical assistance will greatly diminish or cease in the near future. It is essential, however, that scientific and technological interchange with the United States be continued in some manner. The Joint Committee agrees, therefore, that Korea and the United States should seek ways to continue and expand their scientific and technical interaction. While some of these relationships can take place through a Korean science foundation, a variety of other institutional and individual activities must be developed and supported.

4. The Joint Committee agreed on the importance of maintaining an active interest and future advisory activities in the development of Dae Duk Science Town and its individual research institutes, in marine sciences research and education, and in the new Bureau of Information Industry of the Ministry of Science and Technology. Emphasis was placed on the importance of forming collaborative linkages between these new institutions in Korea and appropriate institutions in the United States and elsewhere.

The joint statement resulted from consideration of three major topics, including possible future activities related to those topics. The major points of discussion are summarized in the following paragraphs.

1. Establishment of a National Science Foundation

A background presentation (see Appendix 1) was made on the goals, functions, organization and budget of a proposed science foundation for Korea. The key purpose of the foundation would be to strengthen scientific and technical education in Korea and to provide a focus for research geared to national development needs. Financial support from the foundation would be a badly-needed supplement to the rather limited research and educational support that MOST and the Ministry of Education are able to provide.

The proposed foundation would be incorporated as an autonomous organization, but with government representation on the board much in the manner of the Korea Institute of Science and Technology (KIST) and the Korea Advanced Institute of Science (KAIS). Operating income of about US $8 million for the foundation would be derived from an endowment fund. An endowment of US $50 million has been proposed, with $20 million coming from the Korean government, $10 million from Korean industry, and $20 million from U.S. sources. Concerning a possible U.S. contribution, the Korean group has suggested that it could come from something called the "Foreign Liquidating Commission Fund", a US $20 million fund held in Korean won

and derived from 1947 U.S. commodity sales to Korea. The fund, it is said, is to be used for educational purposes jointly agreed to by the two countries.

The Committee members, as highlighted in the Joint Statement, agreed that a science foundation is an important and urgent need in Korea. Cochairman Franklin Long pointed out that, in fact, the U.S. members have been urging since 1972 that such an organization be considered. Considerable work still needs to be done, it was suggested, in refining the plans for the structure and operating techniques of the foundation. Models in different countries should be examined so that Korea's planning can benefit from knowledge of a variety of approaches, problems, and successes. Another basic issue that must be decided is the definition of science -- the foundation's responsibilities to social sciences and technology need to be clear. Besides the inherent necessity of clarifying structural and organizational issues, answers to these questions will enhance the possibility of obtaining endowment funds.

The concept of the foundation included the suggestion that it should be binational, a joint Korea - U.S. foundation. Considerable discussion on this aspect took place. A major point that emerged was that a science foundation is needed in Korea and that continued bilateral scientific exchange and interaction also is needed between Korea and the U.S.,

particularly as the AID program phases out. It might be a mistake, however, to couple the two needs as tightly as was suggested in the proposal; the foundation's clear objective should be to strengthen Korean science, and part of the process can involve interaction with the scientific communities not only in the U.S. but also in other countries. Furthermore, experience has shown that joint bilateral research programs are complex and difficult under the best of circumstances and thus should not be a principal feature of a science foundation aimed at Korean needs. Even though a formal binational aspect will not be included, however, the Joint Committee agreed that U.S. financial support for the foundation would be appropriate and a soundinvestment.

In conclusion, Minister Choi noted that he expects that some Korean government funds will be made available for the foundation soon and it will be able to start operations in 1977. He anticipates that the foundation could provide support for bilateral activities such as the Joint Committee. The Committee agreed that it would be useful to have a joint advisory team meet in early 1976 to make recommendations on the objectives, structure, and operating methods of the foundation. The team, which might include three U.S. participants, would be roughly patterned after the Terman group that consulted on the establishment of KAIS. MOST will propose a scope of work for a foundation advisory team and initiate the arrangements with the NAS.

2. Current status and future plans for Dae Duk Science Town

A presentation on the construction of Dae Duk (see Appendix 2) showed that considerable progress has been made. Major portions of the arterial road network have been completed, the interchange with the Seoul-Honam Expressway will be built shortly (significantly decreasing the travel time from Seoul), construction of the Shipbuilding Industry Technical Services Institute has been started, and other site and infrastructural development is in progress.

Although some delays and changes in the Dae Duk plan have resulted from funding problems, the long-range schedule has not been affected greatly and it seems clear that the major institutes planned for the town will be built. Increasingly, then, the concerns of the Joint Committee will be less with concept and plans and more with the problems of operating the institutes and making the town a place that attracts high-caliber scientific and technical talent and provides an effective environment for the exercise of that talent. The provision of good housing and good schools, for example, is one of the important matters that will have to be addressed in the very near future and a matter that is high among the concerns of staff members who will be working in the pioneer institutes at Dae Duk.

Two general areas were suggested for possible future advisory activities sponsored by the Joint Committee: (a) the provision and management of central services (computation, information, maintenance, etc.) for the various institutions at the town, and (b) the form of governance for this unique community. Specific future advisory activities also are likely to be useful with regard to the programs and management of the new institutes. These various advisory activities will be planned and arranged by MOST and the NAS.

It was noted that the physical planner of Dae Duk, Dr. Kim Hyung Man, will visit the United States early in 1976 to visit research complexes and new towns that may have relevance to Dae Duk. Dr. Kim's agenda will be planned in cooperation with Joint Committee member George Herbert, President of Research Triangle Institute.

3. Development of systems analysis capability

Background presentations were given on the status of systems analysis and computer use in Korea (Appendix 3) and on the objectives of the Bureau of Information Industry of MOST (Appendix 4).

Some systems analytical techniques are utilized in Korea, although the majority of such work is carried out by government rather than private business and industry.

Korea's present economy and continued industrial development involve large and complex problems that seem to offer considerable scope for application of systems analysis techniques. Experienced analysts are in short supply, however, and most of them are at KIST and a few government agencies.

The Bureau of Information Industry is a new division of MOST whose task is to stimulate more application of systems techniques and help develop more analytical capability for the nation. Discussion of the Bureau's task led to the conclusion that it initially should identify some important but clearly manageable analytical jobs to sponsor. "Success stories" in the short term will help to reinforce the long term perception of systems analysis as a useful tool for planning and management. The Bureau can work on the priorities and criteria for initial projects and put together the actual analytical team from various sources. The Joint Committee agreed that this was an important area for future activity and Prof. Harvey Wagner of the U.S. group wrote a proposal (Appendix 5) suggesting ways in which U.S. advisory efforts could be carried out.

With a few exceptions, private business and industry in Korea has little awareness of or appreciation for the potential uses of systems analysis. It was suggested that a first step in building this awareness might be to stimulate

wider use of computers in accounting and payroll operations. Education, of course, is critical to the development of greater systems analysis capability in Korea. At present, extremely few engineering or business schools have good programs for training students in analytical techniques. The suggestion was made that several such schools be encouraged to establish demonstration programs that would introduce courses in analytical theory and practice into their curricula, and provide sufficient facilities and equipment so that students could work on real analytical problems as part of their studies.

4. Future concerns for the Joint Committee

In summary, possible future advisory activities to be sponsored by the Joint Committee include these topics: structure and operation of a national science foundation; systems analysis projects of the Bureau of Information Industry; provision of central services at Dae Duk; governance of Dae Duk; operation and management of specific Dae Duk institutes, especially the Korea Oceanographic Research and Development Institute (KORDI) and the Shipbuilding Industry Technical Services Institute. A major theme involving all these topics is that the Joint Committee must seek ways to maintain and expand Korean-U.S. scientific and technological interaction now that official aid channels are being closed. It will be useful

to consider ways of involving more U.S. institutions in the deliberations and follow up activities of the Committee.

At the final session of the meeting, Minister Choi was asked what topics he hopes the Joint Committee will address in the future. The Minister emphasized the importance he attaches to developing mechanisms to continue Korean - U.S. scientific cooperation, to strengthening systems analysis capability, and to maintaining advisory links to Dae Duk. New topics of special importance, he added would be those concerned with food production and energy production and use. The members further suggested that university science and engineering education and sister relationships between Korea's new research institutes and appropriate American institutes are two topics that warrant future Committee deliberation.

AGENDA AND PARTICIPANTS

Agenda

The NAS participants in the annual meeting arrived in Seoul 1-2 days in advance of the opening session and left at varying times from 2-4 days after the meeting concluded. Part of the time before and after the formal meeting was used for appointments by NAS participants to discuss related matters with individual Korean colleagues. The NAS group also participated in visits to the science town site and several industrial sites in the southeastern part of the country.

The official schedule follows:

October 10 (Friday)

AM	Courtesy call on Minister of Science and Technology by NAS group.
	Opening session of annual meeting.
	Discussion of establishment of a National Science Foundation.
	Luncheon by U.S. Ambassador for NAS group.
PM	Continuation of science foundation topic.
	Discussion of Dae Duk Science Town construction and plans.
	Dinner by Minister of Science and Technology.

October 11 (Saturday)

AM — Discussion of systems analysis and MOST Bureau of Information Industry.

Discussion of future activities to be spcnsored by Joint Committee.

Luncheon at KIST.

PM — Individual schedules.

Dinner by President of Korea Advanced Institute of Science.

October 12 (Sunday)

Visit to Dae Duk Science Town site by Denny, Long, Wagner.

October 13 (Monday)

Visit to Hyundai Shipyard (Ulsan) by Herbert, Hurley, Wagner, and visit to Pohang Iron & Steel Company by Herbert and Hurley.

October 14 (Tuesday)

Visit to Gyeongju and Dae Duk Science Town site by Herbert and Hurley.

Participants

The participants* in the annual meeting were:

Committee Members

Korea

Choi, Sang Up (Chairman)	Vice President, Sogang University
Ahn, Se Hee	Vice President, Yonsei University
Lee, Hahn Been	President, Soong Jun University
Cho, Soon Tahk	President, Korea Advanced Institute of Science
Chun, Sang Keun	Director-General, Office of Policy and Planning, Ministry of Science and Technology
Hahn, Sang Joon	President, Korea Institute of Science and Technology

United States

Franklin A. Long (Chairman)	Luce Professor of Science and Society, Director of Program on Science, Technology and Society, Cornell University
Brewster C. Denny	Dean, Graduate School of Public Affairs, University of Washington.
George R. Herbert	President, Research Triangle Institute

*Listed in Korean and English Alphabetical Order except for Charimen.

U.S. Specialist

Harvey M. Wagner	Professor of Management Yale University

NAS Liasion Officer

John Hurley	Professional Associate, Board on Science and Technology for International Development, NAS.

MOST Liasion Officers

Hong, Jae Hee	Chief, Bilateral Cooperation Division Technical Cooperation Bureau, Ministry of Science & Technology.
Kim, In Hwan	Assistant Chief, Bilateral Cooperation Division, Technical Cooperation Bureau, Ministry of Science and Technology.

Additional Discussicn Participants

1. Establishment of a National Science Foundation

   Presentation: Choi, Sang Up

   Participants:

Baek, Yeong Hak	Director, Science Development and Promotion Bureau, MOST
Kim, Young Wook	Director, Bureau of Information Systems Development, MOST
Kwon, Won Ki	Overall Planning Director, Office of Policy and Planning, MOST.

2. Dae Duk Science Town Construction Plan

Presentation : Hahn, Sang Joon

Participants:

Kwon, Won Ki	Overall Planning Director, Office of Policy and Planning, MOST.
Baek, Yeong Hak	Director, Science Development and Promotion Bureau, MOST
Kim, Young Wook	Director, Bureau of Information Systems Development, MOST.
Youn, Chung Heup	Director, Shipbuilding Industry Technical Services, KIST
Lee, Byung Don	Director, Korea Ocean Research and Development Institute, KIST.
Kim, Hyung Man	President, Korea Institute for Urban Development
Kim, Zae Kwan	Director-General, National Industrial Standards Research Institute, Industrial Advancement Administration.

. Systems Development

Presentation : Cho, Soon Tahk

Participants :

Kim, Young Wook	Director, Bureau of Information Systems Development, MOST.
Baek, Yeong Hak	Director, Science Development and Promotion Bureau, MOST.
Kwon, Won Ki	Overall Planning Director, Office of Policy and Planning, MOST.
Kyung, Sang Hyon	Head, Energy System Laboratory, Korea Atomic Energy Research Institute
Yu, Seong Jae	Head, Technical and Economics Group, KIST.

HIGHLIGHTS AND COMMENTS

Planning and Preparation

John Hurley, NAS staff coordinator for the Joint Committee, made brief visits to Korea in April and August, 1975, in the course of travel to other countries. These visits provided an opportunity both to discuss ongoing activities in the cooperative program and to lay plans for the third annual meeting. Liaison in Korea was through Mr. Kim Hyung Ki, Director of MOST's Bureau for Technical Cooperation, and Mr. Chun Sang Keun, MOST Director-General for Policy and Planning. In September, Director Kim went on leave for a one-year study fellowship at Harvard University and his coordinating responsibilities for the Joint Committee were assumed by Mr. Hong Jae Hee and Mr. Kim In Hwan, Chief and Deputy Chief, respectively, of the Division of Bilateral Cooperation, Bureau for Technical Cooperation.

During the preparatory visits to Korea by John Hurley, visits were made to USAID/Seoul to discuss the status and plans of the Joint Committee with AID Program Officer Mr. Dennis Barrett and Deputy Program Officer Mr. John Miller. Hurley called on the AID/Washington desk officer for Korea, Mr. Rodolph Ellert-Beck, in September to discuss plans for the annual meeting.

Since a national science foundation was to be a major topic of discussion for the October meeting of the Joint Committee, Mr. Hurley talked with officials of the State Department and National Science Foundation to obtain background information. Discussions were held with Mr. Addison Richmond of the Office of Bilateral and Multilateral Science and Technology Programs at the State Department, and with Mr. Max Hellmann of the Office of International Programs, NSF.

Because all U.S. members of the Joint Committee have been to Korea on numerous occasions, no special briefing meeting was held before the members traveled to Seoul. Briefing materials and background papers were circulated in advance. The NAS group met in Seoul before the opening of the Joint Committee sessions, and held working breakfasts each morning of the Committee meeting.

Meeting Participation and Organization

The Joint Committee has benefitted by continuity of membership on both the Korean and U.S. sides. Committee members have met together for three years now, enabling their discussions to take place in an atmosphere of cordiality and candor. The Korean members now have a good idea of the ways in which the Joint Committee and its U.S. members can be useful, while the U.S. members have a much better concept of the key issues and institutions involved in Korea's scientific and technological development.

With the exception of one Korean and one U.S. member, all members attended the annual meeting. The Minister of Science and Technology, Dr. Choi, was generous with his time toward the Joint Committee, meeting with the NAS group before the opening session, being host of an informal dinner for all members, and taking an active part in the final session of the meeting.

As shown in the section on Agenda and Participants, the discussions of the main topics at the meeting were assisted by the participation of representatives of MOST and other Korean institutions relevant to the topics. The information and ideas provided by these representatives was very helpful.

The NAS group was assisted by the participation of Dr. Harvey Wagner, a specialist in systems analysis. Dr. Wagner is Professor of Management at Yale University and an active consultant with private industry. Before taking part in the Joint Committee session on systems development, Dr. Wagner spent a half-day with representatives of MOST, the Economic Planning Bureau, KIST, and other organizations for a special discussion on systems analysis needs and opportunities in Korea.

The arrangements made by MOST staff members for the Joint Committee meeting and field trips were excellent. The

meetings were held in facilities provided by KIST, and the dinners given by Minister Choi and KAIS President Cho created a good atmosphere for the participants to become better acquainted with one another. If a picture is worth a thousand words, the NAS group felt that the actual field visits to scientific and industrial sites in Korea must have been worth at least 10,000 words.

NAS Contacts with U.S. Officials

As mentioned earlier, John Hurley of the NAS staff contacted AID/Korea staff members during planning visits in May and August, 1975. During the week before the Joint Committee meeting, Mr. Hurley and Mr. Hong Jae Hee of MOST met with Mr. Barrett and Mr. Miller of the USAID program office to describe final arrangements for the meeting and to invite USAID representatives to attend the sessions.

On October 10, American Ambassador Richard Sneider gave a lunch at his residence for the NAS group. The lunch, also attended by Mr. Paul Cleveland of the Embassy and Mr. John Miller of USAID, was the setting for a thorough and helpful discussion. The Ambassador wishes to keep in close touch with the future activities of the Joint Committee and also hopes to stimulate additional linkages between Korean and American scientific and technical institutions.

Ambassador Sneider believes, and the NAS Committee members concur, that it would be very helpful to have a science attache on the embassy staff in Seoul.

After the annual Joint Committee meeting ended, John Hurley met with John Miller of USAID to brief him on the outcome of the meeting. When Hurley returned to Washington, a briefing session also was held with staff members of AID's Asia Bureau on October 24.

NAS Chairman Decorated

On October 11, 1975, Dr. Franklin Long, Chairman of the NAS members of the Joint Committee, was honored for his contribution to the promotion of scientific cooperation between Korea and the United States. In a ceremony attended by Minister Choi and the Minister of Government Administration, Prime Minister Kim Jong-Pil conferred the Order of Civil Merit, Dongbaek, on Dr. Long.

Perspective

The third meeting of the Joint Committee addressed a new topic -- systems development, discussed the realization of an idea that has been raised in earlier meeting -- a Korean science foundation, and continued an active interest in another earlier concern -- the establishment of Dae Duk Science Town. It is clear that a pattern of Joint Committee activity has developed that is perceived as useful; the Committee identifies projects of interest and importance,

and small teams or individuals follow up with more intensive visits and consultation.

While the established pattern is useful and workable, the Joint Committee probably should explore new modes of activity that would be complementary to their work. When the annual meeting is next held in Korea, for example, it might be useful to have the NAS members spend a week visiting a considerable number of scientific and technical institutions, private companies, and government agencies concerned with planning and economic development programs. The members could split up for these visits so that coverage would be greater in the limited time. After these visits, a Joint Committee meeting could be held using a fairly unstructured agenda in which U.S. members would have an opportunity to discuss matters stimulated by their visits. Although this type of meeting may not be needed regularly, it may be a useful mechanism every few years for raising fresh issues and identifying potential problems.

The program of the Joint Committee has had three distinguishing characteristics. First, the Korean group has used it to address issues of genuine importance to the country's scientific and technological development. Second, they have been energetic in their follow up of recommendations that they feel are useful and appropriate. Third, they have assumed an increasing share of costs of the program.

Despite the utility and positive aspects of the program, there is a question about future NAS participation. There are indications that the outside financial support on which the NAS depends for staff costs, overhead, and travel expenses may cease. Although the Koreans have funded the entire travel costs of all Joint Committee advisory teams and consultants for the past one and a half years and have provided local travel and per diem for NAS Committee members, funds for direct NAS costs need to be provided from other sources. Since the program has been a successful one, the Joint Committee members feel it is most important that support be found for continued NAS participation.

The Joint Committee statement prepared at the end of the annual meeting stressed the importance of maintaining scientific and technical interaction between Korea and the United States. The interaction is all the more essential since Korea's economic development depends in large part on technology and since official U.S. aid to Korea is coming to an end. In discussing the continuation of the MOST-NAS relationship, Minister Choi put it this way: "This program is of very high priority to us because you are our window to science and technology in the United States."

APPENDIX 1

ESTABLISHMEMENT OF A NATIONAL SCIENCE FOUNDATION

(PRESENTATION PAPER FOR THE THIRD KOREA-U. S. JOINT CONTINUING COMMITTEE ON SCIENTIFIC COOPERATION)

October 10—11, 1975

ESTABLISHMENT OF A NATIONAL SCIENCE FOUNDATION

Since Korea has an abundance of capable adaptable manpower resources, but little in the way of natural resources the development of both science and technology and the economy is dictated by how efficiently scientific and technical manpower is developed into highly productive technical manpower.

The latent potential of educational institutions in Korea has not been fully developed, and they have thus been operating more or less in isolation from any relevance to national development whether it be economic, social or political. A pool of educated people is certainly a requisite resource for national development, but the effective accomplishment of this task can be assured only if education - particularly its orientation - is properly sighted on national needs. The need for the involvement of the universities in national development is absolutely essential to make education serve society by acquiring the know-how and knowledge of the nature of the real world, and this is the area in which Korea has experienced a vacuum. Present programs administered by the Ministry of Education and by the Ministry of Science and

Technology are too meager in amounts and too slight to expect any significant impacts even if they are properly managed. Since these are administered by government agencies, the resources are either too thinly spread or improperly spread with resulting lack of peer assessments and a consequent too universal participation within the limited scale of the operations.

Therefore, a National Science Foundation has been conceived as the principle instrument for:

a. orienting scientific and educational institutions in Korea in such a direction that they will not only develop but will assume initiatives in framing courses of action to meet national needs

b. bringing about the education of the people in the proper frame of reference, attitudes, and values to fill career opportunities relevent to society's needs and the value accrueing from such work

c. promoting international cooperation through science

I. Development of highly skilled scientific manpower

Those who have obtained master's or Ph. D. degrees and are engaged at institutions of higher learning and/or

research organizations in tasks which require a high degree of creativity can be considered the technically elite manpower. The superior talent developed through such long periods of education and experience in research activities constitute the core of technical manpower and are instrumental in technical reform. In this sense superior talent can serve as the barometer of a country's technical potential.

The demand for creative, scientific ability has been rising in direct proportion to the rapid progress of science and technology and the increasing paces of economic and social changes. In 1973 there were 5,000 professors in higher education and about 6,000 persons engaged in research in either research organizations or businesses. The number of researchers, however, representated only 0.2 per thousand of the total population while this proportion in the United States was 2.6, in Japan 1.9 and in Great Britian 1.8. The number of scientists in Korea also lags behind the more advanced countries i.e. Korea produced 865 persons with master's degrees in natural science in 1973 while the United States produced 52,900 (1969), Japan 11,700(1970), and Britian 8,000 (1969). Output, when measured by conventional criteria

is also below that of developed countries.

The brain drain is another problem facing the developing countries. During the 1953-1972 period, for instance, there were 5,7 0 Korean students studying in foreign countries, a number almost equal to the total number of researchers in the country. In addition, most Korean students who are overseas are reluctant to return to Korea for various reasons including the lack of job opportunities and the poor research environment as well as the fact that many of them have received educations abroad which do not meet Korea's scientific and technological needs so that it would be difficult to use them at home. Education at graduate school level, which is the prime means for cultivating scientists, must be reinforced and promoted to solve the problems involved in the development of scientists and to cultivate their capabilities so that they can play the leading role in the development of science and technology. Greative activities such as basic research must most certainly be given a strong forward push.

Colleges must be developed with the graduate schools as their cores, as is the case in advanced countries, thus to assure graduate school educational reform and the cultivation

of scientists. Colleges centered on graduate schools cultivate intellectuals by emphasizing graduate school lectures and especially research and are institutions where the graduate schools have the bulk of the students.

School administrations, operational systems, curricula and financing must all be reorganized toward this end: experimental facilities must be expanded, and the professorial appointment system must be improved to make it possible to recruit outstanding professors and to open the way for advanced training for bright students. Among others a considerable increase in R & D investment and improved operational systems for maintaining close relations and deepening research and education in colleges and universities, are absolutely necessary to elevate graduate school education overall.

II. National Promotion of Basic Research

Basic research activities at colleges and graduate schools, the sites for cultivating intellectuals and conducting research and development, are of paramount significance in building up the scientific and technical infrastructure of a country. Thus, basic research has been promoted on a national scale in both developing and advanced countries.

Since scientific knowledge is accumulated particularly well through research activities, research is inseparable from education.

Specialists in any field are bound to be involved in research activities, since the application and utilization of knowledge cannot be accomplished without an accumulation of basic knowledge. In this sense, the promotion of basic research is directly related to scientist training. In Japan, basic science researchers in colleges outnumber those working in research organizations, whereas the opposite is true in Korea. This trend in Korea can probably be attributed to the fact that research facilities in graduate schools are far poorer than in advanced countries.

In 1972, the outlay for basic research was W24.5 billion, and of this amount W21 billion went to research organizations whereas colleges received only W1.1 billion. Annual research expenses per person were W2.14 million on the average, but the comparable amount for researchers in colleges was only W200,000 an indication of the neglect of research activities in colleges.

The combined research facilities and equipment in domestic colleges in natural science and college-attached research organizations were worth $20 millions as of 1973, an amount roughly equivalent to that possessed by one average college in an advanced country. This figure clearly points up the shortage of research facilities and equipment in colleges. The cause is insufficient investment in the basic research field, which means that increased investment should be contemplated to deal with the situation.

An organizations such as the National Science Foundation of the United States or the National Research Council of Canada should be instituted to promote basic research on a national scale, while basic research activities should be directed toward national development goals.

III. Outline of the Proposed National Science Foundation

The government has been promoting a plan to establish a National Science Foundation as one step toward encouraging basic research and producing elite scientists. The projected foundation is to be established in 1976 with an endowment fund of about $50 million. The major goals and objectives of the proposed foundation are:

1) casual and random research activities in colleges will be converted into basic and applied research activities to fill national science and technology development objectives
2) educational reform will be made through a reform of research activities in colleges, so that the colleges can perform research as an intrinsic mission
3) international exchange of scientists and engineers as well as scientific and technological information will be expedited.

The major functions of the foundations are suggested as follows:

1) support of mission oriented basic and applied research in compliance with national development goals, through payment of research grants, research contracts, research facility support, and evaluation of the research results

2) payment of research grants through research follow-ships, postdoctoral fellowships, visiting professorships, etc.

3) support for activities of academic societies such as the publication of academic society magazines, academic symposiums, etc.

4) support of various projects for development of science and education

5) enhancement of international scientific and technological activities through: (a) support of international exchange of scientists and engineers, (b) sponsoring of and participating in international academic conferences, (c) promotion of binational research, and (d) exchange of information and data on science and technology

6) support of various other projects for the cultivation of scientific and technological potential

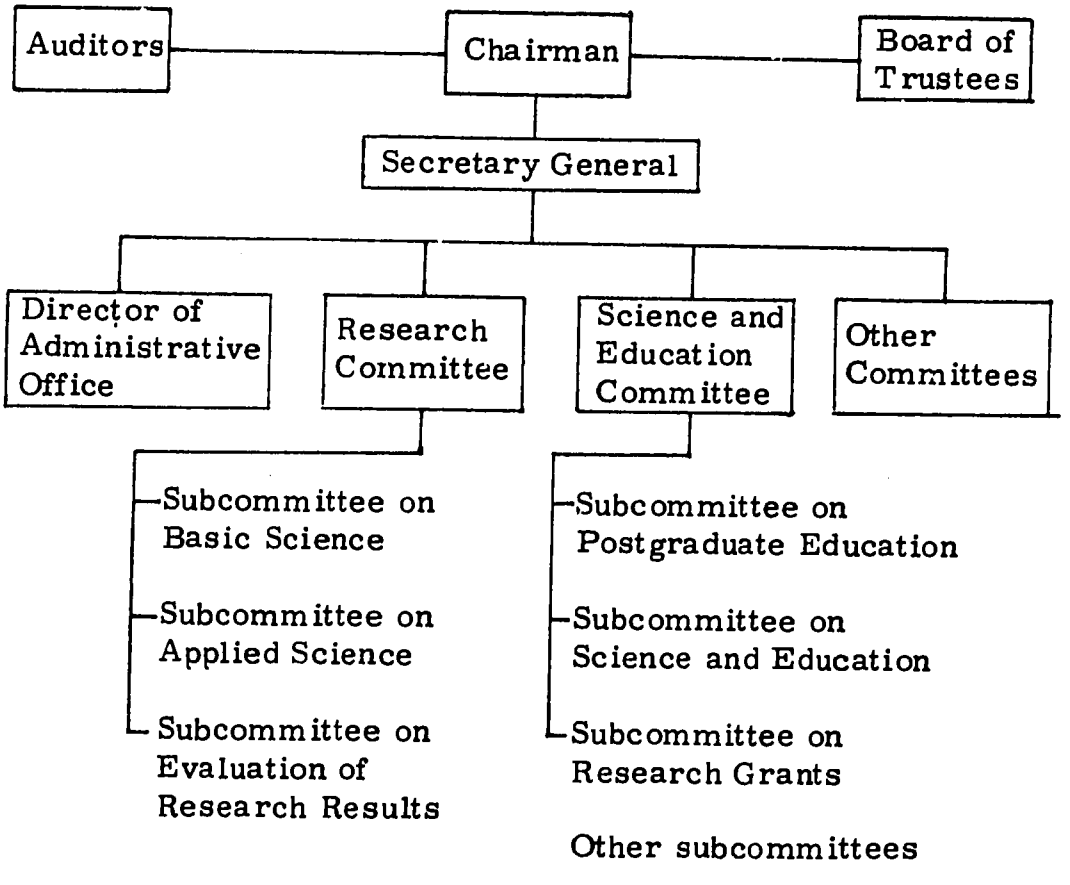
The foundation's suggested organization is briefly:

1) a juridical foundation incorporated under a special law

2) autonomous operating system run by scientists from academic circles

3) the board of trustees should consist of representatives of academic circles, the government, industrial circles and foreign organizations

4) Organizational chart for the Foundation



The organization and operation of the Foundation will be defined and governed by a special law and/or presidential decree. A proposed law is given in the attachment.

A Fund Raising Plan and Schedule Target

Unit: million won

Funds Source	Total	1977	1978	1979	1980	1981	1982 and Following years
1) Government Contributions (ROK)	10,000	1,000	1,000	2,000	3,000	3,000	-
2) Foreign Aid Funds (e.g. U.S.)	10,000	1,000	1,000	2,000	3,000	3,000	-
3) Others (Private)	5,000	500	1,000	1,000	1,000	1,500	-
Sub-total	25,000	2,500	3,000	5,000	7,000	7,500	-
Cumulative Total Amount of the Fund	25,000	2,500	5,500	10,500	17,500	25,000	25,000

Once the targeted endowment fund - about $50 million - is raised, the Foundation will be able to cover its annual operating expenses of about $8 million from the accrued interest and income from the endowment fund.

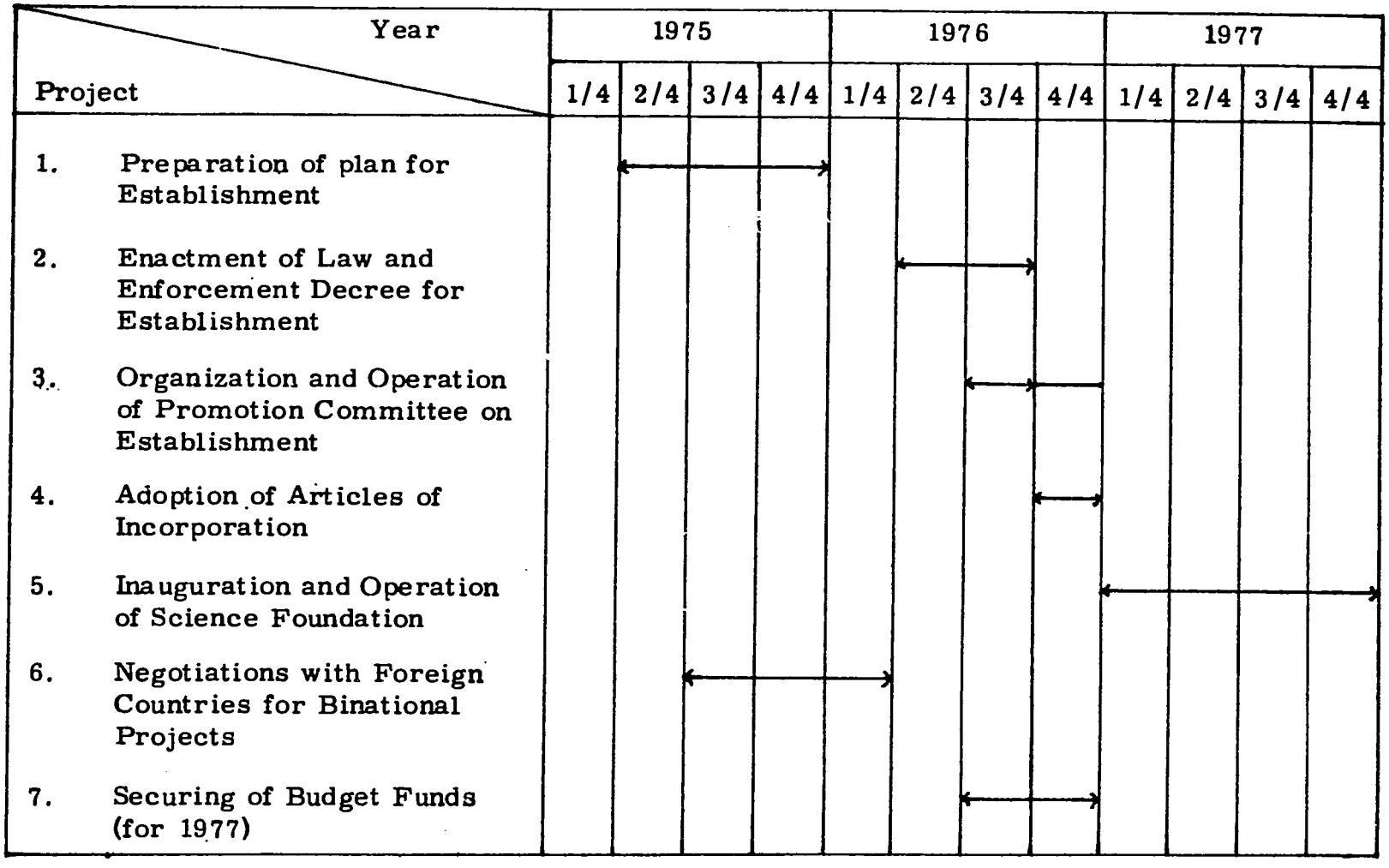
Tentative Plan for the Foundation's Projected Budget

Proposed Foundation Budget

Unit: million won

Details	Budget	Remarks
1. Support for Basic and Applied Research	3,000	Approximately 500 grants and 300 contracts
(1) Research Grants	1,000	
(2) Research Contracts	1,200	
(3) Bilateral Research (with U.S.)	500	
(4) Research and Library Facility Support	300	
2. Training and Manpower development	500	Masters and doctoral level training for 400 persons
(1) Research and Trainee Fellowships	30	
(2) Postdoctoral Fellowships	10	
(3) Training and/or Visiting Scholars Program	10	
3. Support of Academic Society Activities and Technology Transfer Programs	150	One hundred Societies
(1) Publication of Academic Society Magazines	100	
(2) Sponsoring of Symposia	50	
4. International Exchange and Other Scientific Promotion Projects	150	
(1) Sponsoring of and Participation in International Scientific and Technical Conferences, and Visiting and/or exchange professorships	100	
(2) Exchange of Incormation and Data	50	
5. Operating Costs	200	
Total	4,000	

Tentative Schedule for the Foundation's Establishment



IV. Future Prospects for Korea-US Joint Continuing Cooperation in the Fields of Science and Technology

The United States contribution to the modernization and development of Korea has been clearly recognized both here in Korea and in the rest of the world. The most prominent benefit to have accrued from this close association is the build-up of Korea's capacity to chart its own future course in many areas of sophisticated endeavor. As our nation enters the stage at which self-reliance is on the horizon on the one hand and as assistance from our principle partner, the U.S., is dwindling so far as grant based cooperation is concerred on the other, it is thought that in this crucial period we should take action, sometimes audacious, to move toward the establishment of a base from which a new form of cooperation can be embarked upon.

Unlike conventional aid projects, which of necessity must fill immediate needs, this future calls for a relationship which can be sustained in the absence of handout type assistance from one party to the other. It is also true that the past relationship between the U.S. and Korea in the area of development cooperation can find no parallel among other bi-national relationships, and it is a viable one upon which to

build further. Korea's economic development is attributable principally to U.S. technology whether it has been embedded in equipment, manpower or literature. Before we face an abrupt cessation of the contacts which have been made possible largely through aid projects, it is essential that a new form of cooperation be launched upon so that the relationship built over years of cooperation can be broadened as each country finds it justifiable and appropriate.

It is believed that it is essential to create the necessary legal and administrative frames and instruments to accomplish this goal. To move in this direction we propose that the previously suggested foundation be established as a Korea-U.S. bi-national science foundation as the principle instrument for those objectives and functions described before and additionaly for:

a. establishing and broadening professional interfaces between scientific and educational institutions in the two countries on a sustained, long term basis,

b. catalizing linkages and supporting exchange programs between relevant scientific and educational institutions in the two countries,

c. supporting the emergence of centers of excellence at selected institutions as they are relevant to the nation's needs,

d. supporting coordinated or joint research programs between scientist in Korea and the U.S.

It is believed that this foundation will be the most tangible culmination of the past relationship between Korea and the U.S. and can provide the foundation for sustained meaningful collaboration between science and education institutions to influence the orientation of leadership in a most compelling way.

Proposed National Science Foundation Law (Draft)

MISSING PAGE NO. 18

ANNEX

Proposed National Science Foundation Law (Draft)

Article 1. Purpose

The purpose of this law is to establish and manage the Science Foundation effectively to develop technical manpower through advanced level education and research, stimulate and support basic and applied research programs of national interest and high priority, enhance and strengthen international cooperation in scientific and technical endeavors, thereby ensuring the technological manpower and capabilities required for the economic development of the country.

Article 2. Corporate Body

The Foundation shall be a corporate body.

Article 3. Establishment

Paragraph 1. The Foundation shall have its principal office in the Special City of Seoul.

Paragraph 2. The Foundation shall be established upon its registration of incorporation at the location of its principal office.

Paragraph 3. Necessary matters pertaining to its incorporation and registration shall be prescribed by Presidential Decree.

Article 4. Articles of Incorporation

The Articles of Incorporation of the Foundation shall state matters enumerated hereunder:

1. Objectives
2. Name
3. Location of its principal office
4. Matters pertaining to its business projects
5. Matters pertaining to the Board of Trustess
6. Matters pertaining to staff officers and personnel
7. Matters pertaining to assets and accounting
8. Matters pertaining to the fund
9. Matters pertaining to public announcements
10. Matters pertaining to modification of the Articles of Incorporation
11. Matters pertaining to its dissolution

Article 5. Prohibition of Use of Similar Name

None other than the Foundation may use the name of the National Science Foundation or any other name similar thereto.

Article 6. Projects

The Foundation shall carry out projects in the following categories to achieve its purpose as prescribed in Article 1.

1. Support and stimulate basic and applied scientific and technological research programs of national interest and high priority, and evaluate research results.
2. Provide research grants to industries and research organizations for such research as applies to national needs.
3. Support technical manpower development programs including graduate level education and research by providing training grants, research fellowships, research facilities, library facilities, etc.
4. Support academic professional societies and their activities both at home and abroad.

5. Support technology transfer programs that will stimulate close cooperation between industries and academic and research organizations.

6. Support international joint research projects and scholar exchange programs to enhance international cooperation in science and technology.

7. Scientific and technological development projects and those others incidental thereto.

Article 7. Business Year

The Foundation's business year shall correspond to the government's fiscal year.

Article 8. Staff Officers

The Foundation shall have not more than fifteen (15) trustees, one (1) secretary general, and one (1) or two (2) auditors.

Article 9. Election of Staff Officers and Their Terms of Office

Paragraph 1. The Trustees, Secretary General, and Auditor shall be elected at a Board of Trustees Meeting in such manner as prescribed by the Articles of Incorporation,

and their terms of office shall be prescribed by the Articles of Incorporation.

Paragraph 2. Necessary matters pertaining to the qualification of staff officers shall be prescribed by Presidential Decree.

Paragraph 3. The persons enumerated below shall be Trustees ipso facto, without an election by the Board of Trustees:

1. Minister of Science and Technology
2. Vice Minister of Economic Planning Board.
3. Vice Minister of Education.
4. Secretary General.
5. Not more than three (3) persons designated by any foreign organization which has contributed funds to the Foundation.

Article 10. Board of Trustees

Paragraph 1. The Foundation shall have its Board of Trustees consisting of the Trustees to deliberate and resolve important matters related to it.

Paragraph 2. The Board of Trustees shall have one (1) Chairman.

Paragraph 3. The Chairman shall represent the Foundation, convene a board meetings and preside over them.

Paragraph 4. The Chairman shall be appointed by the President from among the Trustees upon recommendation by the Minister of Science and Technology.

Article 11. Secretary General and Auditor

Paragraph 1. The Secretary General shall execute matters resolved by the Board of Trustees and various business activities of the Foundation, and supervise its personnel.

Paragraph 2. The Auditor shall examine the Foundation's accounts and may attend Board meetings and state his opinion.

Article 12. Organizations and Personnel

Paragraph 1. The Foundation shall have the necessary organizations to carry out its projects and the personnel needed to man such organizations.

Paragraph 2. Matters pertaining to the organizations under paragraph 1, an authorized number of personnel, and their appointment and dismissal, shall be prescribed by the Articles of Incorporation.

Article 13. Submission of Project Plans and Budget Plan

The Foundation shall, in such manner as prescribed by the Presidential Decree, prepare the project plans and budget plan for each year and submit the report thereon to the Minister of Science and Technology, and the same shall apply even in the event of a revising of a project plan or budget plan.

Article 14. Peports on Project Implementation and Settlement of Accounts

Paragraph 1. The Foundation shall submit a report on the actual results of the implementation of project plans for each year to the Minister of Science and Technology.

Paragraph 2. The Foundation shall submit to the minister of Science and Technology its financial statements for each fiscal year after an examination has been made by certified public accountants designated by the Minister of Science and Technology.

Article 15. Fund

Paragraph 1. The fund shall be established for the Foundation to finance its fund requirements for its operations and projects.

Paragraph 2. The Foundation fund shall be created with government contributions or contributions made by foreign organizations, or participatory funds provided for joint participation or donations from the general public.

Paragraph 3. Necessary matters pertaining to the use and management of the fund prescribed in Paragraph 2, and other management matters shall be prescribed by the Presidential Decree.

Article 16. Contributions

Paragraph 1. The Government may grant its contributions to the Foundation to be used for the creation of the fund prescribed in Article 15, for establishment, operation, and projects of the Foundation, and for construction costs.

Paragraph 2. Necessary matters pertaining to the grant, etc., of contributions prescribed in Paragraph I shall be prescribed by the Presidential Decree.

Article 17. Transfer of State-Owned Properties

Paragraph 1. The Government may, when it is deemed necessary for the establishment and operation of the Foundation, either transfer without compensation or loan state-owned

property to the Foundation.

Paragraph 2. Necessary matters pertaining to details, terms and procedures for transfer or lending prescribed in Paragraph I shall be prescribed by Presidential Decree, not with standing the provisions of the State-Owned Property Law.

Article 18. Tax Exemption and Reduction

Tax may be exempted or reduced in such manner as prescribed in the Tax Exemption and Reduction Control Law for persons who have contributed funds to the Foundation, who have received research expenses or research grant and for the Foundation.

Article 19. Dissolution

Paragraph 1. In the event of applying for the dissolution of the Foundation, the Foundation shall obtain approval from the Minister of Science and Technology after a resolution adopted by a vote of two-thirds or more of the registered Trustees of the Board.

Paragraph 2. In case the Foundation has been dissolved, its residual assets shall be vested in the National Treasury.

Article 20. Maintenance of Secrecy

Staff officers or personnel of the Foundation, or any person who has been in such a position, and the certified public accountants prescribed in Article 14, shall neither divulge nor atealthily use any secrets learned in the performance of their duties.

Article 21. Penal Provisions

Paragraph 1. Any person violating the provisions of Article 5 shall be subject to a fine of not more than ₩500,000.

Paragraph 2. Any person violating the provisions of Article 20 shall be subject to penal servitude or imprisonment of not longer that three (3) years or to a fine of not more than ₩500,000.

Article 22. Application of Civil Code Mutatis Mutandis

With respect to the Foundation, the provisions of the Civil code concerning juridical foundations shall be applied mutatis mutandis, except when otherwise prescribed in this Law.

Article 23. Enforcement Decree

Necessary matters pertaining to enforcement of this Law shall be prescribed by the Presidential Decree.

Addenda

Article 1. Date of Enforcement

This Law shall go into force upon the date of its promulgation.

Article 2. Preparation for Establishment

Paragraph 1. The Minister of Science and Technology shall appoint not more than five (5) founding members to take charge of administrative work for the establishment of the Foundation.

Paragraph 2. The founding members shall prepare the Articles of Incorporation and obtain permission of the Minister of Science and Technology.

Paragraph 3. The Secretary General in office at the time of establishment shall be appointed by the Minister of Science and Technology.

Paragraph 4. Founding members shall, when the Secretary Gereral of the Foundation has been appointed pursuant to the provisions of Paragraph 3, turn over the administrative work without delay.

Paragraph 5. The founding members shall be deemed to have been released from office upon completing the turning over of their work as prescribed in the preceding paragraph.

Article 3. International Agreement

The Government or the Foundation may conclude necessary agreements, either with a foreign government or a foreign organization, for achievement of the purpose of the Foundation as prescribed in this Law and for implementation of its projects.

IMPLEMENTATION STATUS OF DAEDUK SCIENCE TOWN CONSTRUCTION

(PRESENTATION PAPER FOR THE THIRD KOREA-U. S. JOINT CONTINUING COMMITTEE ON SCIENTIFIC COOPERATION)

October 10—11, 1975

CONTENTS

MISSING PAGE
NO. 2

Implementation Status

of

Construction of Daeduk Science Town

I. Establishment of Master Plan

A. Establishment of Basic Spacing Plan - Completed in 1973

1. Location by Occupant Organizations
2. Road Network
3. Green Belt and Development Restricted Area
4. Reserved Area

* * *

B. Sectoral Plan of Infrastructure

Sector	Implementation Status	Supporting Agency
Landscaping Plan	Underway	Korea Landscaping Corp.
Water Supply Plan	"	Korea Technology Development Corp.
Housing Plan	"	Korea Housing Corp.
Power Supply Plan	"	Korea Electric Co.
Road Design	Completed in 1974 Road Construction: 1974-2.3 km completed 1975-3.9 km under construction	Ministry of Construction

Implementation Methods

1. Joint planning with related government ministries
2. Korea-U.S. joint work performed with NAS experts of the U.S. to establish the Daeduk Science Town Plan

* * *

II. Present Status of Construction of Occupant Research Institutes

A. Strategic Industrial Technology Research Institutes and Support Services

(Unit: Domestic capital ; ₩one billion
Foreign exchange; $one million)

Institute	Scope	Implementation Status	Scheduled Completion
Shipbuilding Industry Technical Services (SITS)	Domestic Capital 5 Foreign Exchange 3 Manpower 200	Established as an affiliate of KIST (Oct. 1973) Secured UNDP aid ($2,100,000) Building lots secured (40,000 pyong) Construction work begun (March 1975)	1978

Institute	Scope	Implementation Status	Scheduled Completion
Korea Ocean Research and Development Institute (KORDI)	Domestic Capital 2 Foreign Exchange 2.3 Manpower 200	Established as an affiliate of KIST (Oct. 1973) Secured UNDP aid ($2,300,000) Building lots secured (5,000 pyong)	1978
Mechanical Engineering Research Institute (MERI)	Domestic Capital 3 Foreign Exchange 3 Manpower 300	Preparatory work to establish as an affiliate of KIST (scheduled in 1976) Tentative approval obtained for UNDP aid ($1,000,000) Preliminary investigation project to be begun by UNDP (Oct. 1975)	1978
Electronics and Communication Research Institute (ECRI)	Domestic Capital 3 Foreign Exchange 2 Manpower 200	Established jointly by Ministry of Communications and KIST	1978

Institute	Scope	Implementation Status	Scheduled Completion
Petrochemical Industry Research Institute (PIRI)	Domestic capital 2 Foreign Exchange 2 Manpower 200	Preparatory work now underway for establishment as an affiliate of KIST	1981
Korea Standards Research Institute (KSRI)	Domestic Capital 2.3 Foreign Exchange 5 Manpower 200	Signing of AID Loan Agreement pending (around Oct. 1975) Formally designated as a special research institute (August 1975) Inauguration of KSRI scheduled for Oct. 1973 - MCI	1978
Support Services	Domestic Capital 5 Foreign Exchange 3 Manpower 300	Plan now underway	1978

B. Daejon Branch of KAERI

- Construction work scheduled to begin in 1975, and to be completed by 1979

* * *

C. Plan for Moving National and Public Research Institutes

1. Basic Policy

   a. To move 12 national and public research institutes now scattered about Seoul to Daeduk Science Town

   b. To unify or abolish research organizations having similar functions

   c. To change to juridical foundations those existing organizations which could be denationalized for research efficiency

2. Implementation Status

   - KIST is now working on the plan in consultation with the ministries concerned.

* * *

3. Organizations to be moved

   a. National Agricultural Equipment Inspection Office

   b. National Agricultural Products Inspection Office

c. Testing Institute of National Agricultural Products Inspection Office

d. Central Fisheries Inspection Office

e. Central Monopoly Technology Research Institute

f. Technical Research Institute of ONTA

g. Foodstuff Research Institute

h. Railroad Engineering Research Institute

i. Korea Geological and Mining Research Institute

j. Electrical and Communications Laboratory

k. National Health Research Institute

l. National Industrial Standards Laboratory

* * *

D. Establishment of University

1. Establishment Policy

a. To establish a university (Chungnam University), with emphasis placed on the College of Engineering jointly with the West German Government

b. To foster the College of Engineering, centered on mechanical engineering, metallurgical engineering, chemical engineering, and electronics departments in consideration of its relationship with research

institutes

c. To consult with the Association of Korean Scientists and Engineers in West Germany on the curricula

2. Implementation status

a. West German government feasibility study mission visited Korea in October 1974

b. Agreement reached on a DM4 million financial loan at the Korea-Germany economic working officials meeting in May 1975

c. Joint formulation of this plan is now under way by the Ministry of Education, MOST and Chung-nam University.

* * *

III. Supporting Facilities

Support Services

To establish jointly the basic supporting facilities which are needed in common by 20 different institutes and organizations to be located in Science Town thus putting to an end their separate establishment by each organization.

1. To reduce facility investment and operating costs

2. To establish a cooperative research system among research institutes.

A. Major Facilities

1. Maintenance Workshop

2. Library and Information Center

3. Computer Center

4. Analysis and Material Supply Center

5. Conference Hall

B. Establishment Methods

1. Establishment of a Joint Administrative Office in the form of a foundation

2. Implementation Status

-- Establishment of basic plan -- MOST

-- Budgetary action for ₩63 million needed for purchase of building lots in 1976

C. Problems

1. For support of those research institutes, for which construction is scheduled to be completed in 1978, these support service facilities should als be

completed by 1978.

2. Orders should be placed for design work, machinery and equipment in 1976, but the required budget has not yet been secured.

3. Budget Requirements in 1976

-- Domestic capital: Additional funds are necessary to finance the design cost of ₩60 million

-- Foreign exchange; It is necessary to secure $3 million in foreign exchange

* * *

IV. Housing Facilities

Basic Plan

Daily living environment will be developed with modern facilities, including housing, educational and cultural facilities, to recruit competent research specialists, boost their morale and improve their efficiency research

A. Housing

1. Principle of Supply

a. To provide apartments for senior researchers.

b. To encourage private housing construction for general employees with private capital.

2. Apartment Requirements for Senior Researchers

Demand Projection (1st-stage: 1976-77)

Agency \ Year / Floor Space (Pyong):	1976 - 1977					
	A (50)	B (40)	C (30)	D (20)	E (15)	Total
SITS	1	17	27	50	52	147
KORDI	1	13	17	19	9	59
KAERI	1	4	23	34	-	62
Administrative Office	1	5	25	20	29	80
KSRI	1	8	18	10	20	57
Mechanical Engineering Research Institute at Hongnung	1	20	50	124	-	195
Total	6	67	160	257	110	600

3. Housing for non-institute et al affiliated Employees and Residents

-- To construct housing units by establishing the standard housing models by floor space, such as 15-pyong, 20-pyong, and 25-pyong houses.

4. Construction Methods

a. entrust the Korea Housing Corporation with the overall work on housing plans for the whole town area, design of standard house models, funding, and construction of apartments and private apartments.

b. enable each research institute to take over apartments after their construction.

c. promote private enterprise participation in construction of individual houses for private ownership or construction of apartments

d. place Administrative Office in charge of the management of a apartments.

5. Land Preparation

Industrial sites and Water Resources Development Corporation will purchase and develop the whole (130,000 pyong) building lot area, and sell lots for development of downtown areas, educational facilities and public and cultural facilities. The H.C. will be responsible for construction of apartment and houses for the institutions and sell it to Individual institute, according to their requirement.

. Infrastructure

A. Roads

1. Construction of Honam expressway interchange--Korea Highway Corp.

2. To complete construction of the arterial roads for the first stage of the plan (14.0 km) by 1978-6.7 km in 1975 -- MOST and Ministry of Construction

B. Waterworks

1. Water supply requirements: 40,000 T/D

In-town requirements 25,000 T/D

KAERI Branch Requirements 15,000 T/D

2. Supply Methods

Supply water from the Daejon City Hoedok water purifying station

3. Work Cost: ₩1,800 million

-- First stage (1977-78) ₩1,000 "

-- Second stage (1979) ₩800 "

4. Start supply of actual water by 1977

* * *

C. Power Supply

1. Power demand — 100 MVA (including KAERI Branch)

2. Supply method: Daeduk substation will be established supply power as a KECO responsibility

3. Implementation Status

   a. Investigation conducted on power requirements of the occupant institutes and organizations

   b. Consultations are now under way with MCI and KECO for selection of the substation site

D. Landscaping

1. Establish the whole area as a large park city

   a. establish the park road and green belt systems

   b. establish special parks, such as sports parks and zoo

   c. select suitable species of trees by street and park area, and establish plans for tree planting

2. Implementation Status

   a. Complete investigation of weather conditions, trees, and soils, as well as population and social

surveys, in the planned town and adjacent areas

b. Landscaping Master Plan

Design and implementation work now under way (Landscaping Corp.)

* * *

VI. Development of Downtown Area

A. Major Facilities

1. Markets for daily needs
2. Medical facilities
3. Town government and public facilities
4. Social and cultural facilities
5. Service and traffic facilities

B. Construction Methods

1. Building lots needed for development of the downtown area will be sold and developed by the Industrial Sites and Water Resources Development Corp.
2. Each government ministry will plan and construct its own public facilities
3. Private capital will be induced to construct industrial facilities.

* * *

VII. Educational Facilities

A. Principles

To establish (in the first stage of the plan) excellent primary school and middle school facilities:

Primary school

Middle school

B. Facility Plan

Complete the construction by 1977, under the supervision of the Ministry of Education and the Education Board of Chungchong Namdo Province

* * *

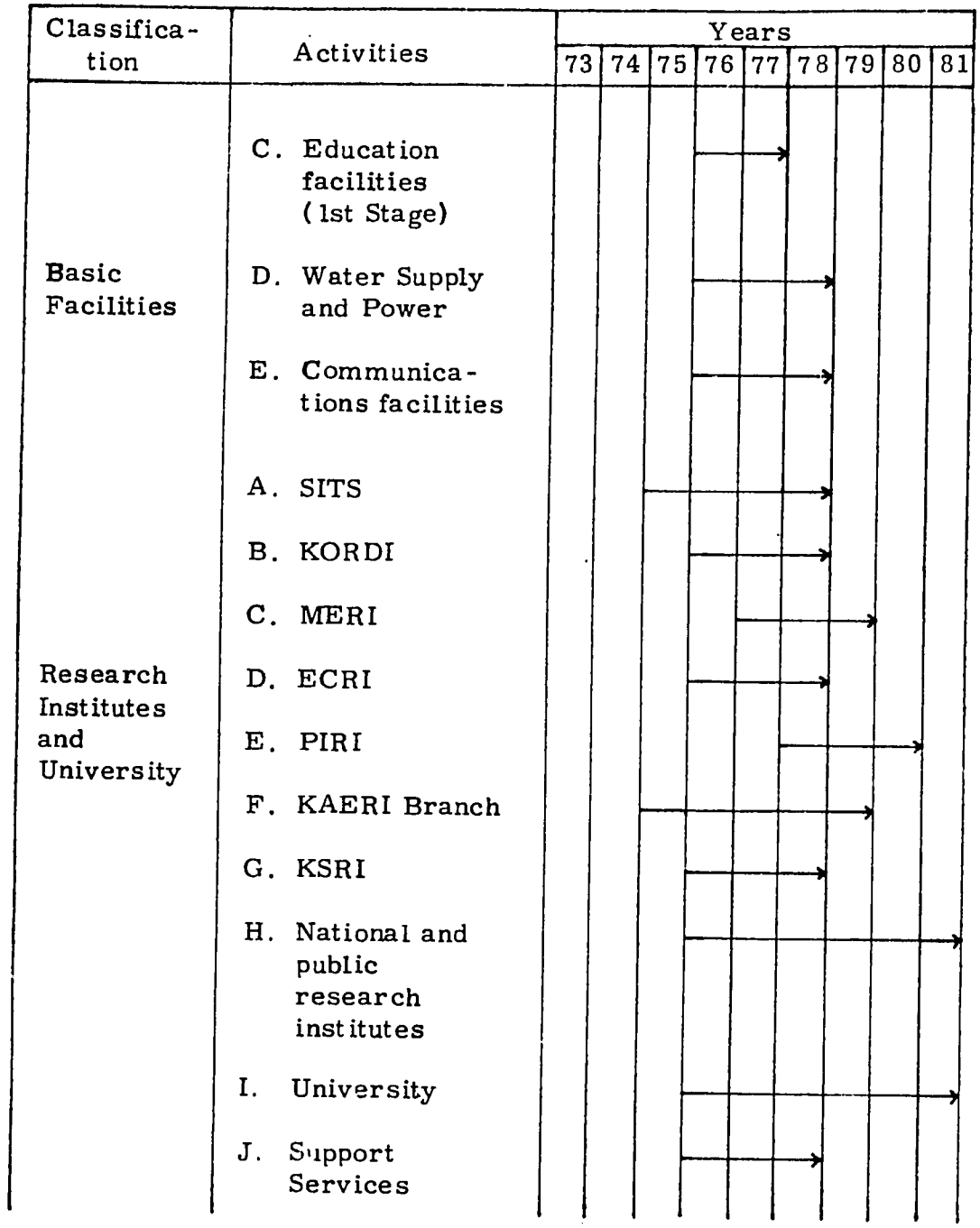
VIII. Daeduk Science Town Construction Plan by Year

Planning	A.	Establishment of Master Plan	1973-74
	B.	Establishment of Sectoral Plan	1974-76
	C.	Planning & Coordination	1973-81
Basic Facilities	A.	Arterial roads (1st stage)	1974-78
	B.	Housing facilities (1st stage)	1976-77
	C.	Education facilities (1st stage)	1976-77
	D.	Water supply and power	1976-78
	E.	Communications facilities	1976-78

Research Institutes and University	A. SITS	1975-78
	B. KORDI	1976-78
	C. MERI	1977-79
	D. ECRI	1976-78
	E. PIRI	1978-80
	F. KAERI Branch	1975-79
	G. KSRI	1976-78
	H. National and public research institutes	1976-81

VIII. Daeduk Science Town Construction Plan by Year

Classification	Activities	Years								
		73	74	75	76	77	78	79	80	81
Planning	A. Establishment of Master Plan	→								
	B. Establishment of Sectoral Plan			→						
	C. Planning & Coordination	→								
Basic Facilities	A. Arterial roads (1st Stage)		→							
	B. Housing Facilities (1st Stage)				→					


Classification
Activities
Years
73
74
75
76
77
78
79
80
81
Basic Facilities
C. Education facilities (1st Stage)
D. Water Supply and Power
E. Communications facilities
Research Institutes and University
A. SITS
B. KORDI
C. MERI
D. ECRI
E. PIRI
F. KAERI Branch
G. KSRI
H. National and public research institutes
I. University
J. Support Services

Classification	Activities	Years								
		73	74	75	76	77	78	79	80	81
Administrative Support	A. Establishment of independent administrative Organization				→	→				
	B. Government and Public facilities					→	→			

APPENDIX 3

SYSTEMS DEVELOPMENT AND COMPUTERS

(PRESENTATION PAPER FOR THE THIRD KOREA-U. S. JOINT CONTINUING COMMITTEE ON SCIENTIFIC COOPERATION)

October 10—11, 1975

SYSTEMS DEVELOPMENT AND COMPUTERS

A. Complex Systems in Modern Society

The modern world, so densely populated and with such rapid means of transportation and communication, has become explosively interactive, and the many social and economic development pressures which exist are producing an interactive complexity which all too often defies wise decision making.

These very difficulties represent a stimulating challenge and those nations which can respond to this challenge most skillfully will not only survive and prosper but can also become leaders. Korea with its rapid and successful economic growth and social development, represents a most opportune environment for the application of the new scientific techniques available to manage these complex interactive situations which are now so common.

Systems analysis is the scientific, logical processing of precisely specified information with due consideration of all elements and interactions. Systems design is the selection

of the complex pattern of elements and their interactions to obtain the most desirable results from the systems analysis. The described set of elements and interactions represents a conceptual model of the real world system of concern, so the more accurate the description - that is, the model - the more accurate and reliable are the results of the systems analysis.

Fortunately, our complex world now has at its command this applied science resource of systems analysis and design which together establish the domain of systems development. This has had its most vivid success in the commercial, industrial and military fields. In many cases successful accomplishment in these fields has been critically dependent on the total application of systems analysis.

In principle the methodology is intrinsically simple and direct. Any correct decision making process should be based on logical consideration of all the factors involved in the situation at hand. This procedure has always been followed by those who have been wise. Such logical decision making is essential in today's world even more than the often more familiar intuitive decision.

The simple procedures of the past are, however, no longer adequate for today's problems. Systems which now confront us involve such a vast number of interactive elements with an equally vast number of separate logical relations that there must be some well organized, scientific process to arrive at correct overall decisions. Not only is there the danger that a simplistic approach will neglect essential elements or logical considerations, but subtle elements of complexity may produce correct decisions which may appear strongly counter-intuitive.

Systems analysis was developed in advanced countries as an integration of scientific methods developed in business and industry planning together with the logically similar but more precise methods of design and operation development of complex technological devices and systems.

Long term planning is typical, in business and industry, of the complex development of new operations in large corporations. Such planning may be applied to the opening up of new market areas with new product lines and production facilities or it may be more sharply focussed as in the establishment of a

new petrochemical complex. The more systematic and scientific the planning process and implementation mechanism in such a case, the more use is made of systems analysis methods. In Korea the steady improvement in business and industry planning is a reflection of the steady introduction of some of the more elementary systems analysis concepts and methods.

In some cases the impact has been even more evident. For example the build-up of KIST into a fully operational research and development institution was effective and successful in a very significant degree because of the use of systems analysis by the KIST management and by the Battelle Institute during the build-up phase. This successful application of systems analysis at KIST recommends and even more thorough and extensive application of systems analysis to the planning and build-up of Dae Duk Science Town.

On an even larger scale, long term nuclear power development in Korea will be heavily dependent on systems analysis not only because of the complex industrial development features, involved but also because of the scientific precision required for the nuclear power plants themselves.

Korea is confronted in every development field : social, business, industry, and technology with an increasing number of problems of great complexity. As these must be solved quickly yet correctly, the most scientific methods must be applied. Consequently during the next decade a major policy direction will be the adoption of systems analysis as a universal methods for solving the society's complex problems.

To pursue this policy direction most effectively, the following steps are being implemented :

1) the Bureau of Information Industries established in MOST will be responsible for policy direction and promotion for the universal adoption and use of systems analysis,

2) KIST will be a center for pilot demonstration of systems analysis to representative problems in all phases of society,

3) the experience and developments in foreign countries in the successful application of systems analysis will be imported both as basic scientific principles and as specific cases for interpretation, adaptation and use in Korea,

4) the computer will be used as a primary tool in systems analysis to enhance the scientific quality of the applications,

5) a national campaign will be established and maintained to promote and support the universal adaptation and use of systems analysis.

In view of the urgency of development, the major policy direction for science and technology should be facilitating the application of systems analysis and design to the maximum extent possible. To this end as a specific objective a coordinating body should be established to serve as experts in the application of systems analysis and design and to provide relevant guidance in research and education development. A further objective should be that systems analysis and design should become a basic and intrinsic practice in all of commerce, industry and government.

B. Computers

1. Status

The Korea's needs and resources are exceptionally appropriate to a major role for computers. The application of both

systems analysis and data processing, in which the computer is a primary tool, will be greatly expanded. The future development of computers themselves will be extensively dependent on specialized competence in such areas as microelectronics and high level computer programming. These depend on manpower resources which Korea is particularly able to develop.

At present the extent of use of computers in Korea is not yet at the level of their use in the developing countries, but particularly at KIST certain applications are very far advanced. Furthermore, the rate of expansion in their use is so high that during the coming decade it can be expected that the use of computers will approach that of the developed industrialized countries.

2. Systems Analysis

The process of complex systems analysis in many cases becomes exceedingly laborious in view of the need for systematic logical consideration of elements which often are not precisely or sharply defined. Nevertheless in principle the methods can always be applied. On the other hand many of the

most impressive systems analysis successes have been those in which all systems elements were fully quantifiable. In such cases the total systems analysis effort can be carried out quite expeditiously, directly and completely by computer.

These computer systems analysis developments have all occured either in highly technological activities such as, space flight, or in fully quantifiable industrial operations such as production and distribution logistics. Examples such as these demonstrate well the exceptional power of systems analysis in such key considerations as optimization or real-time performance prediction.

Any careful examination of any full use of the computer shows two critical criteria for attaining success.

1) input data must have the very highest degree of quantitative accuracy and reliablity. Error propagation in computer systems analysis can not only be very difficult to assess but also can produce grossly misleading outputs if they do not indeed totally destroy their value. Consequently the application of the computer to systems analysis and

design while of the greatest potential value, must be done only with thoroughly accurate discrimination as to the adequacy of the input data,

2) the use of the computer tends to hide the basic dependence in all systems analysis on logical modelling. There is a tendency to place implicit confidence in computer output whereas any flaw or basic error in modelling or formulation of a logical argument can easily produce conclusions that have so relation whatesoever with reality.

Both of these considerations indicate that great emphasis should be placed on the competence and technical integrity of those responsible for computer systems analysis of any degree of complexity. Nevertheless, the potential gain in systems design is so great that a specific objective should be the development of talent along with organizational and facility capability to apply the computer to systems analysis wherever possible.

3. Data Processing

By far the greatest use of computers is in the routine data processing activities of business, commerce, industry and government. This is equally true in Korea.

This type of data processing is characterized by the highly repetitive processing of large volumes of numerical data often with very simple computer programs. The value of this service can be substantial not only in labor saving but in high volume processing speed and accuracy. The need for this service in Korea should be carefully monitored to insure that there is a proper balance in the nature and extent of its use. The development of new and extended uses of computers in data processing should be encouraged and there should be adequate capability in the required relevant research and development. The largest number of programs and techniques will have been developed in other countries, however, and can be readily imported or adapted for use in Korea.

In both systems analysis and data processing, computer operation can require a significant number of properly trained individuals. The planning and regulation of the appropriate educational programs calls for thorough, close attention. The eagerness of students and the receptivity of business and industry management to knowledge of computers can easily lead to exploitation and misleading assurances of use and employment prospects.

A general understanding of the real uses and the real limitations of computers remains seriously inadequate. Leadership and the direction of educational activities should be objectives to insure that real needs will be met and a true understanding will be obtained by all concerned.

4. The Computer Industry

The introduction of the computer into business and industry has produced an extensive computer industry to design and manufacture the computer as well as to service both the maintenance and operation of the computer. This new industry has many exceptional and little understood characteristics. Its evolution is now of such a nature that there is an essential role for it within Korea.

The computer itself is basically a complex and highly sophisticated electronic device. The total computer system involves a variety of components performing different functions all of which together enable the system to operate usefully. The total complex of devices comprising the computer system is called computer "hardware". This hardware has been con-

stantly redeveloped and refind particularly in the directions of convenience, reliability and miniaturization. In the last regard many of the massive central processing units of only a few years ago have been replaced by today's minicomputers using refind electronic design. These in turn are being supplanted by even smaller micro-computers using solid state physics techniques.

These hardware developments in the advanced electronic domain call for highly skilled engineers and scientists; a development and production environment quite feasible in Korea. Major efforts should be made to move forward into the development fields of microelectronics and micro-computers.

Modern computer systems are highly reliable in their operations, nevertheless as devices which involve in their totality both electrical and mechanical elements, there is a need for appropriate maintenance. This service is normally provided by the original manufacturer but can also be provided under necessary agreements and control by service enterprises. As computer use expands these can play an important role in Korea although the complexity of the systems calls for careful regulation of such enterprises.

A second quite vital but highly sophisticated computer service is operational programming. These computational and logical instructions were at first and in principle always provided by the user. As hardware design has advanced there has been built in to the computer an ever increasing capacity to store and use such programmed information flexibly. These procedures can be exceedingly complex and their efficient design is of great importance in cost and time saving for the user. This total area of programming design and development is known as computer "software". Its production requires highly skilled personnel who are thoroughly trained in computer logic and in hardware capabilities.

First it must be recognized that the software industry is a highly professional service, in fact as professional as engineering, law, or medicine. Consequently the regulation and government management of the industry should take this fact into consideration.

Second, this software activity has become so extensive and so useful that a software industry has come into being. This is

an industry which serves varied needs ranging in complexity from systems analysis to routine data processing. The market for the service exists not only in Korea but also world wide. The understanding that exists in Korea for the needs of developing and developed countries and the manpower intensive nature of this industry makes it singularly appropriate for an export role. With skilled and responsible management and favorable government inducements and regulations, its future prospects are excellent. This opportunity, however requires careful planning and government management by individuals who themselves are fully competent in this field or no control or regulation will in fact exist.

Third, there is a great need for a well balanced and well planned development of manpower for the software industry. It would be desirable for there to be government sponsored educational demonstration programs both at the most advanced and also at the routine level. These could then serve as models against which programs could be compared and measured for approval.

Fourth, the prospects for the software industry serving the export market are substantial, particularly if there is encouragement by the government and sufficient development and support of highly skilled manpower. Finally, the regulatory processes must be managed in such a way as to guarantee the highest integrity and dependably of the industry. Service quality is critical in the industry's development and acceptability.

Appendix 4

PROMOTION OF INFORMATION INDUSTRY
through
the Systems Development

October, 1975

Bureau of Information Industry
Ministry of Science and Technology

I. Objectives

1. To promote sound and efficient management procedures at various levels of decision making in society through effective introduction of Systems Approach.

2. To contribute to the process of national economic policy making by Systems Approach in identifying and analyzing changing socio-economic factors and to help develop a national "Rolling Plan" which is an adaptive system for flexible economic policies.

3. To provide effective means for securing timely, unbiased and competent decisions regarding the effects of technological applications on various aspects of national life.

II. Areas Demanding Urgent Application of Systems Approach.

1. Energy planning
2. Food development
3. Health administration
4. Resources development and allocation
5. Transportation and communication network

6. Environmental policy

7. Industrialization plan

8. Human resources development

9. Industrial management development

10. Defense systems development

III. Present Status of System Application in Korea.

Although development of specific applications of Systems Approach in industry and government have been largely spontaneous and without clear overall direction and coordination, the nature and the extent of these applications are beginning to indicate the state of semi-maturity.

1. Industrial Systems Applications

Since the first introduction of a computer system in 1967 within the government (Economic Planning Board) for the purpose of processing census data, the number of computing systems in the country has been growing at a rate of 40% per year. An interesting recent development in importation of computer system is to combine large special-purpose software systems, (i.e. IPARS,VIKING). Domestically developed system applications, primarily by KIST, include those for budget

preparation, telephone subscriber billing, electronic switching, etc. Examples of systems projects currently under active development or consideration are the computerization of administrative procedures in government and financial institutions.

2. System Applications in Government-Decision-Making

Development of large scale systems to aid policy decision making in government has been through the works of foreign firms or by binational projects involving both foreign and domestic expertise. Some of the examples are :

Agricultural Sectoral Study	------ Agricultural Economic Research Institute, MOA, and Michigan State University.
Tourism	---------- Ministry of Transportation and Arthur D. Little, Inc.
Economics of Nuclear Energy	- Kaiser Engineering, Inc.

IV. Foundation for Promoting Systems Development.

1. Establishment of Planning and Promoting Nucleus for Systems Development.

- Creation of Bureau of Information Industry within MOST as a body responsible for planning, developing, promoting and coordinating the Systems Development (in 1975).
- Establishment of an advisory committee for Systems Development comprising of systems specialists (in 1975).

2. Infrastructure.

a). Development of Data Processing and Communication Technology.

- Promotion of EDP systems within the government (Ministries involved : Office of Prime Minister, MOST, Ministry of Government Administration, Ministry of Home Affairs).
- Implementation of total information systems for banking institutions.
- Development of domestic computer manufacturing (Prototype mini-computer was developed by KIST and Oriental Computer Co. undertook commercializing the developed mini-computer).

- Promotion of research activities on data bank design (sponsored by MOST).
- Standardization of input-output formats.

b). Establishment of Systems for Information Processing and Dissemination.

- Establishment of national information dissemination systems (NASSTI plan by KORSTIC).
- Increased exchange of information with international organizations (UNISIST - NASSTI).
- Proposition for establishing a National Science Library in Daeduk Science Town.

c). Information and Systems Industry Promotion Act (draft).

V. Directions of Systems Development.

1. Completion of the Master Plan for Systems Development.
   - Recruitment of Key personnel
   - Procurement of funding

2. Manpower Development.
   - Higher education : Undergraduate systems curriculum development and graduate program

development (Ministry of Education)

- Vocational Training : Development of program at vocational level
- Specialized Training : Training of specialists through pilot projects, initially to be conducted jointly with overseas experts.

3. Development of Pilot Projects.
   - Priority selection procedure
   - Binational joint projects
   - Acquisition, adaptation and utilization of system software packages
   - Development of utility system packages
   - Basic method development

4. Promotion of the Development of Systems and Information Industry.
   - Information and Systems Industry Promotion Act (inducement through taxation and/or financing advantages)
   - Direct financial support

- Establishment of specialized agency for systems development
- Promote utilization of domestically manufactured hardware and software component

VI. Fostering of Rational and Systems Thinking in National Life.

- Education of the public through information dissemination, media utilization and demonstration

October 13, 1975 Appendix 5

TO : MOST-NAS Joint Committee

FROM : Harvey M. Wagner

This memorandum is a response to Chairman F. A. Long's request for a brief summary of recommendations on the appropriate next steps to follow up the Joint Committee's discussion of MOST's Bureau of Information Industry and its goals and missions. Because Dr. Lee Hahn Been kindly has agreed to write a similar memorandum on an action program relating to training and curriculum needs in ROK's institutions of higher education, I will not address such subjects here. The focus of this memorandum is those activities which are most appropriate to a joint cooperative effort between the Koreans and the Americans.

U.S. scientists can make worthwhile contributions in a joint arrangement in three ways: assessing the feasibility of applying systems analysis to a specific area of decision making concern, providing technical advice on systems approaches that have proved to be effective; and suggesting educational and training programs supportive of particular systems applications. Korean scientists and officials bear the full responsibility, of course, for the ultimate selection of applications and the conduct of the chosen projects. The eight steps below enumerate one way in which representatives from both countries can use fully interact, recognizing the roles appropriate to the participants.

Step 1. In the next few months, Dr. Kim Young Wook, his staff at the Bureau, and the Bureau's Advisory Committee can select between six to ten possible pilot projects for further

intensive feasibility studies (as outlined in the steps below). A summary description of each possible project should be prepared. This summary should include a statement of project goals, important project milestones (at intervals of approximately three months), the likely staffing of a project team (that is, a list of personnel with their experience and training), the data availability, and a preliminary assessment of the project's potential benefits and chances of success.

Step 2. The summaries should be forwarded to the U.S. members of the MOST-NAS Committee for review. Most likely, these committee members will seek additional advice from other U.S. scientists familiar with similar systems applications. The committee, through an appropriate protocol, will arrange for a team of two or three qualified U.S. scientists to visit Korea for a period of three to five days, for the purposes stated next.

Step 3. The visiting American team in conjunction with Dr. Kim, the Bureau staff, and the Bureau's Advisory Committee, will discuss in depth each of the potential pilot projects. The U.S. team should interview the prospective "clients" for each of the projects in order to assess their receptivity and the ultimate likelihood of the project's providing useful benefits. The end result of this visit should be a tentative ranking of the projects. The U.S. team would play only an advisory role in the ranking process itself.

An additional target for the visit might be a preliminary outline of training programs that are geared to the projects appearing high on the rank ordered list.

Step 4. Shortly following the visit, Koreans will select two or three pilot projects to be undertaken during the ensuing 12 to 24 months. For each of these projects, a detailed work plan must be devised, showing a time table, staffing, the data requirements, and the data availability. These plans will be forwarded to the U.S. advisory team for review and comment.

Step 5. On the basis of the selected pilot projects, the U.S. team, with assistance of NAS and other appropriate US agencies, will facilitate a visit to the U.S. by the Korean scientists who will lead the pilot project effort. These individuals will have separate itineraries in order to enable each to meet with the most appropriate U.S scientists for the projects involved. A group meeting, however, will be arranged at the termination of the visit to share experiences and to plan for subsequent steps. The group will be comprised of the Koreans and the U.S. team who participated in step 3.

Step 6. After returning, the Koreans will finalize the project plans and initiate the systems analysis studies. They also will formulate educational training programs, as required to assist in the conduct of the work.

Step 7. Approximately two to three months after the initiation of the projects, the U.S. advisors will return to Korea to meet with the Korean project teams to review progress and discuss any new issues that have arisen during the initial phase. This visit should extend for about three days and provide apportunities for the U.S. visitors to meet again with the project's clients and the Bureau's Advisory Committee. The visit also can be the occasion for a review of the overall long term plan for systems education

programs to be undertaken in Korea.

Step 8. In 12 to 18 months after the initiation of the pilot projects, the U.S. advisors will return to Korea to confer with the Koreans on the outcomes of the pilot projects. A major topic of this final review meeting will be the follow-up steps to be taken to further institutionalize the application of systems analysis within Korean organizations.

The suggested eight step approval to a binational cooperative effort would extend over a period of about two years. This will be the most critical time in the firm establishment of systems approaches in Korean institutions. The proposed schedule will maximize the opportunity for interaction between scientists for the two countries.

It was a great pleasure for me to be able to join in the third meeting of the Joint Committee. I hope that NAS and the Joint Committee will not hesitate to call on me again if I may be of additional assistance.