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ASSESSMENT OF THE INFORMATION PROCESSING NEEDS  
FOR AGRICULTURAL SECTOR PLANNING IN GUYANA

PREPARED FOR THE DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
LA/DR/RD

by

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## 1. BACKGROUND

This report presents the results of a study conducted by Analysis Group, Incorporated for the Department of State, Agency for International Development. The main purpose of which was to assess the information processing needs for planning in the agricultural sector in Guyana, South America.

Guyana is located on the Northern Coast of South America. It is bounded on the South and Southwest by Brazil, on the Northwest by Venezuela, and by Surinam on the East. The country has an area of 83,000 square miles, and a population of about 800,000 people. The economy and trade, most of which is controlled by the state, is centered on agriculture and mining; sugar, rice, and bauxite being the principal products.

Over the past decade or so, a number of dramatic structural changes have taken place in the Guyanese economy as the Government of Guyana (GOG) has been placing greater emphasis on public sector activities as means of inducing economic growth and achieving economic self-sufficiency. More recently, the agricultural sector has been regarded as the linchpin of the Government's development strategy. Approximately one-third of all public sector investment funds is earmarked for agricultural development. In addition, the majority of assistance from external donors has been and most likely will continue to be directed to that sector.

One such donor is the Department of State through the Agency for

International Development (USAID), which plans to spend some 1.5 million dollars (US) on agricultural sector planning projects during the next three years. Other donors include: The Inter-American Development Bank (IDB), The Indian Technical and Economic Cooperation Program, and the Inter-American Institute for Agricultural Sciences, (IICA).

The USAID's assistance to the Government of Guyana for agricultural sector planning will go directly to two government units: the Resource Development and Planning Division (RDPD) of the Ministry of Agriculture and the Statistical Bureau (SB) of the Ministry of Economic Development. The assistance to the RDPD includes organizational management; access to secondary information relevant to agricultural planning; and in-country training in consumer behavior, agro-industry, agricultural marketing, agricultural credit, international trade and regional science. The assistance to the Statistical Bureau includes providing the needed computer time and capacity, and providing assistance in developing the data processing and programming expertise, to produce information and data to RDPD and other agricultural planning units on a timely basis.

The University of Guyana (UG) will have a major role in training data processing personnel for SB and RDPD, and USAID will provide it with computer time and capacity for training such personnel.

### 1.1 Introduction

The purpose of this study is to assess the information processing

needs for planning in the agricultural sector in Guyana, and to assist USAID in designing a system to satisfy those needs.

The study was conducted by a team of system engineers and analysts from Analysis Group, Incorporated, a firm located in Washington, D.C., whose personnel have in-depth knowledge of problems of developing countries (in particular the Caribbean and Latin America), and the technical capabilities to solve those problems.

The study involved in-depth interviews with officials of the agencies involved with agricultural planning and information management in Guyana, namely the Ministry of Agriculture through the Resource Development and Planning Division, The Statistical Bureau, The National Data Management Authority (NDMA), and the University of Guyana to determine the need for the system. In addition, surveys were conducted of computer suppliers to determine the availability of different systems for Guyana. Also, attempts were made to determine the person-power and other resources that would be needed to support the system, and to identify alternative options for acquiring those resources. Because of the known shortage of skilled data processing personnel, the training requirements both in the short-term and long-term were given special attention. Another important aspect of the study involved identifying the configuration and software requirements that would facilitate the easy use of the system

## 1.2 Approach

The objectives of the projects were first, to determine the

Government units responsible for agricultural planning to determine the data processing needs. Surveys of computer suppliers were conducted to determine the availability of hardware and support services in Guyana. Present users of computer systems were surveyed to determine the availability of other resources, in particular trained personnel.

Based on the survey of suppliers, a list of possible systems were developed. A careful analysis of these alternative systems were conducted to determine how well each satisfied the data processing needs and other criteria established by USAID and the Government of Guyana. The system which best satisfied all the criteria were recommended as the most appropriate system.

## 2. DETERMINATION OF NEEDS

This section describes the roles of the Statistical Bureau, the Resource Development Planning Division, Ministry of Agriculture, the National Data Management Authority, and the University of Guyana, with regard to acquiring and processing information for planning in the agricultural sector. Also, it attempts to trace the flow of data and information among these organizations; and the flow patterns between these organizations and external suppliers and users of agricultural planning information.

### 2.1 The Statistical Bureau

The Statistical Bureau (Statistical Department) was established in 1957, and its functions articulated in the Act No. 14 of 1965. The purpose of the Bureau is:

- a. to make any census;
- b. to collect, compile, analyze, abstract and publish statistical information relating to social, agricultural, mining, commercial, industrial and general activities and conditions of the inhabitants of Guyana;
- c. to coordinate with departments of government in the collection, compilation, analysis, and publication of statistical records of administration; and
- d. generally, to organize a coordinated scheme of social and economic statistics relating to Guyana.

In order to achieve its mission, the Statistical Bureau has

adopted the organizational structure shown in Figure 1.

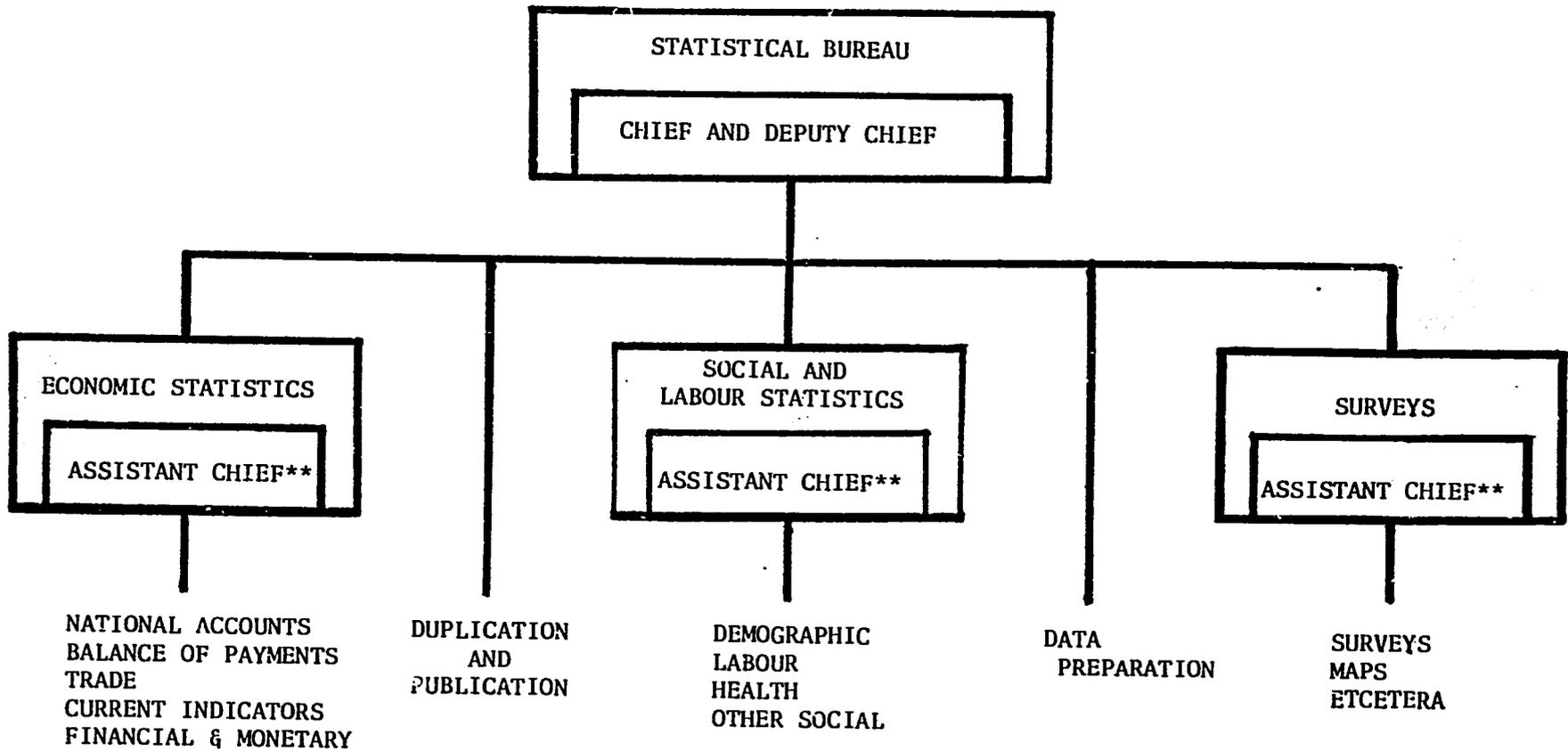
The Statistical Bureau is headed by the Chief Statistician, the Deputy Chief reports directly to him. Reporting to the Deputy Chief are three Assistant Chiefs, who are responsible for managing the three divisions (Economic Statistics, Social and Labor Statistics, and Surveys) within the Bureau. At the present time the Assistant Chiefs have not been appointed, and as a result, the divisions are not clearly defined. The Bureau functions with some flexibility. At one extreme it involves no more than granting formal approval to other government organizations to do survey related work. At the other extreme, the Bureau will manage the survey design, collection, processing and publication of the results.

Since 1957, the Statistical Bureau has worked jointly with several departments, ministries, and international organizations including the RDPD, the Ministry of Labour, Ministry of Health, USAID, United Nations (UN), and the International Labour Organization. A list of the two censuses and ten major surveys conducted to date follows:

1. Census of Manufacturing and  
Commercial Establishments. 1965
2. Agricultural Census 1968
3. Consumer Expenditure Survey 1969/70
4. Population Census 1970
5. National Fertility Survey 1975
6. National Labour Force Survey 1976/77

Figure 1

Organization of the Statistical Bureau



\*\*These Assistant Chief Positions have not yet been filled

7.	National Farm Registry	1977/78
8.	National Accounts	Yearly 1957 to date
9.	Annual Survey of Manufacturing and Commercial Establishments.	Yearly 1960 to date
10.	Trade Statistics	Yearly 1964 to date
11.	Immigration Statistics	Yearly 1968 to date
12.	Vital Statistics	Yearly 1968 to date

The regular activities of the Bureau involve collecting and analyzing data and reporting on the following items:

1. Weather
  - rainfall
  - sunshine
  - shade temperatures
  - relative humidity
2. Consumer Price Index
3. Trade - overseas
4. Trade - internal
5. Registration of Motor Vehicles
6. Industrial Production

- electricity production
  - public utilities of electricity
  - production of specific commodities
7. Production and Labour Statistics
- production of selected commodities
  - employment
  - earnings
  - man-hours worked
8. Crime
9. Shipping and Road Transportation (except bus)
- number of passengers carried
  - tonnage carried in services
  - shipping movements
10. Population and Vital Statistics
- population by sex
  - births
  - deaths
11. Migration
- arrivals and departures by air and sea
  - arrivals by trip purpose
  - immigrants and emigrants by occupational class
  - arrivals by country of usual residence
12. Balance of Payments
13. National Accounts

- gross domestic product
  - national income
  - supply and disposition of goods and services
  - personal income and expenditure
  - government revenue and expenditure
  - gross capital formation by type of investment
  - capital expenditures
  - budget and general expenditures
  - excise duty
14. Banking and Finance
- commercial banks assets
  - commercial banks liabilities
  - loans
  - currency and notes in circulation
  - New Building Society assets and liabilities
15. Insurance, Cooperatives and Credit Unions
- life insurance
  - cooperative societies
  - Guyana Agricultural Cooperative Development Bank
  - Guyana Credit Corporation and Small Industries Corporation
  - Mortgages

In addition, the Bureau routinely produces maps of enumeration

districts (ED) to facilitate survey work, and is presently mapping the entire country in preparation for the 1980 population census. The maps contain roads and streets and in some cases buildings. The Bureau has the responsibility for updating the enumeration districts by re-defining boundaries as the population grows and shifts.

Much of the data and information used by the Statistical Bureau in preparing its reports are collected by other government agencies. The principal suppliers of data and information are:

- (1) Hydrometeorological Division, Ministry of Works and Transport
- (2) Custom Department, Ministry of Finance
- (3) Department of Inland Revenue, Ministry of Finance
- (4) Ministry of Labour
- (5) Police Department, Ministry of Home Affairs
- (6) Department of Transport and Harbours
- (7) Ministry of Agriculture and Livestock
- (8) Mayor and Town Council
- (9) Registrar Office, Ministry of Home Affairs
- (10) Immigration Department, Ministry of Home Affairs
- (11) Public Corporations, Ministry of Public Corporations

To acquire the data and information, the Statistical Bureau will survey these organizations either by asking them to fill out standardize questionnaire periodically, or by having some personnel from the Bureau go through their files and extract the data and information.

In addition to these surveys of public organizations' files, the

Bureau surveys several private establishments for a variety of data and information. These establishments include: markets, wholesale and retail stores, cinemas, hotels, restaurants, garages, funeral parlours, trucking companies, pawnbrokers and others.

Table 1 shows the major types of data collected by the Statistical Bureau, the primary suppliers of that data to the Bureau, and some other characteristics of the data. The data are received on standardized forms or from questionnaires and are tabulated then summarized or key-punched unto data cards.

The Statistical Bureau has nineteen (19) technical positions, three of which are Assistant Chief who would head the different divisions. At the present time, all but these positions have been filled. Table 2 presents the staffing of Statistical Bureau in June 1978.

Presently, the Bureau publishes these documents on a regular basis:

Monthly

- accounts relating to external trade

Quarterly

- the Statistical Digest
- the Review of Financial Statistics

Annually

- accounts relating to external trade
- Economic Survey (Review of the State of the Economy)

TABLE 1

CHARACTERISTICS OF THE DATA COLLECTED BY THE STATISTICAL BUREAU

	SOURCE	TYPE - RAW OR SUMMARY	FREQUENCY OF PUBLICATION	VOLUME
1. Weather	Hydrometeorological Division Ministry of Works and Transport	Summary	Quarterly	N/A
2. Consumer Price Index	In-house survey of selected markets and outlets	Raw	Monthly in Georgetown; Quarterly in Rural Areas	3,500 - 4,000 Cards (File creation) 400 cards x 12 updates.
3. Trade - Overseas*	Survey of files of the Customs Department, Ministry of Finance	Raw	Monthly and Quarterly	13,000 - 14,000 Cards (File creation) 1,500 cards x 12 updates.
4. Trade - Internal	In-house survey of business establishments	Raw	Monthly and Quarterly	13,000 cards (File creation) 1,200 cards x 12 updates.
5. Registration of Motor Vehicles	Survey of Licensing files of Department of Inland Revenue, Ministry of Finance	Raw	Quarterly	1,600 - 1,800 cards (File creation) (on- line updates).
6. Industrial Production	In-house survey of-business establishments	Raw	Quarterly	N/A
7. Production and Labour Statistics	Ministry of Labour and Com- pilation of in-house data	Summary	Quarterly	3,600 - 4,000 cards (File creation) 1,000 cards x 4 updates.
8. Crime	Police Department, Ministry of Home Affairs	Raw	Quarterly	6,000 cards (File creation) 1,500 cards x 4 updates.
9. Shipping and Road Transportation (except bus)	Department of Transport and Harbours, Ministry of	Summary	Quarterly	N/A
10. Population & Vital Statistics*	In-house extractions from Registrar's Office in Georgetown; summaries from R. O. in Rural Areas**	Raw and Summary	Quarterly	840,000 cards (File 10,000 cards x 4 updates)
11. Migration*	In-house extractions from files of the Immigration Department, Ministry of Home Affairs	Raw	Quarterly	365,000 cards (File creation) 100,000 cards x 4 updates.
12. Balance of Payments	In-house surveys of institu- tions and data from the Cen- tral Bank	Raw and Summary	Annual data published Quarterly	N/A
13. National Accounts	Summary of in-house data and data from the Ministry of Finance	Summary	Annual data published Quarterly	1,000 cards (File creation)
14. Banking and Finance	In-house survey of institu- tions	Raw	Quarterly	N/A
15. Insurance Cooperatives and Credit Union	In-house survey of institu- tions	Raw	Annual data published Quarterly	N/A

\* Key-punched unto cards

\*\* Registrar's Office is in the Ministry of Home Affairs

N/A -- Not Applicable

TABLE 2.

STATISTICAL BUREAU STAFFING PATTERN - JUNE 1978

1	Chief Statistician
1	Deputy Chief Statistician
2	Senior Statistician
10	B. S. Level Technicians (6 are new positions approved but not yet funded, 2 are presently under temporary funding, 1 is vacant)
26	Clerks and office assistants (3 vacancies)
8	Key Punch and verifier operators
48	Crop reporters (6 vacancies)
9	Field Supervisors (1 vacancy)
1	Cartographer
3	Assistant draftsmen
1	Surveyor (vacant)
<hr/>	
108	Total positions in Staffing Pattern
-6	Positions to be funded
-12	Vacancies
<hr/>	
90	Total positions filled as of June 1978.

The publications of the Statistical Bureau contain sufficient information for most domestic users. Requests for additional information are made mainly by international organizations. The United Nations requests data to show the trends in trade, migration, production, and other indicators. The International Monetary Fund requests additional information on almost every area of concern of the Bureau. The World Bank seeks additional information on trade, finance, and other economic indicators. Students of international institutions request information mainly on trade. The domestic requests come mainly from students and businessmen, both groups requiring information on trade and other economic indicators. Finally, at "budget time" the Minister of Economic Development requests some very specific bits of information to support his budget request.

The Statistical Bureau responds to every request. Over the past several years the major problem in responding to those requests was not a lack of data in-house, but the lack of a good storage and retrieval system. The installation of the computer system should substantially reduce the time required to satisfy requests for special information.

The Statistical Bureau has just completed the coding and key-punching tasks of the Rural Farm Household Survey of the Department of Agriculture, and is preparing for the 1980 census of the population which will consume most of its resources in the short-term.

The Survey Division is a relatively new component of the Statistical Bureau and in the long-term (past 1980) most of the

additional work will be generated by that Division. Present plans are to schedule the new survey activities sequentially (whenever possible) to avoid large peaks and depressions in the work load.

## 2.2 The Ministry of Agriculture

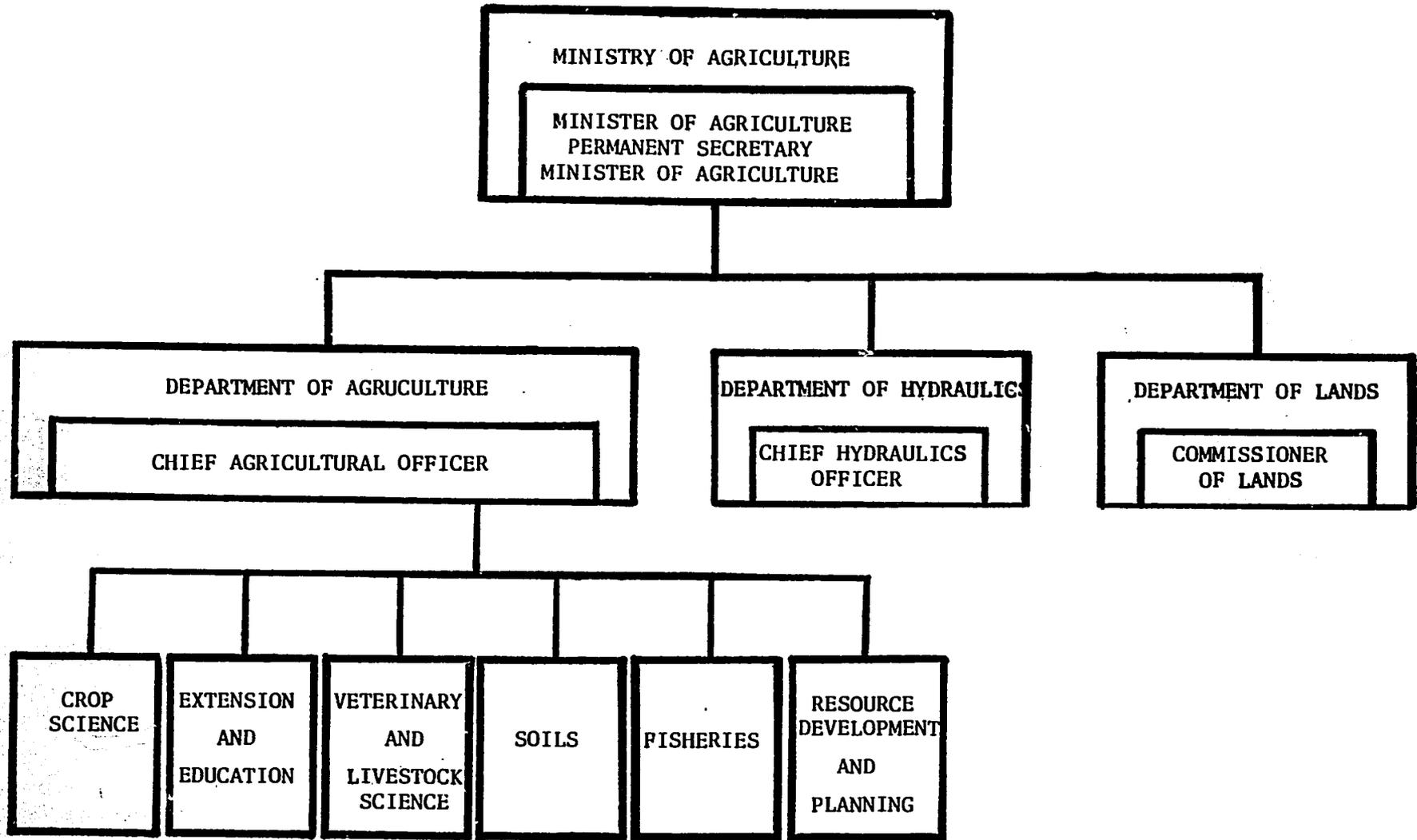
The Ministry of Agriculture is composed of three separate departments: Agriculture, Hydraulics, and Land (see Figure 2). The Agriculture Department has six divisions: Crop Science, Extension and Education, Veterinary and Livestock, Soils, Fisheries, and Resource Development and Planning. The computer system under consideration is expected to be used primarily by the Resource Development and Planning Division, with periodic use by the Crop Science Division, and the Soils Division. The Crop Science Division presently sends data to Trinidad for Processing, and it is anticipated that the turn-around time will be substantially reduced when the system is installed.

The RDPD, which will be the principal user of the system in the Ministry has the following major responsibilities:

- to provide basic resource data and assemble agricultural statistics
- to consult with the State Planning Commission and assist its Chief Planning Officer in the preparation of National Development Plans
- to assist the Agricultural Coordinating Committee
- to prepare, evaluate and monitor agricultural projects
- to initiate and direct economic/agriculture sector

Figure 2

Structure of Ministry of Agriculture



research, policy analysis, special studies, etc.

- to develop strategies for growth, by region, by commodity, by land use
- to maintain liaison with international organizations
- to prepare farm management budgets
- to monitor capital budgets of Ministry and related agencies
- to coordinate, justify, and submit capital budgets for Ministry
- to prepare recommendations and estimates for the five-year development plan.

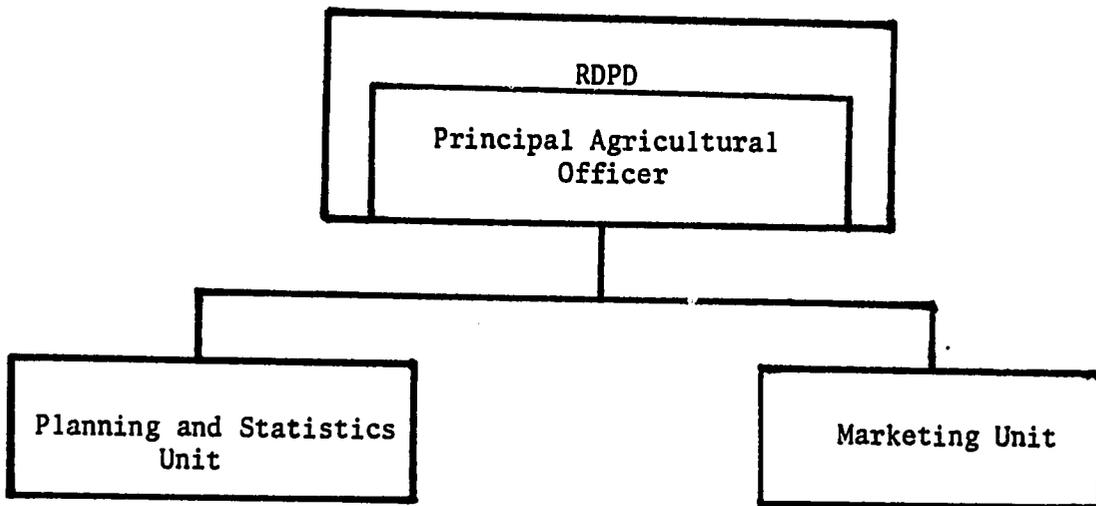
To date, RDPD has performed some of these activities more consistently than others, mainly those relating to the issues and operations directly under Ministry control. The RDPD has not engaged significantly in these planning activities for those parts of the sector dominated by the relatively autonomous State agencies and development authorities.

In order to satisfy its functions, RDPD is composed of two units: The Planning and Statistical Unit, and the Marketing Unit (see Figure 3). The types of information collected routinely by RDPD includes:

1. Food Consumption:
  - grain and cereal
  - roots, tubers, and other starchy foods
  - sugars and syrups

Figure 3

Present structure of the Resource Development and Planning Division (RDPD) of the Ministry of Agriculture



- pulses, nuts and oilseeds
  - vegetables
  - fruits
  - meat, fresh and processed
  - eggs
  - fish and fishery products
  - milk and cheese
  - oils and fats
  - beverage food
  - alcohol beverage
2. Monthly average prices paid to farmers by GMC for agricultural commodities (for 55 agricultural commodities)
  3. Monthly average wholesale prices of agricultural produce in the Municipal markets (for 25 agricultural products)
  4. Monthly average retail prices in Municipal markets (for 45 products)
  5. Rates paid by farmers for selected agricultural services
  6. Prices paid by farmers for selected farm inputs
  7. Average wholesale and retail prices of fertilizers and limestone
  8. Guyana Marketing Corporation (GMC) purchases by areas
  9. Aircraft shipments of agricultural produce from interior areas to Georgetown
  10. Agricultural commodities landed at the T & HD wharf

from Parika, Pomeroon and the Northwest District

11. Quantities, values, and average prices of food imports
12. Exports of agricultural machinery
13. Imports of agricultural machinery
14. Imports of chemical fertilizers and liming materials
15. Sugar production and related information
16. Rice production and related information
17. Domestic outputs of coconut products
18. Animals slaughtered
19. GMC purchases of pigs and related information
20. Estimated pork production
21. Slaughterings by GMC and others
22. Beef production
23. Milk consumption, domestic production and imports
24. Mutton and goat meat production
25. Production of fish and shrimp
26. Timber production
27. Poultry meat and egg production

RDPD gets much of its data and information from other government agencies and government corporations. The principal sources are:

- (1) Guyana Marketing Corporation (GMC)
- (2) Guyana Agricultural Corporations (GAG)
- (3) Transport and Harbour Department
- (4) Statistical Bureau

- (5) Guyana Sugar Corporation (GUYSUCO)
- (6) Guyana Rice Board (GRB)
- (7) Ministry of Trade
- (8) Police Department
- (9) Georgetown Abattoir
- (10) Milk Plant
- (11) Fisheries Division, Ministry of Agriculture
- (12) Forestry Department, Ministry of Agriculture
- (13) Veterinary and Livestock Division, Ministry  
of Agriculture

In addition RDPD collects some data and information by surveying private business and from the general public. These sources include the Municipal Markets and outlet stores. Much of these data are collected on standardize forms at the level of detail that is required by RDPD. Table 3 shows the major types of data collected, the principal suppliers, and other relevant characteristics of the data.

RDPD undertakes some Ad Hoc activities. The recently completed Farm Household Survey is one such activity. Others include producing maps in support of agricultural related activities, and analyses of selected trends and behaviour patterns in the agricultural sector.

The data collected routinely and data from special studies are processed an analyzed to produce the following outputs:

a. Quarterly:

Area and production estimates

TABLE 3

## CHARACTERISTICS OF THE DATA COLLECTED BY RDPA

	SOURCE	TYPE RAW OR SUMMARY	FREQUENCY OF COLLECTION	FREQUENCY OF PUBLICATION	VOLUME
1. Food Consumption	In-house summary of Data	Raw	Weekly	Annually and Quarterly	1,500 - 2,000 cards (f.c.) 30 cards x 50 updates
2. Prices paid for agricultural commodities	Guyana Marketing Corporation (GMC)	Summary	Monthly	Annually and Quarterly	500 - 1,000 cards (f.c.) 50 cards x 12 updates
3. Wholesale prices of agricultural produce	In-house survey of Municipal	Raw	Weekly to make monthly summary	Annually and Quarterly	2,700 - 3,000 cards (f.c.) 100 cards x 50 updates
4. Average retail prices in Municipal markets	In-house survey of Municipal Markets	Raw	Weekly to make monthly summary	Annually and Quarterly	2,700 - 3,500 cards (c.f.) 100 cards x 50 updates
5. Rates paid for selected agricultural services	Will not be included in future Reports	Raw	Weekly to make monthly summary	Annually and Quarterly	1,000 - 1,500 (f.c.) updates frequency unknown
6. Rates paid for selected farm inputs	In-house survey	Raw	Quarterly	Annually and Quarterly	3,000 - 4,000 cards (f.c.) 3,500 cards x 4 updates
7. Prices of fertilizers and limestone	In-house survey	Raw	Quarterly	Annually and Quarterly	3,000 - 4,000 cards (f.c.) 3,500 cards x 4 updates
8. (GMC) purchases by areas	GMC	Summary	Monthly	Annually and Quarterly	500 - 1,000 cards (f.c.) 50 cards x 12 updates
9. Aircraft shipments of agricultural produce	GAC	Summary	Weekly to make monthly summary	Annually and Quarterly	2,700 - 3,500 cards (f.c.) 100 cards x 50 updates
10. Agricultural commodities landed at the T & HD Wharf	Transport and Harbour Department	Summary	Weekly to make monthly summary	Annually and Quarterly	8,000 - 10,000 cards (f.c.) 500 cards x 50 updates
11. Average prices of food imports	Statistical Bureau (SB)	Summary	Quarterly	Annually and	N/A

TABLE 3 cont'd

	SOURCE	TYPE RAW OR SUMMARY	FREQUENCY OF COLLECTION	FREQUENCY OF PUBLICATION	VOLUME
12. Exports of agricultural machinery	Statistical Bureau (SB)	Summary	Quarterly	Annually and Quarterly	N/A
13. Imports of agricultural machinery	Statistical Bureau (SB)	Summary	Quarterly	Annually and Quarterly	N/A
14. Imports of chemical fertilizers and liming materials	Statistical Bureau (SB)	Summary	Annually	Annually and Quarterly	N/A
15. Sugar production	GUYSUCO	Summary	Weekly	Annually and Quarterly	1,000 - 2,000 (f.c.) cards x 12 updates
16. Rice production	Guyana Rice Board (GRB)	Summary	Spring & Fall	Annually	N/A
17. Domestic outputs of coconut products	Ministry of Trade	Summary	Quarterly and Monthly	Annually and Quarterly	13,000 - 15,000 cards (f.c.) 1,000 cards x 12 updates
18. Animals slaughtered	Georgetown Abattoir and Rule Department	Raw	Quarterly	Annually and Quarterly	1,000 - 1,300 cards (f.c.) 50 cards x 12 updates
19. GMC purchases of pigs and related information	GMC	Summary	Monthly	Annually and Quarterly	500 - 1,000 cards (f.c.) 50 cards x 12 updates
20. Estimated pork production	Ministry of Trade	Summary	Fixed prices - Do not change often	Annually and	13,000 - 15,000 cards (f.c.)
21. Slaughterings by GMC and others	GMC (Related to #18)	Summary	Monthly	Annually and Quarterly	1,000 - 1,300 cards (f.c.) 50 cards x 12 updates
22. Beef Production	From #18 and #21	Used to make in-house estimates			N/A
23. Milk consumption	Milk Plant	Summary	Monthly	Quarterly	500 - 1,000 cards (f.c.) 25 cards x 4 updates

TABLE 3 cont'd

	SOURCE	TYPE RAW OR SUMMARY	FREQUENCY OF COLLECTION	FREQUENCY OF PUBLICATION	VOLUME
24. Mutton and goat meat production	In-house summary	Raw	Annually	Annually	N/A
25. Production of fish and shrimp	Fisheries Division Ministry of Agriculture	Summary	Annually	Annually	N/A
26. Timber production	Forestry Department	Summary	Annually	Annually	N/A
27. Poultry meat and egg production	Veterinary and Livestock	Summary	Weekly to make monthly summary	Quarterly	11,000 - 13,000 cards (c.f.) 1,500 - 2,000 cards x 50 updates

Note

**Imports/exports**

**prices, etc.**

**b. Semi-annually:**

**Area and production estimates**

**Analysis of use, distribution and tenure  
of land and water**

**Assessment of the status of agricultural  
sector projects**

**Commodity channel studies**

**c. Annually:**

**Assessment of the past year's performance  
distribution**

**Analysis of livestock situation**

**Analysis of agricultural credit situation and  
its impact on small farmers**

**Analysis of the status and potential of agro-  
industry**

**Analysis of export potential and food imports**

**d. Less than annual frequency:**

**Analysis of data from 1978 to 1979 Farm Household  
Survey**

**Land use maps**

**Survey and analysis of small-scale agro-industry**

**Survey and analysis of household expenditure and**

### income patterns

Several National and International Organizations request information from the RDPD on a regular or random basis. These organizations and the types of information requested are discussed in the following paragraph.

The Food and Agriculture Organization of the United Nations (UN) requests information on rice, coarse grain, fertilizer, tea, fisheries, trade, forecasts of productions, and production during the year for its Production Year Book. The Economic Committee for Latin America requests information on production. The Statistical Bureau requests information on production, farm gate prices, and other data to compute the GDP. The Ministry of Information requests information for its Year Book. The Ministry of Trade makes periodic requests for trade-related information. CARICOM asks for data on oils and fats, for the Oils and Fats Conference; Agricultural Marketing Protocol information, and Agricultural Commodities Prices. The Bank of Guyana requests information for its annual report. The Small Industries Corporation and the Agricultural Bank also makes requests for information.

RDPD has been understaffed over the past two years. The staffing pattern during that period is presented in Table 4 below. RDPD is presently being reorganized and the exact configuration and location within the Ministry has not been decided. However, a likely location and configuration is discussed below.

First, RDPD will report directly to the Permanent Secretary and

TABLE 4

## STAFFING PATTERN OF RDPD

	<u>Auth. 1977</u>	<u>Auth. 1978</u>	<u>Current Incumb.</u>	<u>Requested 1979</u>
Principal Agricultural Officer	1	1	1	1
Specialist Agricultural Economist	-	-	-	2
Senior Agricultural Economist	1	1	1	1
Agricultural Economist	1	1	2	3
Agricultural Officer	1	1	-	2
Statistical Officer	1	1	-	2
Agricultural Technical Assistant II	2	2	1	2
Agricultural Technical Assistant I	4	4	3	4
	—	—	—	—
	12	12	8	16
	—	—	—	—

Note: The Agricultural Officer position requires a University degree and the Agricultural Economist and higher positions require a second degree or equivalent experience.

Technically, the RDPD is supposed to have two units. These are the Planning and Statistics Unit, and the Marketing Unit.

will have coordinative responsibility for the planning related work of the Drainage and Irrigation Division, the Corp Science Division, the Veterinary and Livestock Division, the Land Development Projects Division, and the Lands and Surveys Division. It is anticipated that the Division will consist of five units: the Planning and Project Unit, the Marketing and Trade Units, the Economics Research Unit, the Farm Management Unit, and the Administrative and General Unit (see Figure 4). This reorganization will be accompanied by a growth in staff from eight (8) technicians presently to twenty-six (26) by 1982 and thirty-seven (37) by 1985.

Activities anticipated for RDPD in the future includes some participation in the 1980 population census, the 1981 Labour Force Survey and development of 1980 and 1985 Agricultural Sector Plan.

### 2.3 National Data Management Authority

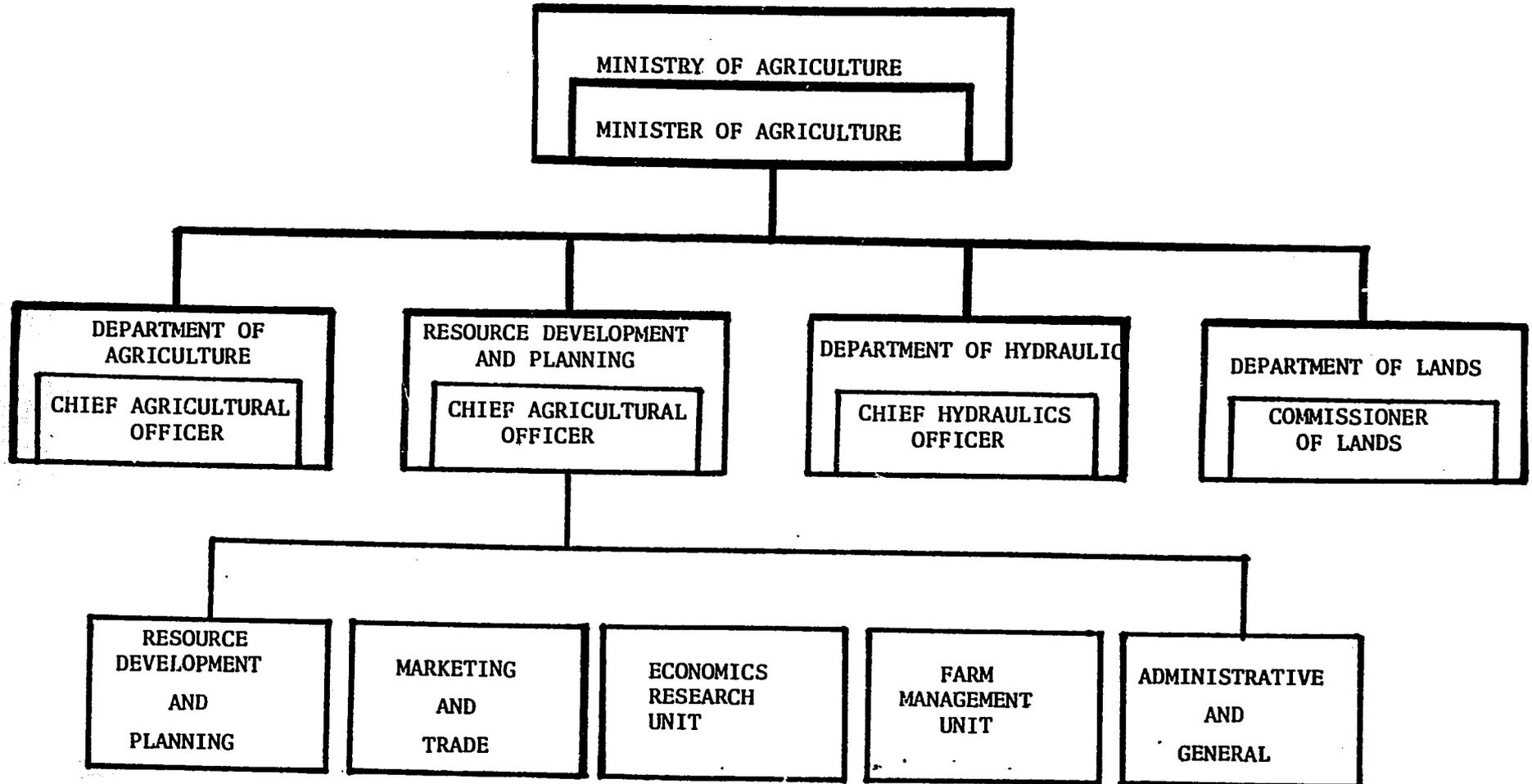
The National Data Management Authority was established as an autonomous organization within the Ministry of Economic Affairs and under the general direction and control of the Minister responsible for economic matters.

The objectives of the Authority are to ensure:

- a. Optimal evolution of User's systems and application needs of the entire public sector including local government and other statutory and public bodies in consonance with national development policy

Figure 4

STRUCTURE OF THE RDPD



subject to resource constraints;

- b. Uniformity as far as practicable with regard to the recruitment, pay and conditions of service of personnel employed on such systems;
- c. Training, development and manpower planning with a view to providing adequately trained personnel for the efficient operation of the systems, and
- d. Establishment and maintenance of reliable communication linkages among user groups and optimal utilization and deployment of hardware/software resources.

At the present time, the Authority is under the management and control of a Board of Directors of about seventeen members. A plan to create a decisionmaking body of about five members is being considered for the future, with the other members of the present Board functioning as resource personnel.

The major activity of the Board to date has been the development of a data processing plan for the public sector 1979 to 1982. The result of that activity is a very detailed proposed scheduling of computer installations in the public sector. Another principal activity of the Authority has been the recruiting and training of personnel. The GOG has had some problems recruiting and keeping highly

skilled personnel because of the availability of more lucrative jobs in the private sector of neighboring countries. The Authority, because of its structure as an autonomous organization, can set pay scales to be competitive with the private sector, and hopefully could recruit and keep personnel with the skills needed for data processing in the public sector. Thus in the long run, the Authority expects to establish a pool of highly trained Data Processing (DP) personnel to be used as needed in the public sector.

The Authority is presently utilizing several strategies in acquiring this pool of skilled DP personnel. One strategy involves recruiting trained nationals who presently reside in other countries. This has been done on a very limited basis, mainly by personal contacts, but a harder drive is expected for the future. A second strategy involves some in-house training followed by some training at a university abroad. The third strategy which is being developed involves setting up a training program at the University of Guyana. In the short term, the intention of NDMA is to develop a two-year program leading up to a diploma from the University followed by a Bachelor's and perhaps graduate programs abroad. A four-year program leading up to a Bachelor's degree at the University of Guyana is anticipated for the long-term. NDMA has devoted considerable effort in developing a training program for the University of Guyana, but funding and the internal politics at the University are major causes of delay in implementing the program.

NDMA envisions training large numbers of data processing personnel. This would assure the availability of skilled personnel and facilitate competition in the field. The training schedule developed involves training twenty analysts and 50 programmers in 1979 and another 10 analysts and 50 programmers in 1980.

#### 2.4 The University of Guyana

The University of Guyana has several academic programs which can benefit from having access to a computer system. Most important among them are the programmers in Mathematics, Geography, Management, Linguistics, and Engineering.

At the present time, only one mathematics course involves some computer training (Math 455) in the form of Programming (FORTRAN and COBOL Languages) and Machine Operations. The programming is done on the GUYMINE's Computer System, located in Linden. Because of the distance from the University to Linden, some 70 miles all programs are transported in batch to Linden where they are placed in the queue and are given relative lower priorities than programs in support of GUYMINE's activities. The process is time consuming and does not afford the students hand-on experience with the computer. The long turn-around times on students' programs are due partly to the high utilization of the old computer system (the IBM 360-30) for GUYMINE's activities. The installation of the new 370-115 should reduce the turn around time; however, the distance will continue to prohibit hands-on experience with the computer. Presently, about twenty students and

faculty members use the GUYMINE's Computer System.

If access to a computer becomes easy in the future, the Mathematics Department plans to develop both theoretical and practical training programs with courses that can be of benefit university-wide. This would include a general programming sequence for first year students, which would involve mainly languages and the use of canned packages: FORTRAN, COBOL, SPSS, SAS, BIOMED etc., followed by an application sequence which would include topics as Numerical Analysis, Statistics, Linear Programming, Optimization, Regression Analysis, Critical Path Analysis and other applications such as Mapping that are especially relevant to Guyana in Mining and Agriculture. This will be followed by a sequence in computer science which will involve studies of computer design and operation, but no programming.

It is anticipated that these courses will attract some fifty (50) to seventy-five (75) students regularly. In addition, the Mathematics Department is interested in using the computer in solving practical problems being experienced in the public sector. This would involve using the techniques developed in the Applications, Sequence.

This program, being considered by the Mathematics Department, is independent of the NDMA's Program. The Mathematics Department sees a joint program in Mathematics and Computer Science being feasible in the long range. Also, at the present time, the Mathematics Department does not have the staff to develop the computer science portion of that program, and as a result, this program can be categorized as long-range

plans.

Overall, for teaching purposes in the short-term, the NDMA Diploma Program and the present Mathematics course (Math 455) will provide the majority of users. In the long-term there will have to be some compromise in program contents between the Mathematics Department and the NDMA. but there is good consistency between the number of student proposed by both sources, somewhere between 50 and 75 annually.

### 3. ANALYSIS

#### 3.1 Choice of a Manufacturer in Guyana

There are three American Computer manufacturers in Guyana: National Cash Registers (NCR), Burroughs, and International Business Machine (IBM). The project team surveyed each of them. Of the three firms, National Cash Registers (NCR), Burroughs, and International Business Machine (IBM), only IBM appears to offer in Guyana a product line and the necessary level of support services consistent with data processing needs as projected by the information obtained during the needs survey.

Burroughs and NCR offer small business processing systems to various organization and agencies in the Government. NCR offers in Guyana support up to the 8200 series; neither organization supports large scale general purpose computing systems. In addition, a representative of Burroughs claims that the company has very little interest in selling less than six large computer systems in Guyana because of the potential problems in providing maintenance for them

from a location outside of Guyana.

Currently, IBM is installing a 370/115 at the Linden office of GUYMINE, the national bauxite corporation. From discussion with the IBM representative in Georgetown, the presence of the 115 in Linden makes the installation of a compatible machine (any in 370 series) in Georgetown an attractive proposition for IBM in terms of the provision of maintenance and other support services. The survey of manufactures determined that IBM was the logical producer of the type of equipment required for agricultural sector planning in Guyana.

### 3.2 Choice of a Machine

The computer selected for the GOG is to have three principal users, the Resource Development and Planning Division, the Statistical Bureau, and the University of Guyana. We have previously outlined the present processing needs of these government entities. The project team interviewed potential users of the new computer to assess the level of "processing power" which might be adequate.

The RDPD plans to incorporate the machine into the agricultural planning process. This is a need beyond the use for simple report generation and other tasks such as routine record manipulation. Discussion with agricultural officials revealed that sophisticated input/output models for agricultural resource allocation will be incorporated into the planning process when sufficient computing capability becomes available. Regression packages and other standard statistical routines will sometimes require large core allocations and processing of large arrays of data.

To assess the computing power requirements, we need an analysis of

the set of problems to be solved in a given computing environment. Often this is done by simulation of the environment and the characteristics of the given systems under consideration. Kernel programs are developed for testing the overall system response. Given the assumption that the machine will be used in a time-shared mode and support a batch stream as well, let us look at some types of computations which might indicate the computing power requirements.

The RDPD plans to use sophisticated scientific techniques in its planning and resource allocation. One problem, which we admit may not be typical, which the analysts at the RDPD discussed with the project team was that of understanding the relationships between the soil characteristics, rainfall, and other factors which impact upon crop production. The GOG is interested in investigating strategies for increasing the productivity of certain crops. This means there will likely be future occasions when some hydrological modeling is desired. Frequently modeling of this nature is accomplished using sets of differential equations which take the form of difference equations when implemented on the machine. Typically, for the problem of solving a set of 4 partial differential equations in hydrodynamics with 5 variables we might require the partitioning of the problem into say 1000 time steps for 1000 spatial zones. Each zone might require say 50 operations per zone per time step, 1000 times. Storage requirements would be 5000 words to store 5 variables for each of the zones. For 1000 zones and 50 operations per zone, per time steps or 50,000

operations and there are 1000 time steps, therefore 50 millions operations might be needed for this type of agricultural model. Assuming a machine of say the 360/85 class where machine instruction execution times are estimated from .08 microsecond to say 2.65 microseconds. Let us assume an average execution time of from 0.3 to 0.5 microseconds or 2 to 3 million instructions per second. Any computer program includes a number of things besides arithmetic operations (e.g. fetchs, from and stores to memory, program branching, etc.) so that two or three million instructions per second might correspond to perhaps one million arithmetic operations per second. So on this machine, some 50 seconds are required for this type of problem.

If we add an additional space dimension to the problem, the requirements are as follows:

Number of variables	7
Number of zones	1,000,000
Operations/zone/time step	100
Number time steps	1000
Storage	7 x 10 <sup>6</sup> word,
Total operations	100 billion
Time	28 hours
	(at one million
	operations per
	second)

The point here is to show that even for some rather straight

forward applications, we can quickly saturate some of the largest machine generally available today.

We do not expect the application to be exclusively of the nature, but we would want to specify a machine of sufficient power to allow these types of problems to be feasible for the proposed system.

The Statistical Bureau will utilize the machine for the production of the various periodic reports as required. The development of large data bases of demographic information is envisioned. The machine will also be used to process information for the 1980 census. More sophisticated statistical packages such as Statistical Package for Social Sciences (SPSS) should be available for the use by the analysts at the Statistical Bureau. We have previously outlined some of the data which are currently collected and are to be processed on the new computer. Many of the large statistical packages require the manipulation of large sets of matrices which require relatively large amounts of computation.

The University of Guyana will utilize the machine in the training of computer science and other computer oriented students. Computer science students can consume an enormous amount of the computational power as they develop algorithms, and software as part of their training.

The planned system is expected to be available for the next few years, therefore we would recommend a system with the power in the large scale class as being desirable in terms of capability for

handling the expected computing growth over the time horizon of interest. The machine is to be used in a time-shared mode. To keep the user response time acceptable, we would want to have sufficient computing power to handle the expected large number of anticipated "compute bound" types of users.

It was the concensus of the study team that the IBM 370 model 148 would supply the necessary "computing power" to satisfy academic computing requirements of the University of Guyana as well as the highly scientific and specialized needs of the Statistical Bureau and the Ministry of Agriculture. This model in the IBM 370 line was first introduced in early 1977 and is one of the most powerful machine currently available in the Carribean area. This particular model has a virtual storage capacity as a standard feature while actually allowing up to 2,097,152 bytes of main storage. The cycle times of this machine are relatively fast; read cycle time is 405 nanoseconds and write cycle time is 540 nanoseconds. With this storage maximum capacity and cycle speeds, this computer hardware will not only satisfy the immediate needs but also allow for future expansion.

### 3.3 Configuration

The plan calls for the central location of the machine with remote access via the telephone network. There has been questions raised about the quality of transmission of the network. The project team found out that IBM completed (the study was not available to the team)

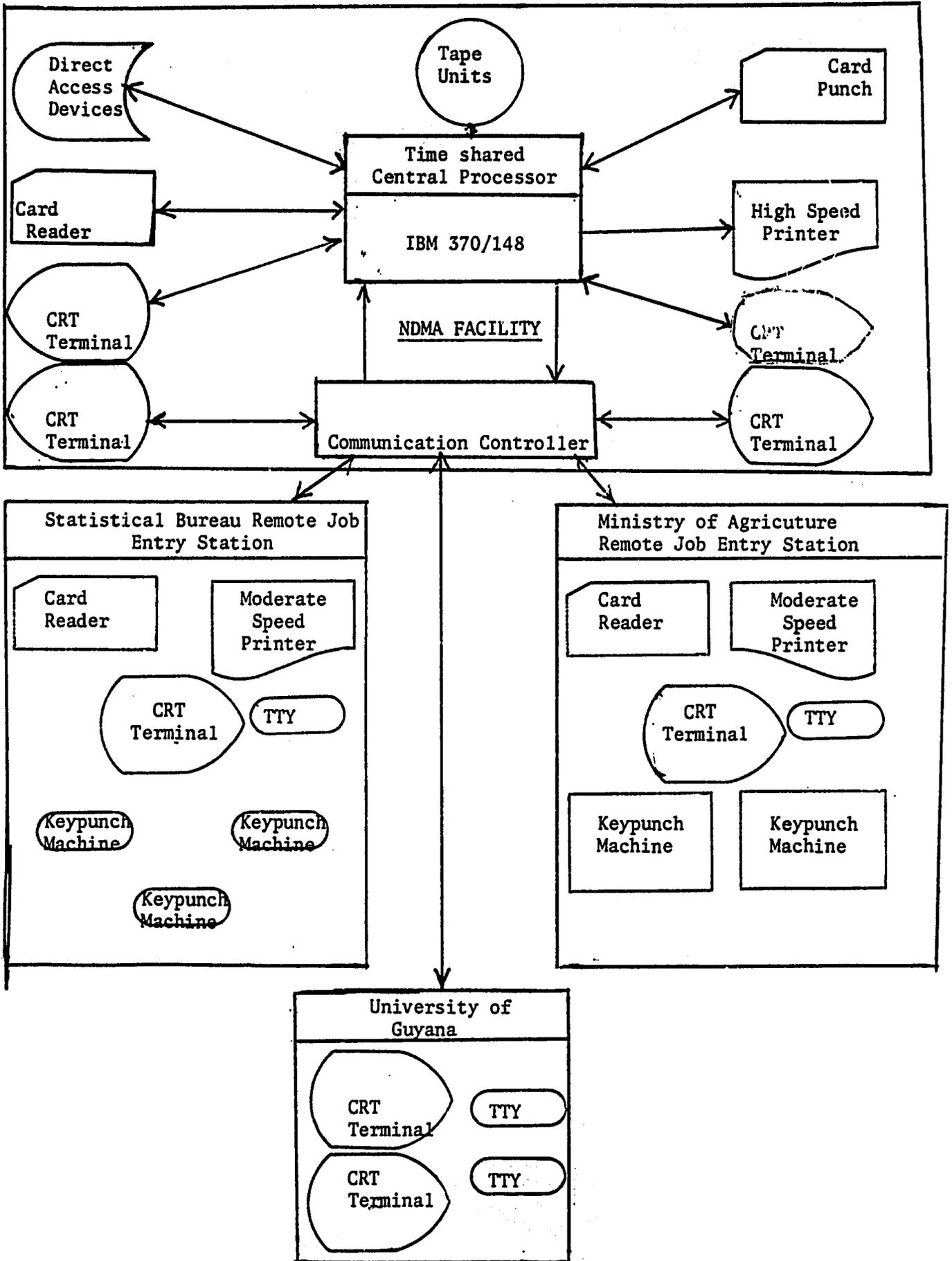
characteristics adequate for computer data transmission. In that regard, the network will be further tested this fall when the computer at the Linden facility "talks" via telephone lines to the computing facility at the Berbice operation.

This section will outline the project team's recommendations for the sites for computer hardware installation and the types of hardware required at each site. The results of this study revealed sufficient evidence that the development and management of the overall computer facility could be facilitated by a centralized mainframe computer with remote job entry terminals connected by telephone lines. This centralized approach to data processing will allow the sharing of computer time by several users, each operating independently without an awareness of the use of the facility by others. This "time sharing" concept is one in which the central computer works on several user programs concurrently with the underlying purpose of maximizing the use of the system hardware. Figure 5 illustrates the recommended centralized processing scheme for use by the NDMA, the Statistical Bureau, the Ministry of Agriculture and the University of Guyana.

This initial hardware configuration will sufficiently satisfy the immediate needs of the various system users as well as provide a flexible framework for future system expansion. The project team determined that the University of Guyana would be the best site for the housing of the NDMA computing facility. Located here will be the central computer processing unit, primary and secondary storage devices

Figure 5

PROPOSED CONFIGURATION



and main storage. This site currently has a facility to house the computer. This site is easily accessible to most users that would require the services of this central computer facility.

In addition to the central computer, two remote job entry (RJE) stations will enhance the accessibility of the computer. The two locations for these stations would be the Statistical Bureau and the Ministry of Agriculture. Additional computer terminals would be made available at various locations at the University of Guyana. The study team collected data relative to the processing needs of these users and determined that the level of required input and output would warrant the installation of remote job entry stations at these two sites. These stations would include several keypunch machines that would supply the necessary amounts of cards for initial data entry and file maintenance. More importantly, these RJE stations would include a card reader, a moderate speed printer, and a cathode ray tube (CRT), and facilities for paper tape, diskett, and teletype terminals. The terminal, could be used:

- . to input moderate amounts of data,
- . facilitate any program development,
- . and monitor the status of active jobs  
and jobs awaiting execution in the system.

Any future expansion in the near future could be accommodated in this hardware configuration. If desired, additional users could be added by the installation of additional terminal devices or the

installation of additional RJE stations. The central computer facility would have some terminals hardwired into the central processing unit while other terminals could be connected to the computer via telephone lines. These portable terminals could be easily transported to field installations or wherever they are required as long as telephone lines are accessible. As other potential users in these agencies and others become more aware of the benefits of computer data processing, their needs and subsequent involvement in this computing network will increase. This resultant increase in computer utilization will require that the initial hardware configuration be expanded by the possible addition of more main core storage, additional direct (secondary) storage, and additional peripheral equipment.

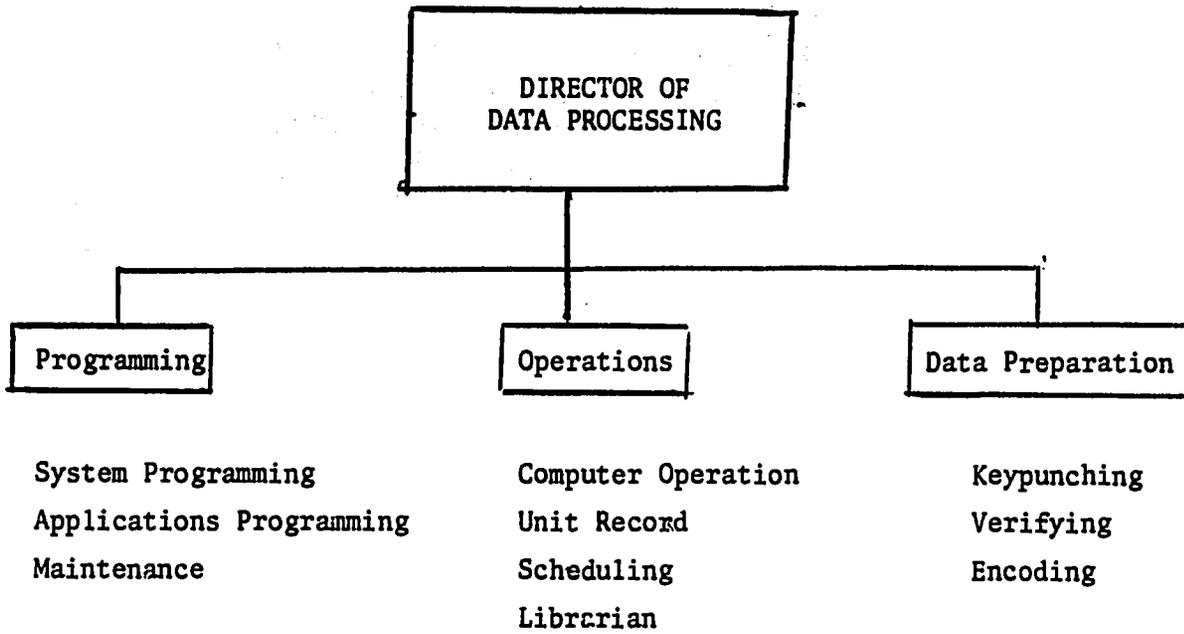
#### 3.4 Personnel Requirements

Figure 6, shows a possible organization for the data processing center. Under the direction of the director of the data processing center three major tasks are to be performed, programming, operations, and data preparation. Let us look at the personnel which might be required to perform these tasks.

The director of the data processing center would be the manager of the computing facility. He would be expected to have had at least 8-10 years of experience in the computing field. Presumably, but not necessarily, he would have had broad training preferably in a scientific field such as mathematics, physics, or engineering. He should have a background in some aspect of computing such as system

Figure 6.

DATA PROCESSING STAFF ORGANIZATION



programming or systems analysis, numerical analysis, or even hardware design. His job is mainly administrative, but he must be able to communicate with his technical personnel. A university degree would be expected for anyone with this job, however, the experience factor is at least as important.

At least two types of programmers are necessary for the data processing center. First there is the applications programmer. Generally, for the assumed scientific as opposed to business environment, we would expect this person to have at least a bachelors degree and preferably an advanced degree in physics, mathematics, or engineering. Programming in these areas tends to be in high level languages such as FORTRAN. The ability to develop algorithms from an analysis of specific problems is a key attribute of this type of person. There is no need initially for rather specialized knowledge of complex data structures since his major concerns will be with mathematical manipulations and calculations.

Systems programmers or software specialist are concerned with the operating system, and the support programs which are available to the user. Systems programmers include the compiler writers, operating system people, utility routine programmers, and application package developers. These people are usually machine-oriented and are adept at assembly language programming. They are usually university trained, but traditionally they have come from a variety of different backgrounds. Since the emergence of computer science as a discipline, some systems

programmers are produced by university programs.

Machine operators are often trained in some of the specialized computer trade schools. Computer manufacturers offer courses which train operators for their machines. Generally, a university degree is not required for a computer operator. Computer trade schools are varied in their quality and computer operation courses can be anything from 6 months to two (2) years depending upon the specific school.

A computer-aid is an entry level position often occupied by one with at least a high school education. This person would be responsible for data preparation such as keypunching and verifying. This is a trainee position.

Initially, for the NDMA's facility, we would recommend a professional staff of at least a director of data processing, one systems programmer, and one applications programmer. It would be adequate to have for each shift two machine operators, a shift supervisor, and one computer aid.

The strategy of the NDMA is to shift part of the Statistical Bureau under its administrative control. The project team learned that sufficient programming expertise exists in the Statistical Bureau and at Guymines to provide the initial data processing staff.

The long-range strategy for development of computing expertise will depend upon the ability of the NDMA to develop trained personnel. The degree to which any machine is adequate or effective will depend more upon the availability of software than upon the hardware computing

power. In the long run, most applications programs will be produced by the Data Processing Centers' own staff and the applications programmers at the other locations. At each location there would be 2-4 applications programmers. Additional computer instructional personnel would be at the UG. The computer manufacturer will provide an operating system. Additional software support may be available through the new IBM Software Support Center (SSC) concept. This concept allows almost two-thirds of all customers software problems to be handled with a toll-free telephone call to the Software Support Center. According to discussions with IBM in Georgetown, this is not yet available for Guyana; however, it appears to be a service which is in the planning horizon to be located in Trinidad.

### 3.5 System Acquisition Strategies

The expected time for delivery for a 370/148 system in Georgetown is currently estimated at about 12 months from the signing of a purchase contract. Perhaps, two to three months can be saved by procedures available to the IBM managers which allow certain actions before the actual contract signing. It appears that the manager has a 90-day option to order a machine under certain circumstances before the actual signing of a contract. This option was not brought to our attention by the IBM representative, therefore, we do not give it full weight. Never-the-less, such an option could only perhaps, cut down the delivery time to 10 months. Given the history of delivery of IBM equipment in Guyana, there might be additional problems which could add

2 to 3 months delay, therefore, we feel that 12 months is a reasonable expectation for delivery time. In addition, the 370/148 is now in "limited new production" to fulfill existing commitments (see Datamation, March 1979); this is due to the announcement of the new 4300 Series-E machines. This development may have some impact on the availability of the 370's.

Perhaps, more critical is the availability of the IBM service personnel. Discussion with IBM officials in Toronto revealed this might be more of a bottleneck than the acquiring of the computing hardware. IBM Toronto could not state, at the time of the interview with project team, that the service personnel in Linden trained for the 370/115 could be used at the proposed 148 location in Georgetown. Technological differences between the 115 and 148 might not make this feasible.

The project team has recently surveyed some of the computer leasing/resale firms for the availability of a 370/148. We have found one firm which claims it can provide a 370/148 60 days after contract signing. We explored this further in terms of providing a machine in Guyana. This appears to be a feasible option if the 12 months delivery time is unacceptable. Under such arrangements, if an IBM machine is purchased from a resale firm, it appears that in Georgetown the service and maintenance contract will have to be signed with the local IBM service organization. IBM does not look at such arrangements with pleasure. The service contracts under such agreements might be quite

prohibitive. In addition, the import tariffs on used machines might be more than with new ones. We would not recommend such a strategy.

Given that the need for a new computer is such that the required one year waiting time is prohibitive, one strategy for obtaining immediate computing equipment is to install another 370/115 at the NDMA facility in Georgetown. Since the installation in Linden has the trained maintenance personnel there will be no delay due to training. This machine could serve during the interim period until all of the questions about "announcement" of the 370/148 or comparable equipment in Georgetown have been resolved. The immediate needs could be met with the model 115, the future computing needs may surpass the capacity of this machine. The question of the additional cost involved in using a machine which may be inadequate for future needs can not be adequately assessed at this point. However, whatever this cost may be it must be balanced against the benefits of having some computing power available to be able to immediately deal with automatic data processing requirements.

#### 4. SUMMARY

The purpose of this study is to assess the information processing needs for agricultural sector planning in Guyana and to assist in specifying a system which would be utilized for that activity. Three primary users of the proposed systems are the MOA, SB, and the UG. Each was surveyed in turn to assess the current and anticipated data processing activity.

The SB has the charge to make a national census, collect, compile, analyze, abstract and publish statistical information relating to the demographic and economic conditions of the Nation. In addition it has a coordinating role with other government departments in the publication and statistical record administration. Presently additional data processing capability is required to assist the SB in the publication of many periodic reports; e.g., monthly documents relating to external trade, quarterly statistical digests, and annual accounts relating to external trade. In addition a new Survey Division component, has been added which is planning new survey activities on periodic and a periodic basis. This new activity is expected to create additional data processing demands.

The principal user of the proposed system within the MOA is expected to be the RDPD. Major responsibilities of this unit include provision of resource data and agricultural statistics, input for the national development plan, monitoring of agricultural projects, agricultural coordination, direction of economic/agricultural sector research, development of strategies for growth and land uses, and long-range planning among other activities. In addition the RDPD supplies information to several national and international organizations, e.g. the Food and Agricultural Organization of the United Nations.

The third principal user of the proposed system will be the UG. Initially the system is envisioned for the training of students in the

discipline of computer science. These activities will be primarily under the administration of the mathematics department. Other programs such as Management Science, Geography, Linguistics, and Engineering are expected to also utilize the new system.

Presently, there is a need for much routine data processing, such as the development of large data bases of information from which periodic and aperiodic reports can be generated. There is also the rather straight forward need to be able to quickly process data obtained from routine surveys. The 1980 census looms in the immediate future and there will be extensive data processing requirements associated with this task. Much of the routine processing can be done with an intermediate scale computing processor. However, there is a definite sense and appreciation within all area surveyed by the project team for the increased and sophisticated approach to planning. For example, in the MOA, analysts are very concerned about the use of systematic approaches for development of strategies for growth and land use. There is an awareness among the planners of the power and utility of modeling and simulation in policy formulation. It is felt that a computer will allow eventual, say within 2 to 3 years, incorporation of these techniques into the planning processes. Therefore, the project team assessed two distinct levels of processing requirements. The most immediate being the rather routine development of data processing capability involving the processing of survey and statistical report information. The next level involves the need for the ability to do

scientific programming. This need will come most immediately from the UG where course in computer science are being planned while other UG departments will also utilize the machine. In the future the MOA and the SB will be developing more sophisticated approaches to the carrying out of their tasks. This will involve the development of scientific programming routines or algorithms and the use of large application packages.

In order to have automatic data processing capability immediately, a two phase strategy was recommended. A 370 model 115 which is compatible with the Linden computer can be installed almost immediately. This will allow the present processing requirements, for example, the 1980 census work to begin.

In the long run, however, a processor at the bottom of the large scale models was recommended, specifically a 370/148.

REFERENCE DOCUMENTS

- 1 R.D. Sookraj, Selected Agricultural Statistics 1965 - 1974  
RDPD, Ministry of Agriculture, Guyana. August 1975.
- 2 \_\_\_\_\_ Quarterly Digest of Agricultural Statistics,  
(January to March 1977). RDPD, Ministry of Agriculture, Guyana.
- 3 \_\_\_\_\_, Monthly Accounts Relating to External Trade.  
Statistical Bureau, Ministry of Economic Development, Guyana. February  
1978.
- 4 Harold E. Klein and Kenneth L. Koronher, "Organization and  
Management Study: Guyana Agriculture Sector Planning Project  
(USAID/Guyana Project 504-0077)", February 22, 1979.
- 5 Quarterly Statistical Digest October to December 1977,  
Statistical Bureau, Ministry of Economic Development, Guyana.
- 6 Quarterly Review of Financial Statistics, December 1977  
Statistical Bureau, Ministry of Economic Development, Guyana.
- 7 Project Identification Document Agricultural Sector  
Planning (Project No. 504-0077).

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