भारत सरकार
अन्तरिक्ष विभाग
इसरो मुख्यालय
कावेरी भवन डिस्ट्रिक्ट आफीस मार्ग
बेंगलोर 560 009 भारत
तार : इसरो टेलेक्स : 043 - 499 : 043 - 326
दूरभाष : 27371 विस्तार : 231

सत्यमेव जयते

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
ISRO HEADQUARTERS
CAUVERY BHAVAN DISTRICT OFFICE ROAD
BANGALORE 560 009 INDIA
TELEGRAM : ISRO TELEX : 043 - 499 ; 043-326
TELEPHONE : 27371 EXTENSION : 231

PROF. S. DHAWAN
CHAIRMAN

SC/CH/C. 9/96

12 June 1980

Dear Siddhartha,

At the request of the Prime Minister, Prof. Nurul Hasan, Vice-President, CSIR has requested for a meeting with a select group of Scientists and Engineers from Indian Institute of Science and Indian Space Research Organisation. This meeting will take place on Monday, 30 June 1980 at the Indian Institute of Science in the Council Chamber (first floor) starting at 10.30 a.m. and is expected to last most part of the day with a break for lunch at the IISc Guest House.

2. As far as I know, the purpose of the meeting is to have informal discussions with a range of Scientists and Engineers who are currently involved in scientific research and technological activity for strengthening science and technology effort. I have requested Prof. Nurul Hasan for a brief on the items which may come up for discussion and will pass it on to you for information.

3. May I request you to be in Bangalore on 30 June for the discussion.

With regards,

Yours sincerely,

S. Dhawan

Dr. V. Siddhartha
ISRO Hqrs
Bangalore. 560 009.

Active File

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
Rafi Marg
New Delhi-110001

Professor S. Nurul Hasan

Vice-President

June 17, 1980

Dear Dr. Siddhartha,

The Planning Commission has initiated necessary steps towards the preparation of the Plan Frame for the Sixth Five-Year Plan (1980-85). The exercise is scheduled to be completed by July end. The present Government is deeply aware of great potential of science and technology as a force for economic and social change and is committed to giving S & T a meaningful place in its Plan formulation. In the Plan Frame both the broad policies as well as indication of the resources for the different areas of thrust in R&D and the total quantum of resources required will have to be covered. The policies are to cover: the support to universities, institutions of technical education, including education at all levels; fundamental research specially in areas like biology, mathematics, electronics and earth sciences, generation of new technologies, challenges of high technology; need of financial institutions to support R&D and its utilisation; import of technology and its assimilation and development; R&D management; particular problems of human productivity (including the development of supporting staff); linkages between R&D and economic ministries and public sector undertakings; questions of value of system, and the problems of returns from R&D and other connected problems.

R&D from corporate sector in Univs.

2. The areas of thrust in R&D are to cover short range and immediate problems which require S&T inputs for their solutions including the increase in operational efficiency of the production system, meeting the needs of people in specific areas and uplift of those who have not benefited from development so far; and also cover long range problems, so that in five to ten years new technologies are available to meet the type of problems we are then likely to face. The necessary priority areas are to be worked out, with a proper balance between the short and long range objectives.

3. The Prime Minister has desired that I should hold consultations with scientists and engineers in different parts of the country to ascertain their views on the S&T component of the Plan, the magnitude of investment, priorities in different fields of specialisation including relative priority to be given to education in science and technology. Your ideas and experience would help us in arriving at meaningful conclusions and to make recommendations to the Planning Commission in the areas briefly indicated before. It may be worthwhile that in the course of discussions, we identify major areas of inter-disciplinary and inter-agency research programmes in fields such as energy, reproductive biology for population stabilization, transport, S&T manpower utilisation, water management,

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natural resources (exploration and utilisation), environment including water and air pollution etc. Further these discussions could also suggest means through which the climate for R&D is generated and improved, its utilisation enhanced, the culture of science is promoted and the value system changed to enhance the prestige of creative work and service to the people. The more concrete and result oriented that we can make these discussions, the more relevant and worthwhile will be the Plan frame that we generate.

4. I am writing this to request you kindly to give some thought to this matter and to request you to participate in an informal consultation meeting which I am holding on June 30, 1980 at 10.30 A.M. in the IISC, conference room, Bengalore. The meeting would be followed by lunch and I would be happy if you could join me to the same.

5. I hope you would be kind enough to excuse me for the short notice for this meeting, and would be grateful for your participation and appreciate an early confirmation to this effect.

With kind regards,

Yours sincerely,

(S. NURUL HASAN)

Dr. V. Siddhartha,
ISRO Headquarters,
The Indian Space Research Organisation,
Bangalore - 560009.

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
Rafi Marg
New Delhi-110001

Professor S. Nurul Hasan

Vice-President

June 17, 1980

Dear Mr. Rajan,

The Planning Commission has initiated necessary steps towards the preparation of the Plan Frame for the Sixth Five-Year Plan (1980-85). The exercise is scheduled to be completed by July end. The present Government is deeply aware of great potential of science and technology as a force for economic and social change and is committed to giving S & T a meaningful place in its Plan formulation. In the Plan Frame both the broad policies as well as indication of the resources for the different areas of thrust in R&D and the total quantum of resources required will have to be covered. The policies are to cover: the support to universities, institutions of technical education, including education at all levels; fundamental research specially in areas like biology, mathematics, electronics and earth sciences, generation of new technologies, challenges of high technology; need of financial institutions to support R&D and its utilisation; import of technology and its assimilation and development; R&D management; particular problems of human productivity (including the development of supporting staff); linkages between R&D and economic ministries and public sector undertakings; questions of value of system, and the problems of returns from R&D and other connected problems.

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With kind regards,

Yours sincerely,

(S. NURUL HASAN)

Mr. Y.S. Rajan,
ISRO Headquarters,
The Indian Space Research Organisation,
Bangalore - 560009.

Karnataka State Council for Science and Technology

With the compliments of

Prof. A. K. N. REDDY

Secretary

Indian Institute of Science Bangalore 560 012

DRAFT

ON THE METHODOLOGY OF PREPARING A SCIENCE AND TECHNOLOGY PLAN FOR KARNATAKA

1. Introduction:

There is as yet no tried and tested methodology for preparing a Science & Technology Plan for a state. Even at the national level, the NCST's plan did not involve an integration with the national socio-economic plan. Hence, the methodology for preparing a S&T plan for Karnataka has to be evolved by discussion and trial. It seems clear, however, that Karnataka's Science & Technology plan must:

(a) avoid, unless deliberately desired, duplication of the national Science and Technology Plan;

(b) serve, at the same time, the basic objectives of Karnataka's socio-economic plan; and

(c) work towards the effective utilisation of science & technology to satisfy the basic needs of the people of Karnataka.

2. Scope of a State S&T Plan:

It is recognised here that while a S&T Plan subsumes a R&D plan, the scope of the S&T Plan must be much larger. The formulation of a S&T Plan, and its relationship with socio-economic plans, are indicated in the accompanying diagram. The non-R&D elements which fall within the scope of a S&T Plan are described briefly below:

2.1. State-of-the-art studies to support rational choice of technology and to identify areas in which development is needed.

2.2. Identification of existing S&T infrastructure (laboratories, institutions, test facilities etc) and intellectual resources in the state; identification of new skills/expertise required. (Manpower planning for scientific and technical personnel).

2.3. Software studies to identify improvements in relevant organisations and institutions; identification of constraints to the effective utilisation of technology and suitable policy measures to overcome such constraints.

2.4. Development of an information base and suitable organisation structures for documentation and dissemination of technical information.

2.5. Demonstration projects, pilot plant studies and policy research related to implementation.

2.6. Promotion of scientific temper and popularisation of science, development of mechanisms for active interaction within the scientific community, including social scientists, and creation of a scientific movement.

3. Relationship between a S&T Plan and the State's socio-economic plans:

3.1. Some relevant features of socio-economic planning:

(a) Time horizons: Socio-economic plans are normally prepared for three different time horizons, namely, one year (Annual Plan), five years (Five Year Plans) and 15-20 years (Perspective Plan). The concern of Perspective Plan is to define an overall path for development in terms of broad macro-economic aggregates such as levels of investment, savings and consumption. Five Year Plans are more specific and are mainly concerned with inter-sectoral allocations, while Annual Plans specify budgetary allocations for individual schemes and projects within each sector.

(b) Planning Process: Annual Plans are prepared by the Planning Department on the basis of plans prepared by the various departments. Plan targets and outlays for individual departments are modified through discussions between the Planning Department and the various departments. Subsequently, the Annual Plans are finalised by a process of summation.

(c) Restriction to department's awareness of available technologies: Departmental plans, which embody specific projects and schemes, are based on the department's awareness of available technologies. Thus, even if there are technologies available, but of which the department is not aware, such technologies are not considered. Similarly, if there are technologies which are emerging but the departments are not aware of the development and its likely time schedule, such technologies are also not reckoned with.

(d) Restriction to needs which fall under jurisdiction of departments: If there are people's needs (e.g. cooking fuel) which do not come under the jurisdiction of some department or other, they do not come into the plans until the jurisdiction is assigned.

(e) Gestation Time of projects: Projects included in the plans have gestation times which run into years.

3.2. Some features of S&T Plans:

(a) Relationship to needs: If R&D units in E,S&T (Educational, Scientific and Technological) institutions are not organizationally linked to users of R&D (industries, farms, departments, people etc), as is generally the case, the S&T programme proposed by these R&D units may not have any relationship to needs.

(b) Identification of programmes and priorities: The most important aspect of S&T planning is the mechanism for identifying programmes and projects and the associated priorities. The standard mechanisms are (i) proposals from R&D units, (but these may not be need-based), (ii) requests from user departments, industries, etc (but these may not show full awareness of technical possibilities), and (iii) reports of panels, expert committees, etc (but these suffer from the well-known defects of hierarchy, patronage, biases in the composition of panels and expert committees).

(c) Gestation time: R&D projects show a distribution of gestation times, such that, on the average, the output of a S&T plan emerges only about 3 years after initiation of S&T plan. In addition, some projects bear fruit in one or two years, and a few others may take 5-10 years.

(d) Uncertainty element: S&T planning is planning for creativity and innovation, and therefore involves uncertainty.

3.3. Linkage between socio-economic plans and S&T Plans:

Although a state S&T plan must serve the objectives of the state's socio-economic plan, it is felt that it would not be either feasible or advisable to have a one-is-to-one correspondence between the two plans. A number of reasons underlie this opinion and are briefly summarised here:

(a) Since the outputs of a S&T plan show a distribution of gestation times, the linkages with socio-economic plans would depend on specific projects.

(b) The level of investment envisaged in socio-economic plans for a particular sector need not necessarily reflect the importance of that sector from the perspective of a S&T Plan. Thus, the investment in the power sector may be very large compared to small-scale industries due to the nature of projects undertaken; but the potential for improvements may be much greater in the latter.

(c) As observed earlier, socio-economic plans embody only those technologies which are well-known to government departments. On the other hand, the concern of a S&T plan must be necessarily larger since S&T planning is planning for creativity and innovation.

In other words, a S&T plan should not be tied to a specific socio-economic plan. What is more important is that the broad socio-economic approach and perspective should be common for both the plans. Such an approach could be derived from a scrutiny of past socio-economic plans (Five Year Plans and Perspective Plans) and by an exchange of views between planners and scientists.

Specific linkages between the S&T plan and the SE Plan would depend on the gestation periods of specific projects. Thus, it may be possible that many software projects, such as studies on choice of technology, could form inputs to annual plans in the next time period, while long-term policy studies with a horizon of 20 years or more could influence perspective socio-economic plans. Similarly, SE plans could be disaggregated into sectors/units of study which when subjected to scientific evaluation, would provide inputs to a S&T Plan.

What is being suggested here is a two-way linkage between S&T plans and SE plans leading to a resonance between the two. Such a relationship is possible only when the S&T plan is not tied to and derived mechanically from a specific SE plan.

4. Formulation of the S&T Plan:

A S&T plan may be considered as an assemblage of projects and programmes for various sectors/areas/basic needs. As mentioned earlier, a S&T plan includes projects involving conventional R&D as well as a non-R&D component. The problem of formulating a S&T plan is precisely the problem of identifying and, if necessary, selecting projects (both R&D and non-R&D). The following sections outline a suggested methodology for formulating a S&T plan.

4.1. Identification of projects: Identification of the various projects in the different sectors is the first step in the formulation of the plan. One crucial problem in S&T planning is the mechanism for formulating these component programmes. It is vital inconsidering this problem to appreciate that the following aspects are involved in formulating a S&T programme for a particular sector/area/basic need:

(a) well-defined objectives of the S&T/R&D programme,

(b) a precise understanding of the needs/requirements,

(c) a clear picture of the resources and constraints (economic, social),

(d) a definition of the criteria to be satisfied by a technology before it is considered as acceptable,

(e) an identification of all the available and realisable technologies which are candidates for acceptability.

In view of the limitations of the three conventional mechanisms (viz proposals from R&D units, requests from users and reports of expert panels), it is proposed to adopt the seminar/symposium approach which has been tried by the KSCST in formulating its R&D programmes for the areas of Rural Housing and of Energy Planning. This approach involves the organisation of a seminar/symposium on a specific subject/area/sector/basic need, involving the presentation of papers by planners (eg. from the Planning Department), users (e.g. govt. departments, industrialists, farmers) and R&D scientists and engineers. The papers must have three main emphasis: (1) defining the needs, (2) reviewing the available and realisable technologies and (3) identifying the main problems. A breakdown of the problem areas would identify (a) the relevant R&D gaps or relevant R&D potential and (b) the linkage between different R&D projects or problem areas. It is expected that, by and large, the non-R&D components of the S&T Plan could also be identified by the same approach as suggested above for R&D projects. Specifically, these components may be considered in three categories:

a) problems related to S&T infrastructure, including information and manpower; (2.2, 2.4)

b) problems related to promotion of scientific temper (2.6) and

c) problems related to improving the effective utilisation of technology (2.1, 2.3, & 2.5).

Of the above, it would be logical to consider category (c) along with the relevant R&D sector when a seminar is organised for that sector. To illustrate, some of the problems identified at the seminar on Energy include optimisation of source-mix, energy forecasting, input-output analysis of energy, environmental impact of energy systems etc. The other two categories cannot be combined easily with individual sectors and it would be necessary to organise separate seminars to account for them.

As discussed earlier, the S&T plan should be consistent with the socio-economic scenario as envisaged in the perspective plan. Thus the objectives for each sectoral programme would be derived from the broad targets and directions set out in the Perspective Plan. At the same time, the need-based approach should govern the identification of relevant projects. Defining the felt needs of society at large and ordering these hierarchically according to their relative importance could help in a normative determination of the particular needs to be satisfied and the extent of satisfaction of the same. In order to cope with the enormous variety of needs, problem areas, projects and sectors, it may be worthwhile to adopt the ABC approach at this initial stage itself. This would result in a consideration of sectors/problem areas in a phased manner according to their importance. This initial ABC classification and selection would identify those important sectors/problem areas that could be taken up in the first phase of the S&T plan. Such an approach would increase the effectiveness of S&T programme formulation. For example, it may be necessary to introduce an important constraint, viz to eliminate those R&D problems which are of national importance and thus best left to other appropriate agencies.

The problems which emerge from the papers must be collected and integrated into a coherent S&T programme which must be placed before the seminar/symposium and discussed and adopted by it.

The above mechanism not only exposes the ideas and suggestions to open, free and frank discussion, but increases the number of people involved in the formulation of a R&D programme by a factor of about 20, ie. from about 10 in an Expert Panel to about 200 seminar participants. If necessary, the R&D programme thus arrived at can be further circulated for comments to a wider and/or more expert audience.

4.2. Evaluation and selection of the projects: It is expected that the operating constraint on the number of projects would be the availability of institutional resources and infrastructure (including scientific manpower) rather than funds. These constraints would have to be explicitly taken into account. In the face of such constraints, it would not be necessary to employ a quantitative methodology for project selection. It would be sufficient if a set of criteria is developed. A bank of projects, generated as outlined in the previous section, would then be tested according to the criteria. The projects which are found to be "eligible" after such a scrutiny could then be grouped according to subject/priority within each sector for purposes of funding.

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S & T PLANNING PROCESS

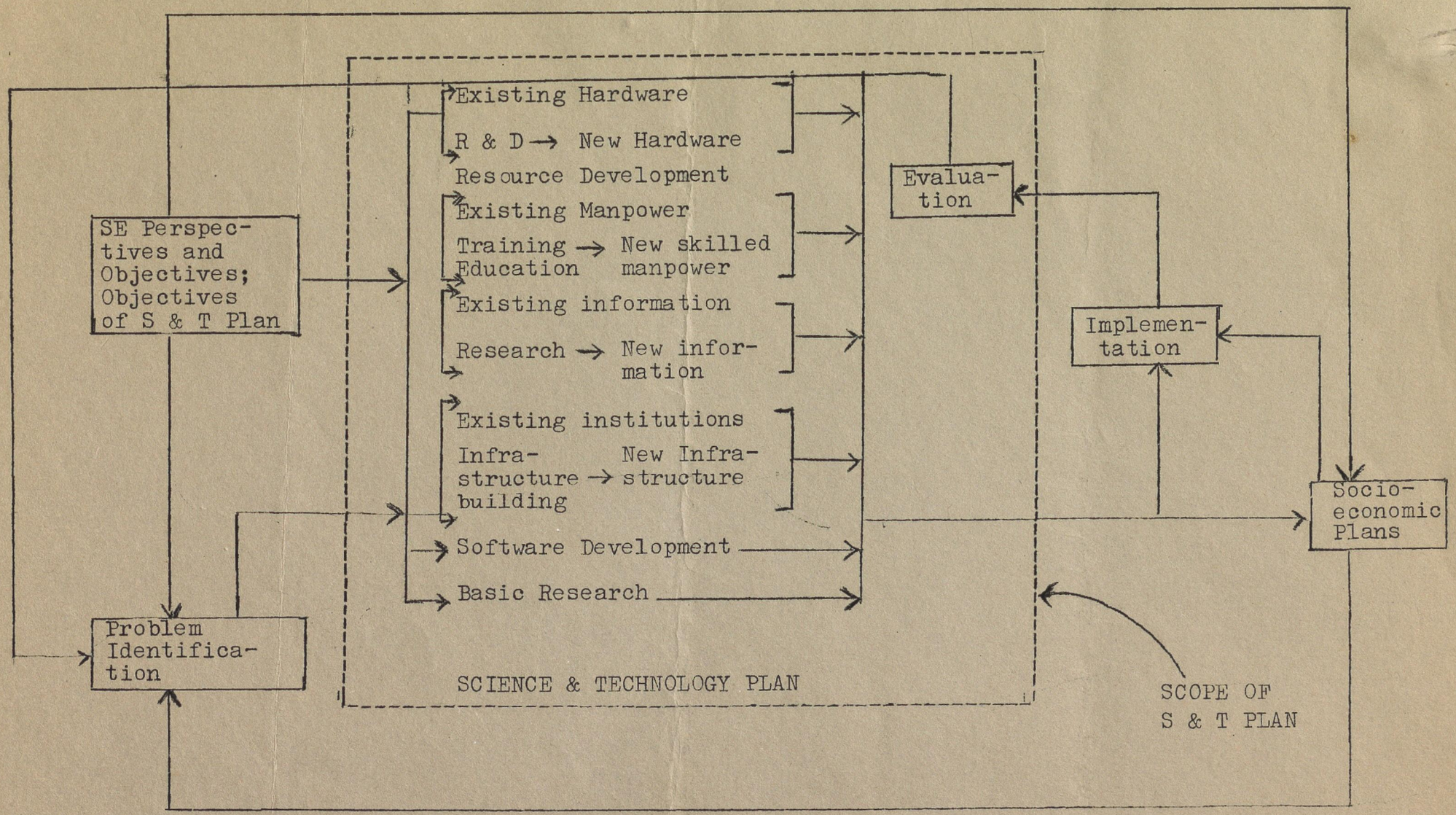

Figure. 1