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THE APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND
AND ITS ROLE IN RESEARCH AND DEVELOPMENT^{1/}

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The Applied Scientific Research Corporation of Thailand (ASRCT) was established in 1963 by Royal Act and became operational in 1964. It is a main center for applied scientific research in Thailand. With the passage of the Applied Scientific Research Corporation of Thailand Act B.E. 2506 (1963 A.D.), the legal framework was established for the creation of a semi-autonomous applied science institution operating outside the Thai civil science. Because of its semi-autonomous structure, despite largely governmental financial support, it has an almost unique capability within the country of being in a position to coordinate research programmes involving governmental departments, other governmental organizations, foreign and international agencies as well as to carryout research projects, on contract basis, for private industry. The main facilities of ASRCT are located in suburban Bangkok, adjacent to Kasetsart (Agriculture) University and to the Office of the National Research Council. A new site of approximately 20 acres of land has recently been acquired for expansion of its physical facilities.

ASRCT reports to the President of the Council of Ministers, i.e. the Prime Minister, and its management is in the hands of a Governing Board appointed by the Cabinet upon the recommendation of the National Research Council. According to the ASRCT Act, the Board is to be composed of not more than three Governors, four Expert Consultants and two Special Governors, the latter not necessarily being Thai citizens. The Board could delegate to any Governor or Special Governor the authority to conduct the whole or any part of the affairs of the Corporation. At present, the

Board consists of a Governor, who acts as the executive administrator and as the Chairman of the Board, and four Expert Consultants, i.e., the Secretary-General of the National Research Council, the Secretary-General of the National Economic and Social Development Board, the Secretary-General of the Board of Investment and, finally, a business executive.

The administration of ASRCT is relatively centralized, by international standards, for an applied research institute. Decision making on administrative matters, as well as policy, largely rests with the Board acting on the recommendation of the Governor.

OBJECTIVES

As stated in the Act, the objectives of ASRCT are:

- (1) to initiate, carry out, promote and support applied scientific research and investigation in connection with, or for the promotion of, any matter affecting national development, the natural resources, industries and administrative services of the kingdom, including the health and welfare of the Thai people and to promote the application of the results of applied scientific research for the benefit of the nation;
- (2) To train scientific research workers;
- (3) To provide a central service for making scientific tests and measurements of all kinds.

ORGANIZATION

To carry out the work to achieve the above objectives, ASRCT, at present, consists of 8 departments, namely:

- 1) Technological Research Department (formerly Technological Research Institute)
- 2) Agricultural Research Department
- 3) Engineering Department
- 4) Economic Department
- 5) Building Research Department
- 6) Testing and Standard Department
- 7) Environmental and Ecological Research Department
- 8) Thai National Documentation Center

In addition, there are a number of specialized as well as administrative offices to provide necessary supporting services to the research departments. See Figure 1 for the organisation chart, as of July 1976.

Modeled to a large extent upon Australia's highly successful Commonwealth Scientific and Industrial Research Organisation (CSIRO), ASRCT has, nevertheless, unique features which enhance its efficiency in the milieu in which it has to work, i.e. that of a developing country with a huge range of problems which it could investigate but with a dearth of experienced scientific manpower. To offset these difficulties, the Board and management of ASRCT utilise two mechanisms to maximise the utility of its resources. First, despite the apparent rigidity of the organisation chart, research is in fact carried out by multi-disciplinary teams drawn from the various groups, as appropriate, of the 8 departments together with such outside assistance (i.e. universities) as is necessary. The second mechanism is that of continually monitoring each research programme from the commercial/^{and} economic viewpoint so as to detect as early as possible flaws in the viability of the programme.

MANPOWER

In 1964, the year after the Act was passed and operation began, ASRCT had a staff of 41 persons, a large number of which were fresh graduates recruited for further studies and training abroad. Over the following decade, the Corporation grew in size and scope of operations. The growth of ASRCT staff from 1964 to date is shown in Table 1. At present, ASRCT has a staff of 385 persons including 165 professionals. The distribution of staff among and within various departments is given in Table 2 and the educational background of the professional staff is given in Table 3. (It has been noted by several management experts that the technical capability of the staff at ASRCT is quite good and that the weaknesses lies in the areas of management and marketing).

Part of the reason ASRCT has been able to obtain a staff that is felt by many to be quite good in terms of the technical expertise rests with ASRCT's salary structure which in general is considerable better than their counterparts in the civil service. On the other hand, the industry offers even better salary and, indeed, loss of staff to industry is one of ASRCT's major difficulties. However, it could be stated that while it is a problem for ASRCT, it is nevertheless one of the nation building functions to train people for industry.

TABLE 1
GROWTH OF STAFF OF ASRCT, 1964-1976

Year	No. of Staff
1964	41
1965	81
1966	131
1967	227
1968	260
1969	307
1970	343
1971	357
1972	372
1973	365
1974	378
1975	372
1976 (July)	385

TABLE 2
ASRCT STAFF NUMBERS AND DISTRIBUTION (July 1976)

Departments	No. of Staff
Technological Research	76
Agricultural Research	29
Engineering	68
Economic	11
Building Research	18
Testing and Standard	18
Environmental and Ecological Research	55
Thai National Documentation Center	20
Administrative Services	<u>90</u>
Total	385

TABLE 3
EDUCATION OF ASRCT'S STAFF

	No. of Staff	Per Cent
Ph.D. level	8	2.08
Masters level	52	13.51
Bachelors level	87	22.60
Certificates and Diplome level	129	33.51
Junior Highschool/Elementary School level	109	28.31

FINANCIAL RESOURCES

The sources of ASRCT's income, as set forth in the ASRCT Act, are to be from:

- (1) Grants made available by the Government, grants from various other sources, and gifts from benefactors;
- (2) Fees charged by the Corporation for investigations or for scientific tests or measurements or for other services;
- (3) Interest and other income from investments.

The major source of ASRCT's annual income is from the Government in the form of a block allocation of funds. Of ASRCT's 31 million bahts income in 1975, 27 million bahts or 87.1 per cent came from the Government's allocation. Three million bahts came from foreign and international agencies in the form of grants. Finally, approximately one million bahts came from earnings. The planned growth of ASRCT's budgets and the potential sources of its income during the next five years, from 1977 to 1981, are given in Table 4.

• Twenty bahts equal one US dollar.

TABLE 4
THE PLANNED GROWTH OF ASRCT'S INCOME
(1977-1981)
(in million bahts)

Year	Income		
	Government's budget	Other sources	Total
1977	32.10	1.61	32.10
1978	30.04	3.34	33.38
1979	29.51	5.21	34.32
1980	28.89	7.22	36.11
1981	28.16	9.37	37.55

COOPERATION WITH OTHER INSTITUTIONS

During the past years, ASRET has been working in collaboration with several local and foreign institutions:

Local

Universities : Graduate student training programme in the areas of agriculture, industrial fermentation, building research and environmental studies.

Governmental institutions/agencies

Department of Technical Agriculture: pulp and paper project; high-land crops cultivation; soybean project.

Government Pharmaceutical Organizations: Tetracycline production -
: feasibility study.
: Medicinal plants project.

Military and Research Development Centre: Physical and human resources study.

Asian Institute of Technology: Material for concrete; sewage treatment and waste utilization programmes.

National Statistical Office: Data processing

Board of Investment: Feasibility studies for new industries.

Foreign

Association of Southeast Asian Nations (ASEAN): Soybean processing and utilization.

World Data Center, Brisbane, Australia: Microbial culture collection

Tropical Products Institute, London, England: Essential Oils; Food fermentation (fish sauce) and soybean processings.

University of Sussex, England: Science policy studies

Denver Research Institute, Colorado, USA: Industrial Information;
Research Management Develop-
ment; Rubber seed oil for
paint project.

It should be noted that ASRCT and DRI have been in close association for almost three years on a technical project on rubber seed oil for paint. In addition, ASRCT and DRI have jointly organized a series of management development workshop designed to improve the management capabilities of RI's in developing countries of SE Asia. As a result a smooth working relationship exists between the two organizations.

Negotiation is at present underway for the formal establishment of a linkage, between the Applied Scientific Research Corporation of Thailand and the Denver Research Institute, University of Denver, Denver, Colorado, USA. It is proposed that the linkage be built around a program of mutual interest which will assist industrial development in Thailand. The proposed program will specifically focus on agricultural and rural-based industrial problems and on improving ASRCT's management capabilities and procedures in order to work effectively in these areas.

UNIDO : (Development and Transfer of Technology Section)

Research on the development of a small-scale rice bran
stabilizing unit.

RESEARCH PROGRAMMES AND ACTIVITIES

The emphasis of ASRCT activities is on applied scientific research, i.e. it is charged with the task of promoting the applications of the results of applied research for the benefit of the nation. The research activities are directed to research programmes which have been assembled in the light of the requirements of Thailand's economic development plan. Research programmes have originated in many ways, most often from governmental and industrial requests (contract research), but also through surveys and contact with industry (in-house research) and approaches from foreign and international agencies (grants research). As a result of the industrial survey, a book entitled "Industrial Sector of Thailand" was published.

The research programmes may be divided into five main categories:

1. Research to promote agro-industry
2. Research to solve problems of existing industries (trouble-shooting), including pollution problems
3. Research to adapt known technology to local conditions
4. Research associated with techno-economic (industrial) feasibility studies
5. Research on utilization and upgrading of local raw materials, including agricultural wastes and crop residues.

Existing and planned research programmes are given in Appendix 1 and Appendix 2 respectively.

Concomitant with carrying out applied research, ASRCT is also responsible for training scientific research workers, providing central technical information services, standard testing service, and providing a central service for making scientific measurements.

REASONS/FACTORS AFFECTING THE EFFECTIVENESS OF RESEARCH AND DEVELOPMENT
IN THAILAND

Listed below are some major reasons as to why ASRCT finds difficulty in serving industry through the application of science and technology. In general, it may be stated that all too often the reason for the difficulty in applying technology for the benefit of clientele industry has little to do with technology itself. Some of these non-technical factors or barriers to effective service to industry are:

1. Lack of confidence in an institute's technical capabilities.

Most research staff members are recruited directly from institutions of higher learning and consequently have very little or no opportunity to be exposed to the actual industrial situations. As a result, industry is reluctant to have confidence in the technical capabilities of the staff. In some cases, staff members are unable to relate what they have learned in developed countries to the appreciably different problems which exist in their country.

Solutions: (1) In some instances, co-participation in research projects with more established institutions from outside the country could strengthen local technical capabilities and, consequently, could result in increasing confidence in the Corporation.

(2) It is often found that on-the-job training programme for the junior staff, after a few years with the Corporation, is very effective in exposing them to actual industrial situations and in increasing their self-confidence.

2. Industry bias toward government institution. Although ASRCC is a semi-autonomous agency, there is still a demonstrable bias on the part of management in industry toward the Corporation, as being an institution of a governmental nature. This is particularly true in the case of small industries.

Solutions: (1) By promoting more contacts with industry through extension services, visiting them regularly, and providing relevant industrial information.

(2) By conducting activities in a business-like manner, i.e. keeping formalities to the minimum.

3. Inadequate or long-term technological pay-offs. The industrial community is generally dissatisfied with the relatively long periods of time required for an investment in technical development to pay-off. The industry is not willing to invest much time, effort and money in supporting adaptive research when in most cases a readily available and presumably suitable developed technology could readily be obtained from developed or more advanced countries.

Possible solution: Government's effort to induce investment in the form of research and development by the industry through policies of granting protection to such industries, tax moratoria profit repatriation, etc.

4. "Tied" technical and financial assistance from foreign companies. All too often, there has been the practice of licensors in developed countries requiring their licensees to obtain all technical assistance from the patent holder and that any technological modification

or research and development be undertaken in the headquarters country. This is a rather serious question and does indeed require governmental support and assistance for solution.

Attempt is currently being made to obtain Government's approval to allow tax exemption for the money spent by the industry for research and developmental services provided by ASRCT or other governmental research agencies. This incentive, it is hoped, would serve as an inducement for the industry to seek technological changes through research and development.

POSSIBLE AREAS OF TECHNOLOGICAL COOPERATION

For mutual benefits, it is suggested that areas of technological cooperation, with little or no business competition, should be:

1. Waste recovery/utilization, particularly agricultural wastes (including crop residues).
2. Packaging technology, particularly for agricultural produces and fresh fruits.
3. Industrial waste water treatment.

APPENDIX 1

LIST OF EXISTING RESEARCH PROGRAMMES

- AGRO-INDUSTRY:**
1. Tapioca utilization
 2. Soybean processing and utilization
 3. Food fermentation
 4. Vegetable oils production
 5. Essential oils production
 6. Animal feeds from wastes and crop residues
 7. Coconut processing and utilization
 8. Mushroom production and processing
 9. Natural products for toiletries and pharmaceutical products
 10. Rubber seed oil for paint
 11. Kenaf for pulp

NON-AGRO-INDUSTRY:

1. Galvanized tin plate production
2. Dolomite for basic refractory
3. Ferrocement application
4. White clay utilization
5. Lightweight clay aggregate
6. Low-cost housing design and construction
7. Gelatin capsule production

* only those of regional or global interest are included.

APPENDIX 2

LIST OF PROPOSED OR PLANNED PROGRAMMES

1. Packaging of produces
2. Tetracycline production (using locally available raw materials)
3. Glucose syrup from tapioca
4. Bamboo processing and utilization
5. Sponge iron production
6. Fuel from (local) lignite
7. Rhizobium (soybean inoculant) production
8. Baby food production
9. Upgrading quality of silk
10. Nursery blocks production (from agricultural waste)

FIGURE 1
ASRCT ORGANIZATION CHART

ASRCT. ORGANIZATION CHART

AS OF JULY 9, 1976

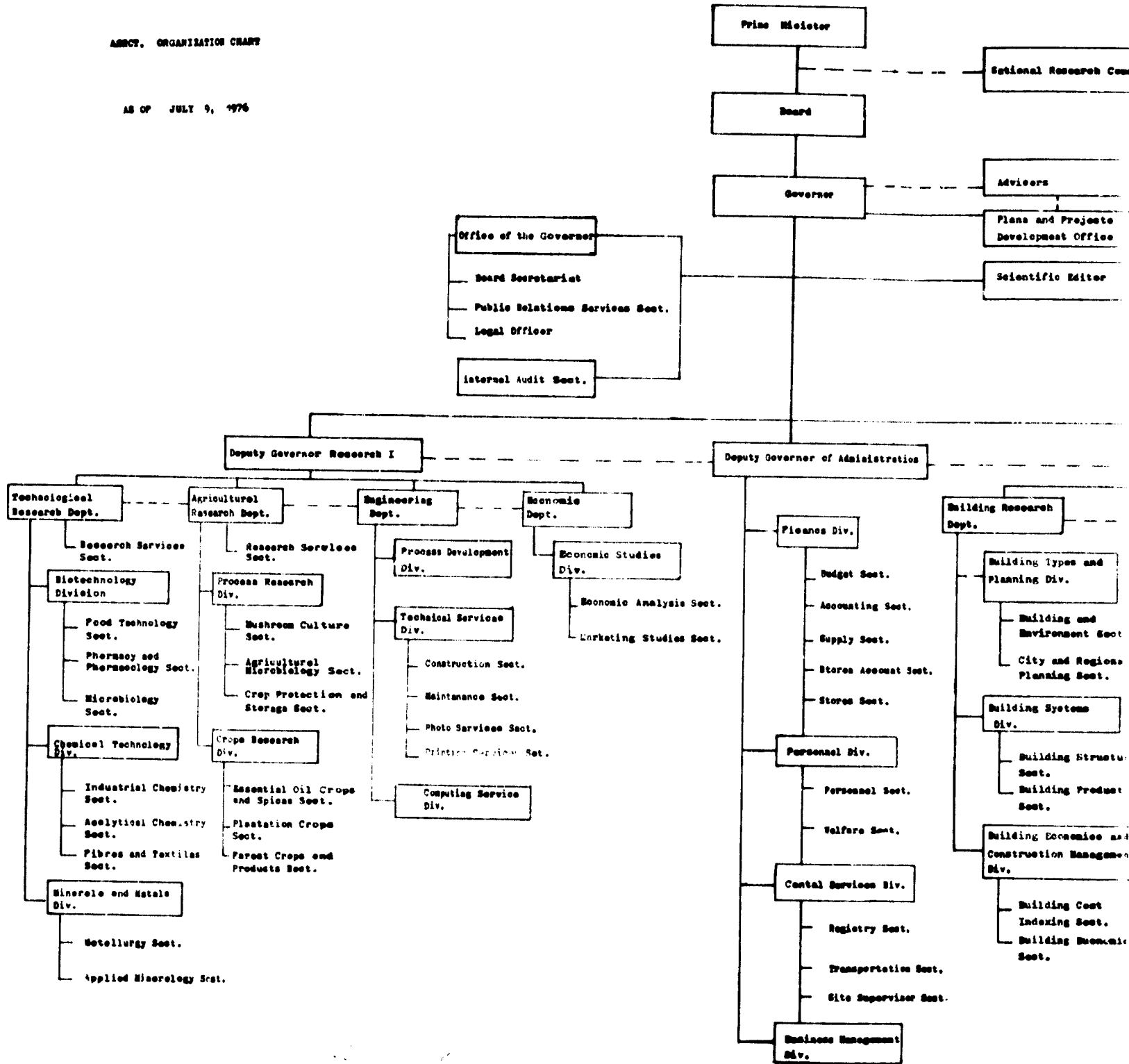
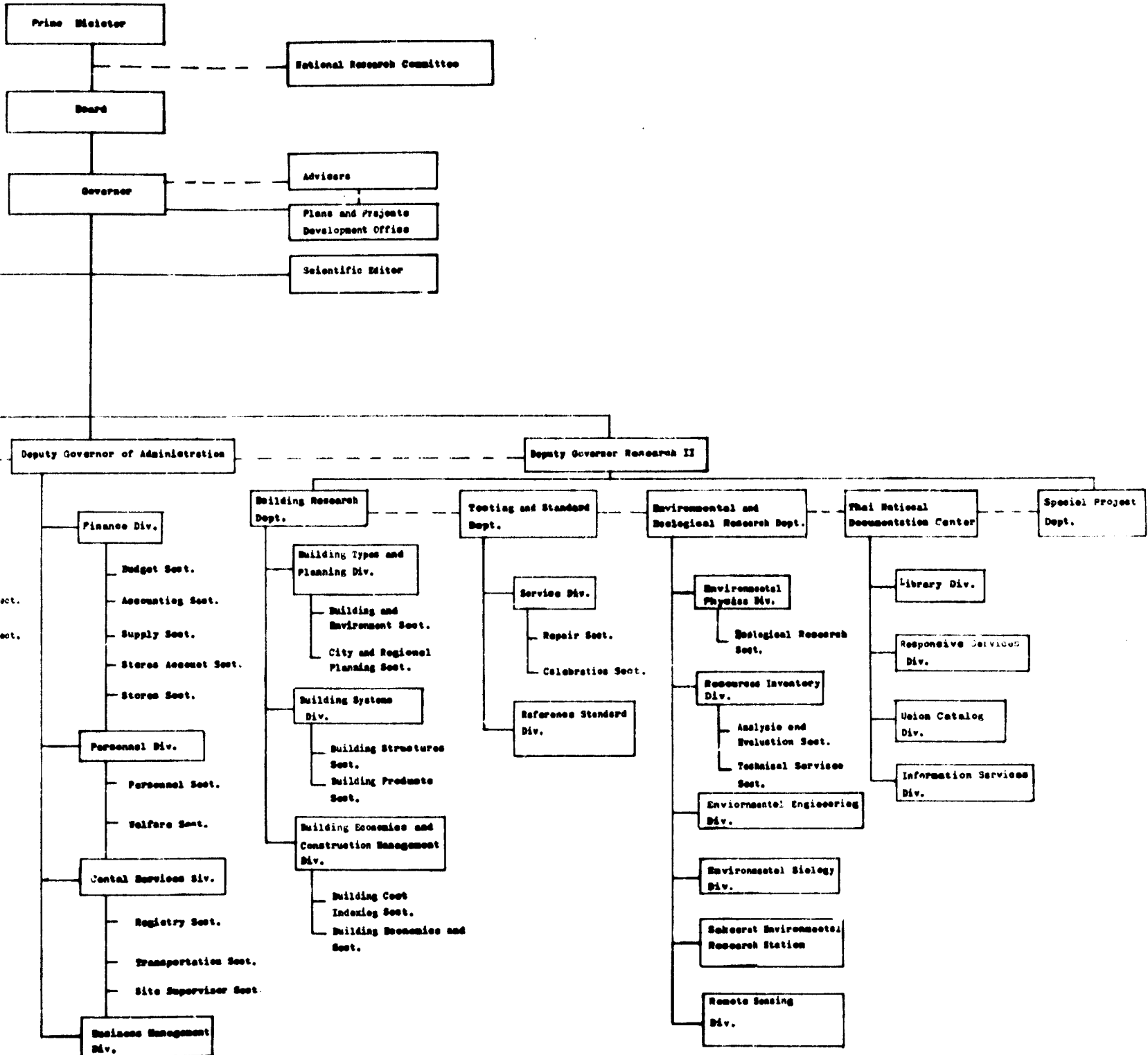
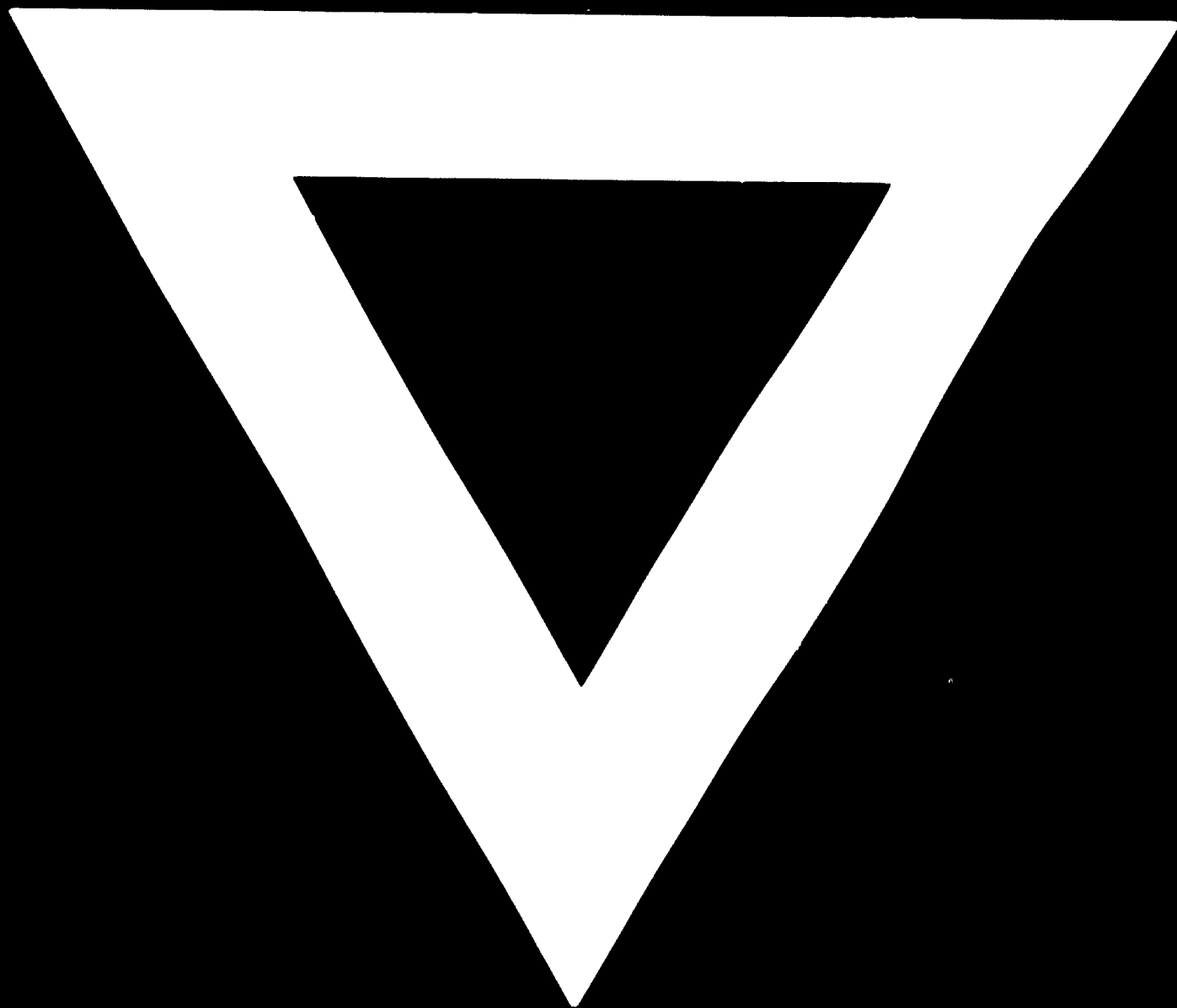


FIGURE 1

ASRCT ORGANIZATION CHART



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