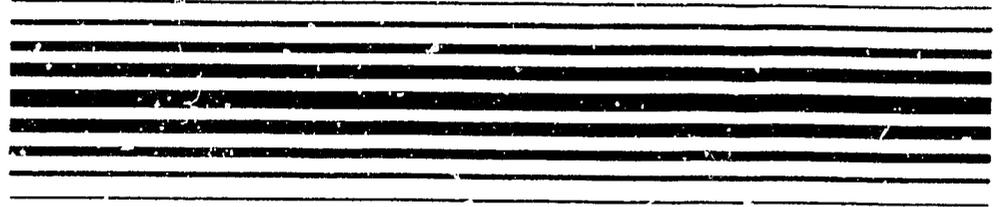


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**Evaluation and Development
Information Methods IQC**



**NIGER ECONOMIC POLICY
REFORM PROGRAM**

**Study and Recommendations for
Computer Systems and
Database Support for the Niger
Customs Service**

for
United States Agency for International Development

Prepared by:

Nasser E. Abdelilah
Renato Correia Paes

A contract between the U.S. Agency for International Development and the
Academy for Educational Development, Contract No. PDC-0085-I-00-9061-00.

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FINAL REPORT
Niger Economic Policy Reform Program
Study and Recommendations for
Computer Systems and Database Support for
The Niger Customs Service

Prepared by:

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For:

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USAID/Niger

Delivery Order # 001
Project # 683-0263

The Academy for Educational Development, Inc.
1255 23rd Street, N.W.
Washington, D.C. 20037

January 31, 1990

USAID PDC-0085-I-009061-00

EVALUATION AND DEVELOPMENT INFORMATION METHODS
INDEFINITE QUANTITY CONTRACT

ACADEMY FOR EDUCATIONAL DEVELOPMENT

**Niger Economic Reform Program
Computer System and Database Support
Study and Recommendations**

**PART-I
Functional Requirements Definition and Analysis**

December, 1989

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FOREWORD

This project would not be possible without the full and effective cooperation of the Government of the Republic of Niger and the United States Agency for International Development.

There is no doubt that the assistance, cooperation and support offered in Niger by the Government authorities and, especially by USAID/Niger, were fundamental. In this respect, I would like to point out the performance of Messrs. George Cullen and Michael Kerst of USAID, who were present at all times to facilitate the work and provide guidance and assistance for us to obtain the desired results. I would also like to mention Mr. Diallo Mamadou, Director of Accounting and Statistics of the General Customs Administration of the Niger Government, who literally opened the doors of that institution for our surveys and analyses, and communicated to us his knowledge of the problems and an enthusiasm for undertaking our work.

Among the various readings and support materials offered to us, I would like to underline the following:

- Niger African Economic Policy Reform Program (683-0259 and 683-0263)
- Report on "Sources for Measuring Niger's Agro-Pastoral Exports" - April, 1989, George Cullen, USAID/Niger
- Consultant's Report - "Customs Matters Relative to the Project" - December, 1987, Paul Ausay - Development Alternatives Inc.
- "Analysis of Tax Impact on Exports with Respect to Export of Agro-Pastoral Products", February, 1988, Roger J. Poulin, William J. Grant, H. Art Achar.
- "Niger: Reform of Foreign Trade Laws and Regulations" - May 1989, Benjamin H. Hardy - Multinational Strategies Inc.

From among the many visits, interviews and meetings we conducted, I would like to highlight the following:

Customs:

Office of the Director of Accounting and Statistics
Office of the Director General
Data Processing Center of the Office of the Director General

Bureau Niamey - Route

Bureaus Niamey - Airport

Bureau Maradi

Bureau N'Konni

Bureau Doutchi

Bureau Gaya

National Data Processing Dept., Planning Ministry

Chamber of Commerce, Niamey

Export Promotion Center

Data Processing Center of the Ministry of Finance

General State Treasury of the Ministry of Finance

Data Processing Center of the Ministry of Communications

Foreign Trade Office of the Ministry of Commerce

Domestic Trade Office of the Ministry of Commerce

Finally, I would like to emphasize the importance of our presence in the field, at Niamey and in the interior of the country. The surveys and interviews conducted at Niamey, Maradi, Doutchi, N'Konni, and Gaya, were indispensable tools that enabled us to reach important conclusions, followed by feasible recommendations.

ANALYSIS OF CURRENT SYSTEM

To understand the context, it is important to review the role of the Niger Customs Administration.

The Republic of Niger is an active member of both CEAD --Economic Community of Western Africa (Benin, Burkina, the Ivory Coast, Mali, Mauritania and Senegal), and the Customs Cooperation Council --CCD--, with headquarters in Brussels.

With respect to fully operational customs regulations and procedures, there are norms according to the System of Imports for Consumption, of Imports under Temporary Admission, an Export System, a System for Goods in Transit, and a System of Incentives for the Investigation of Fraud.

The CCD's tariff nomenclature is strictly followed, with whatever changes are justified by the country's political and economic policies.

The Customs Administration territory covers an area of 1,267,000 km². The country borders Lybia, Algeria, Mali, Burkina, Benin, Nigeria and Chad. Niger has a population of about 7,000,000 inhabitants. The country's international trade, import and export activities are intensive, especially with countries such as Nigeria (with

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120,000,000 inhabitants) and Benin. Agricultural and livestock products comprise about 45% of the GNP; the main commodities produced are: millet, sorghum, peanuts, beans, cotton, rice and cowpeas. A large segment of the population, including young people, is illiterate; this has a direct effect on the work and performance of the Customs Administration. The communications system is still unstable. There are few roads; the distances are enormous, and there are many extensive regions without electricity or telephone, where a postal system has yet to be implemented.

All of these factors contribute to uncertain service delivery by public institutions especially the work of the Customs Administration in the country. Even services such as gathering and obtaining data for developing national statistics encounter many obstacles.

Automation Efforts

In 1987, the Republic of Niger adopted the Sydonia System -Système Douanier Automatisé--, a system developed by the United Nations Commission for Cooperation and Development -- UNCCD. The Sydonia System is an international system widely known for high quality, and used in different countries, including some that border Niger.

The implementation of the Sydonia System has not been fully completed. It is expected that with the mature operation of the Sydonia System, Customs' functioning will be greatly improved, including the critical work of data gathering to generate reliable statistics.

Microcomputers are used with the Sydonia System at the following places:

- Niamey-Rive Droite (since January 1987)
- Niamey-Route (since March 1987)
- Niamey-Hidro (since August 1987)
- Niamey-Airport (since August 1988)
- Maradi (since April 1988)
- Zinder (since July 1989)
- Arlit (since November 1989)

Eighteen French Bull microcomputers plus 16 printers have been installed for the operation of the Sydonia System. At present, their physical distribution is as follows:

- Niamey - Data Processing Center of the Office of the Director General
5 microcomputers and 3 printers
- Niamey-Route 2 microcomputers and 2 printers
- Niamey-Aiport 3 microcomputers and 3 printers

● Niamey-Hidro	1 microcomputer and 1 printer
● Niamey-Rive Droite	2 microcomputers and 2 printers
● Maradi	2 microcomputers and 2 printers
● Zinder	2 microcomputers and 2 printers
● Arlit	1 microcomputer and 1 printer
TOTAL	18 microcomputers and 16 printers

The equipment installed operates with the PROLOG 2.4 operational system. This is a system of European origin developed by a company which is one of Bull's subsidiaries. The system has many limitations, and is essentially outdated. At this time, CNUCED is developing the application of the Sydonia System under the international UNIX Operational System, which can be used with equipment from different countries and manufacturers. This mode of operating Sydonia under UNIX is already being used by the CNUCED in Guatemala, with excellent results.

The Sydonia System version implemented and operated in the Republic of Niger is the 2.0 version, and the programs have all been developed in the BAL language, similar to PLI.

Organizational Structure

Customs is organized under the following structural-organizational plan:

MINISTRY OF FINANCE

OFFICE GENERAL DIRECTOR CUSTOMS ADMINISTRATION

1 2 3 4

1. Office of the Director, Accounting and Statistics
2. Office of the Director of Administrative and Economic Affairs
3. etc.

It is important to point out that the field operations and operational actions of the Customs Administration are carried out through Regional Customhouses, Customs Bureaus, and Border Posts. Some of the Regional Customhouses located at Niamey, Dosso, Tahua, Zinder and Maradi have subordinate bureaus.

There are specialized customs agencies and fixed limitations for the different customs operations of the Bureaus as follows:

- Niamey Route, Niamey Airport, Niamey Rive Droite, Maradi, Zinder, Arlit, Tahoua, Dosso, Agadez, Diffa, N'Konni, and Gaya are open for all customs operations, that is, TMI (entry of all merchandise without value limitations), TME (exit of all merchandise), AT (temporary admission), T (Transit), and E (Entrepot).
- Ngigmi, Madama, Dirkou, Ayorou, Torodi, Tera, Bosso, Maine Aorba, Cheri, Kargueri, Gandu, Mallaoua, Dungass, Magaria, Aassoumbroum, Mattameye, Gazaoua, Dan Issa, Madarounfa, Guidan Roundji, Bangui, Jalmi, Dogo N'Doutchi, Zaziatou, Dioundiou, Dozo N'Tapki and Assamaka are only open to border traffic, both import and export (without value limitations), and to traffic of merchandise.

Personnel

The personnel organization chart of the Customs Administration shows around 700 public employees throughout the Office of the General Director, the Offices at Niamey, the Regional Customhouses, the Bureaus and the Border posts. The personnel system is a para-military one. Personnel functioning at a higher level of complexity and decision making have to pass through the ENA (the National School of Administration). Those who succeed at the top of their class receive specialized instruction at Neuilly, France, at the internationally-known *École de Douanes*.

Recently, at ENA, the Customs personnel received instruction on the principles of Information Systems. Those who attend the *École de Douanes* at Neuilly also learn the Information Systems material.

Those employees in charge of the Customs Data Processing Centers who are directly responsible for operating the microcomputers and the Sydonia System are trained for a period of not more than three months. These officials have very limited technical knowledge of Information Systems.

Facilities and Equipment

The physical installations of the Customs Administration, whether at Niamey or at the different facilities in the interior are considered acceptable according to the standards of the country. This concept of "acceptable", does not consider adequate electric power, telephone, telex, radio, access, postal service, data processing equipment, printers, etc. Material support is critical here; the provision of office supplies is not sufficient or constant. All these factors combined result in operational deficiencies.

Customs has a fleet of 12 very small vehicles for border control. None has radio communications and many of them (one out of every four, at present) are out of service due to serious mechanical problems. The rest are not in very good condition. A great volume of tax collection transactions are carried out at the Data Processing Center at Niamey-Route. At this important facility, the equipment (installed microcomputers) is exposed to extensive dust, posing a potential risk for transcribing data. At the new facility at N'Konni, where two of the future microcomputers of the Customs Administration are to be installed, there is a drainage problem in the roof that worsens during the rainy season.

Among facilities problems, it is necessary to highlight the deficiencies in "Facilities and Security". The lack of equipment, (even back-up equipment), plus difficulties in equipment maintenance, makes it imperative to recommend a specific program on the subject of equipment security, processing materials (discs, etc), safekeeping of materials and documents, access to the facilities, etc.

Still, in spite of equipment deficiencies, Customs has motivated personnel, receptive to change, interested in gaining new knowledge and applying new techniques. They are ready for technological development. Within the context of economic development, Customs plays a vital position. Even with its flaws and limitations, the Niger Customs Administration is a key factor in the country's development, as the most reliable repository for processing data and information to help the Government formulate its national policies. The level use of data processing by Customs, (low according to international patterns), is considerable internally, according to national patterns.

NEEDS FOR TRAINING AND EXPANDED INFORMATION SYSTEMS

Just as with economic and social development, the development of the Customs structure in any country will need to progress through several stages.

In the first of these stages, Customs will have to limit itself, almost exclusively, to the functions of tax collection, monitoring and control of both import and export of goods.

In a second stage, the Customs Administration adds to its functions of monitoring, control and tax collection. As a support entity for gathering data and information for the Government, the Customs Administration becomes the fundamental base of an information system that provides the Government with reliable and on-going figures for determining national policies. This information contributes to balancing the price structure, promoting exports, controlling imports, protecting domestic economic

activities and employment in the country, and formulating economic and social development policies.

Unfortunately, passing from one stage to another does not depend only on utilizing sophisticated hardware, proper administrative documents, or modern techniques. This transformation comes about with a change in the way of thinking, toward "organizational and operational culture" that experience, time, and hands-on performance, organizational maturity and awareness can develop. It is a slow evolution that can be accelerated through education and training.

In the case of the Republic of Niger, all analyses, information, interviews and observations indicate that the country and its Customs Administration are still in the first of these stages. There is still no overall and effective awareness among Customs personnel of the importance of gathering data from their field operations. Few officials realize that from their statistical treatment, accurate data frequently serve as effective tools for formulating national policies. Even now, many Customs officials who hold important positions do not know the ultimate use of data processed by the Sydonia System.

The process of control and collection of taxes and import and export duties in the country is still conducted in an inefficient manner. Personnel need to be retrained, not only on the subject of customs techniques, but also on administrative, organizational, planning and control techniques, plus data processing and the Sydonia System. Cooperation with other Government agencies needs to be fostered to improve the services. Overcoming Customs' operational deficiencies such as those in the communications process (postal, telephone, telex, electric power services, etc.) are priorities. If this is not all possible at once, it is at least imperative that certain utility companies establish special rates for the Customs Administration. For example, there is need for an agreement with the PTT to set up postal service agencies within Customs facilities in order to transfer special packages of processed data diskettes. At present these diskettes have to be hand-carried by individuals for processing and consolidation at Niamey's Office of the Director General.

This is apparently a small step, but its importance is significant and the results will be to speed up the entire processing of Customs documents. Ultimately, improvement in communications and Customs' greater efficiency are the Government's objectives; the outcome will be the development of the Republic of Niger.

Synchronizing Information

To furnish statistics to other Government agencies and the private sector in a timely fashion, the data and information gathered by Customs have to be transmitted in a more agile, orderly and organized manner.

It is also necessary, slowly but surely, to reform the strongly rooted cultural tradition of the Customs Administration, which permits free and constant exchange without any control and/or record on the part of the State. This exchange of agro-pastoral and industrialized goods is frequently carried out at the borders between the people of both countries (especially at the border with Nigeria). The exchange operations occur routinely at the border, and despite the small individual volumes, they make up a very significant cumulative volume, both in weight and value. These unrecorded exchanges may distort the statistics produced from data gathered at the source by the customhouses. Present data processed and recorded on agro-pastoral trade could have significant distortions both in volumes and prices and reproduce pale statistics of the real import and export figures of those products. The correction of this dysfunction will bring with it over time not only a significant improvement of international trade data and information, but also an increase in the volume of records processed by Customs this outcome will have a bearing on personnel needs and the adequacy of existing facilities and equipment.

RECOMMENDATIONS FOR IMPROVING THE QUALITY OF INFORMATION

The following suggested measures are simple in order to ensure their adoption and use. They offer practical suggestions in harmony with the realities of the country:

Remedying backlogs

A priority is transcribing 100,00 documents found in the customhouses, at Niamey and the interior. These documents represent the years 1987, 1988 and 1989, and correspond to the number of documents processed in one year (the annual volume is around 90,000 documents transcribed). By transcribing these documents, country statistics can be updated beyond 1986. At present, the Data Processing Centers at Niamey (Office of the Director General), Maradi and Zinder have additional staff available. Personnel have been hired through a specific endowment, to work on this task for the next eight months. The Customs Administration Chief of the Data Processing Center has estimated that by June 1990 all records for the 1987 and 1988 transactions, plus those for 1989, could be processed. The data would be introduced into the Sydonia System files, thus allowing for the development of national statistics. While it is possible

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that the 1987 and 1988 documents will be processed within the next 6 months it is still essential to have a better system for dispatching and receiving the documents. The documents are not yet in the Data Processing Centers. In previous dispatches, documents for 1987 and 1988 arriving from the different operational units of the interior were mixed up, requiring slow and cumbersome separation work. This results in low productivity in executing the processing work, plus a diversion of the operators from their main duties.

The recommended solution to this problem would be a strong administrative directive that documents must be sent properly marked, in lots dated by number and year, and origin (Bureaus and Regional Customshouses.) The adoption of this basically managerial and administrative measure would ensure processing of the 1987, 1988 and 1989 documents and, consequently, of the country's International Trade statistics. Such an administrative directive could be effective immediately, drafted with the cooperation of the Director of Accounting and Statistics and the responsible party for the Data Processing Center, Office of the Director General of the Customs Administration.

Equipment

Another necessary measure is the purchase and installation of more microcomputers and printers to give support to the Sydonia System. Complete implementation of the system and the volume of transactions involved (around 80,000/100,000 per year) fully justify these acquisitions. The Office of the Director General of the Customs Administration needs 6 more microcomputers: 1 for Maradi, 1 for Zinder, 1 for Arlit, 2 for N'Konni. The ideal would be to have even more equipment, but these 6, plus one for Niamey are basic. The Niamey microcomputer would be used for new services, back-up and training at the Data Processing Center of the Office of the Director General. This new equipment would have to conform to the other 18 already operating at Customs, both in configuration and the technical characteristics of the hardware. Such conformity would guarantee flexible equipment replacement in all departments of Customs at all times, thus responding to the needs of the service, and equipment maintenance.

The Office of the Director General could in 1990, implement a small equipment maintenance center. With a small stock of relatively low cost parts, and two trained people for minor repairs and regular maintenance, there would be a greater likelihood of operational continuity. Ultimately, the total number of microcomputers would be 25 (18 already installed plus 7 more to be acquired). Such an expansion would result in greater use, and consequently, greater wear of the microcomputers. The manufacturer of the equipment could train the two technicians.

Adequate personnel will be available to operate the new microcomputers. During the first semester of 1990 the Customs Administration will have openings for staff in the Office of the Director General. These new employees will be trained by Customs officials already working with the Sydonia System, and in a short time will be capable of operating the equipment and putting the work in order.

There are financial difficulties hampering equipment acquisition. After studying the possibility of borrowing microcomputers from the Ministry of Finance or another Government entity, the plan was abandoned because there is no equipment available. There is a lack of equipment throughout the Government. The only option is to purchase microcomputers.

Organizational Structure

Another measure essential to strengthening Customs as a whole is to establish a rigid and realistic organizational structure. The Border Posts have to be subordinate to the Regional Bureaus, and these, to the Office of the Director General at Niamey. The current fragmentation of responsibilities and obligations, without clear lines of hierarchy and communications frequently results in the remittance of documents - quittances - directly from Border Posts to the Data Processing Center at Niamey. This presents a number of problems including delays in the transmission of data. The Data Processing Center at Niamey is not prepared to input the entry of data from all over the country, but is prepared to handle the consolidation of data. These delays occur at the post office due to merchandise classification errors and the loss of complete lots of documents.

The present formal organization structure is not followed in practice. The recent implementation of the Regional Bureaus, and the Sydonia System partially explain this situation. In the future, as the Regional Bureaus mature in their operation, and with new equipment installed, the administrative process should become more efficient. Such efficiency will ensure greater speed in data processing; therefore data consolidation at Niamey will be faster and more consistent.

Consolidation/Training

To achieve optimal consolidation, seminars and regional encounters need to be promoted, preferably in the regions themselves (Regional Bureaus/subordinate Border Posts), with the participation of the Customs Central Administrative authorities, plus the person responsible for the Data Processing Center of the Office of the Director General. At those seminars/regional encounters, the subject of Customs Information should be emphasized, stressing its importance as a support tool for government decision-

making. This education would, in the short run, be the feasible way to help change Customs' approach from the tax collection/monitoring/control phase to the data support phase for government decision-making. These seminars/regional encounters would ideally be held during the first semester of 1990. Technically, the Niger Customs authorities are capable of developing these seminars/regional encounters. The cost of this activity is not high.

At present, Customs follows the political-administrative model of the country. This is not necessarily the best model for its operational actions. The volume and frequency of import and export transactions need to be factored into the operational plan. To attain greater efficiency in its operations, Customs has to be close to its generating factor, to the potential taxpayer, to collect taxes, control, monitor, process data and information, and finally, to facilitate the taxpayer/State, Economic Agent/State relationship. In a country such as Niger, the Customs Administration and its officials can be one of the main agents of change to promote economic development in the process of executing formal duties.

At the seminars/regional encounters the subject of avoiding mistakes needs to be addressed. The most frequent mistakes are those resulting from the incorrect classification of merchandise and those derived from the classification of several products under a single number (without indication as to price, volume and duties for each one of the products). To avoid these mistakes, especially in quittance documents originated at Border Posts (e.g. oral declarations) it is advisable to change the form used for input and output of data, and for payment receipts. This change of form would be implemented after the consolidation of the customs operation and the Sydonia System.

Technology/Information Distribution

The Sydonia System is still not fully well-known by some of the important officials of the Customs Administration. The accounting system adopted by Customs records dates from the 25th day of one month to the 25th of another; the Sydonia System records from the first to the 30th of each month. Making comparisons between systems is, therefore, not possible, yet officials at high-level meetings discussed such comparisons.

The Sydonia System in operation contains a number of files: tables with data and information that could be of great importance. Many of the Public and Private entities visited have no knowledge at all of the many advantages the Sydonia System can provide.

Disseminating data contained in the files of the Sydonia System to other bodies of the Public and Private sectors, as well as to the different bodies comprising the Customs

Administration is another priority. The Sydonia System has access to the following files and tables: Tables of Countries, Tables on Foreign Exchange, Tables on Customhouses, Table of Enterprises, Table of Declarants, Card Index of Creditors, Tables on Modes of Transport, Table of Regions, Table of Duties and Taxes, Table of Regimes, Table Taxable Bases, Table of Budget Affections, Table of Banks, Table of Stores, Table of "Pièces Jointés", Table of "Conditionnements", Table of Inspectors, Table of Returns, Table of CEAO Product Category, Table of CEAO Product Agreement, Tables of Enterprise Agreements, Table of Written Codes, Table of Modes of Regulations, Table of Final Utilization, Table of Types of Contracts, Table of Types of Titles, Table of Directors of Commerce, Table of Types of Entrepot, Table of Entrepots, Table of Customs Officials, Image of Base Customs Officials, financial and economic, Card Index of Visiting Inspectors, Card Index of Values, Card Index of Manifests, Card Index of base Tariff, Card Index of national Tariffs, Card Index of Nomenclatures, Card Index of "Marchands", Temporary Card Index of Recovery of Credits, Card Index of Transcoding Origin, Card Index of Foreign Trade Titles, List for BD Consultation, List of Regimes for Consultation, List of Nomenclatures for Consultation, List of Countries for Consultation, List of Bureaus for Consultation, List of Enterprises for Consultation, List of Duties for Consultation, of Trade in General, Import and Export, Special Trade, Import and Export, Hours Pertes Exemption Regimes, Pertes Regimes of CEDEAO and CEAO formula, Card Index of Liquidations, Card Index of Recoveries, Card Index of "Operations de Caisses", Card Index of Series, Card Index of Declarations, Card Index of Monthly Declarations, Card Index of Documentation Extracts and of "Rubriques", of key words, documentation text and list of "rubriques" to be edited.

To remedy the lack of widespread knowledge, the Customs Administration could publish a regular bulletin giving other State institutions (e.g. the Ministry of Finance, Planning and Commerce), as well as other private sector entities (such as the Chamber of Commerce and Employer Unions), data and information stored in its computers. This task would not pose any technical problem and could be carried out immediately. Such a publication with wide distribution would be a great service to the country, and would also serve as an instrument to evaluate the work carried out. Finally, the publication of the bulletin would be an internal tool contingent on automatically keeping up-to-date data and the existence of data that facilitate statistical studies required by the different bodies of Government. These tasks would require a small addition of two people to the personnel in the Customs Administration Data Processing Center. More material will be used (paper-forms) and microcomputers used more intensively. Still, benefits generated by publishing the bulletin would outweigh the costs and the work volume involved.

In a subsequent stage, to upgrade the bulletin, the personnel involved may be trained in specific software acquired for text publication. With this bulletin, Customs would have regular and frequent outside contact with other entities in the country, breaking out of isolation and expanding its interactive role.

Data Input

Another necessary measure is establishing a mini-structure for receiving and controlling data for input at the Data Processing Center of the Office of the Director General of Customs at Niamey. There is a constant flow of documents for data input (quittances, forms and discs) that results in irregular and poor distribution in the input effort. By establishing a nucleus for receiving and controlling, the process could be corrected dramatically.

At present, Customs agencies (Regional Bureaus and Border Posts) have long delays in dispatching documents, sometimes in excess of 5 months. Documents have been mixed up and sent in a disorderly fashion, generating low productivity in processing the work. In addition, there are cases of erroneous tariffs classification which cause problems in tax collection and in recording data correctly. The storage of processed documents is handled in a haphazard and deficient manner, generating more control problems.

The proposed mini-structure would have power to collect from the regional and border entities, promote corrections, prepare documents for processing, and keep custody of documents processed or to be processed. Its implementation could promote greater productivity, better consistency in the processed data, faster data transmission and, also, serve as an administrative presence in the Office of the Director General to operate the regional units. This is a simple low-cost task that can be implemented in the short run and depends only on an administrative decision.

On the Sydonia System, Customs must initiate a request to CNUCED, in Geneva, asking for assistance to implement the newest version of the System, which is much more powerful and faster than the present version. In Niger, there is absolutely no documentation on the Sydonia System to allow further technical expansion. A minimum knowledge of the documentation pertinent to the source programs of the Sydonia System is necessary locally to initiate adjustment measures, complement and extend the services produced. The suggested support needs to be accompanied by training, so that practical results may be obtained. The opportunity of implementing and installing new equipment, the growth and experience already acquired in the operation of the Sydonia System in the country, strongly justify this proposal.

Coordinating Technical Growth

The application of sophisticated technologies in data processing in the Republic of Niger at the present historical moment with the existing limitations is just dreaming. For optimal technical growth, the economic and social development of the country as well as improvement of the educational system are prerequisites. An essential factor is the formulation of a National Information System Policy that establishes principles, norms and actions toward development. The Republic of Niger is now taking its first steps in that direction. Unless the National Data Processing Center of the Planning Ministry defines its role as coordinator, the systems will remain autonomous, and there will be little chance of taking measures allowing for mass processing of information, generation of data bases of a multi-ministerial nature, or distribution of their data processing.

Some measures need to be taken to ensure specific applications such as a National Taxpayers Register, an exchange of computer information by different bodies, and to prepare and plan the data processing system of the country. Despite the use of data processing, there are no professional people among Customs personnel capable of conducting analysis and/or systems programming, either for big equipment or for microcomputers. Even Lotus, DBase, Symphoni, and others designed for microcomputers, programs long in use in most parts of the world, have serious limitations in this country. While there is a lack of material resources for purchase, there are many professional staff members interested in acquiring further knowledge. Sooner or later the need for improving the services through new data processing will become more apparent, not only in the field of administrative applications, but in the field of technical and customs applications. Some of these growing areas are excise taxes on tariff charges and their repercussions on the national economy, comparison of different price origins, and applications for management decision-making.

Full knowledge of the Sydonia System, of the operational system used (especially UNIX) plus programming languages (BAL or other), as well as DBase and Lotus type software is essential for Customs personnel. Only through this knowledge will Customs be able to make full use of the opportunities offered by the Sydonia System and the data registered in its files. The Data Processing Center of the Office of the Director General of the Customs Administration, including its officials, need to be treated as a repository of the education/training effort. At present, this Center can serve as a disseminator of data and information to improve the Customs Administration's operational performance in the country.

Internal Communications

In the first stage, parallel to the educational and training phase, the Center needs to distribute to all Customs agencies tables currently existing in the Sydonia System. Changes of tariffs which are now sent through memos, for example, may be sent by the Center through outputs of the System. Printed sheets could substitute for those in books, thus avoiding handling several sources for the classification of merchandise. It can also print and distribute conversion tables for weights and measures, prepare a dictionary with customs terminology, etc. All these internal measures would improve Customs operational performance, by creating a system of internal communications that will help to promote a closer relationship between different departments/officials of the Regional Bureaus/Border Posts and the Central Administration at Niamey.

The present structure of relationships between data users and the systems is unsatisfactory. Within the Ministry of Finance, which oversees the Customs Administration, there is no interaction between systems at this time.

The Data Processing Center of the Ministry of Finance is used exclusively for purposes of payroll, accounting, and tax collection systems. There are only five professional people working on analysis. In 1990, the Ministry is expected to develop a Data Processing Master Plan. The current narrow focus of activities is a result of pressures for immediate data where each application involves only one organizational objective. This single minded goal creates a series of dysfunctions, including the following: a) Each application, and therefore each body, considers itself as the owner of their master files and, thus, of their information; b) As the Government is made up of organizational sub-systems, isolated applications generate problems of consistency between informations, files and procedures; c) This redundancy of data generates inconsistency between the systems and, therefore, between the users of the same type of information.

It is difficult to change such a structure; this can only be accomplished slowly. Optimal interaction between systems and users in the short and medium run may not be possible. But eventually with the implementation of a Data Bank System, coordinated efforts will become more feasible.

There are certain measures that can be taken now towards this objective. One of them is the definition of a single identifier for taxpayers. In the case of economic agents, there are at present three criteria: from the Ministry of Finance, the Chamber of Commerce, and Customs. It is necessary to choose and define one criterion, and make

its use universal, in order to be able to make comparisons between data and cross-information. There is a group already studying this matter, but there are no clear resolutions yet.

It is necessary to create a committee within the Ministry of Finance, (with the participation of personnel from the Ministry of the Treasury, the Customs Administration, the DGI, CPD,) to define the procedures for filing and data use with a view toward an integrated information system.

While this is an easy concept in theory, in practice it will require a level of technical knowledge of information systems that does not yet exist in the country. Such planning involves knowledge beyond the issue of the availability of specific hardware and software capable of performing these functions.

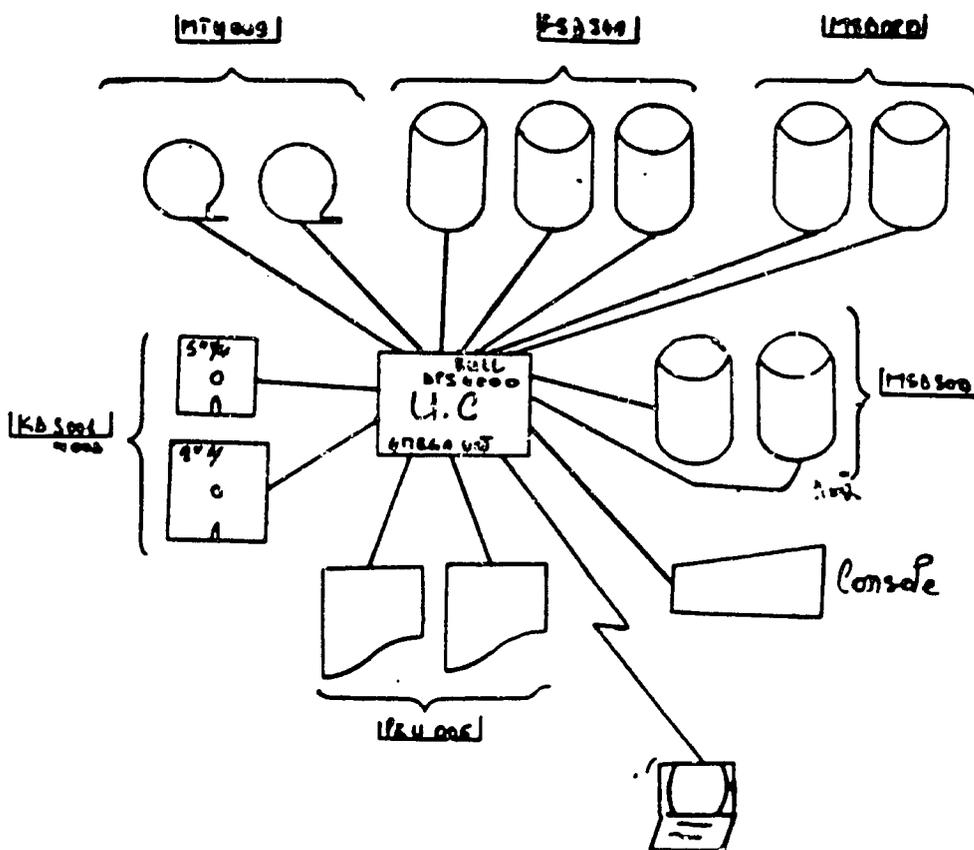
A data bank is a properly structured set of data that can be used efficiently within an organization for a number of applications, for example, the Ministry of Finance. When we refer to a set of structured data, this automatically means the existence of related information among data, besides data itself of interest to the users. Therefore, a data bank will have the following characteristics: the existence of a structured set of data; a diversity of users and parties interested in the information contained therein; it will be planned to be as stable and efficient as possible vis-a-vis the different needs of the information structures (total or partial). The manner in which the data bank will be projected or designed depends on the methodology for analysis and projection of each group responsible for data processing. The data bank may be defined as a whole and the effective load (scaled after having all the applications and their respective programs and procedures already established) starts at this point for operation of the data bank. Such a plan would include the capacity to adjust new data to the basic data each time one of the applications is incorporated into the system.

Additionally, with respect to the Data Processing Center of the Ministry of Finance, information obtained in a personal interview points to the existence of a Bull DPS4000 equipment already installed, with 4MB memory, two 80 MB discs, two 300 MB discs, two tape units (1100 and 9000), and two-200 LPM printers. This equipment was installed two years ago and works with a GIGOS system. It is hooked up to 40 terminals, 10 of them outside. Its main applications are accounting (general Budgeting and Accounting), Payroll, Tax Issuance. The programmes were developed locally using COBOL language. They use the DBS and may convert to DMS at the end of 1990. As they only have a central unit, there are problems in conciliating the operation of the system with the conversion they want. Their personnel is limited: 6 analysts for studies,

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3 analysts/programmers, 1 Project Chief (who has just started and will report to the Project Director of the Ministry). The first applications date back to 1986/1987. The systems are developed in the classical manner, without any formal and established systems methodology, using informal methods and some rules as to presentation. This confirms the serious difficulties of having competent personnel knowledgeable in information systems in the country (some people have received training in Gabon, where there is a school that serves all of Western Africa). The Center uses about 10 files, and these have countless duplications of data.

CONFIGURATION OF THE DPC - MINISTRY OF FINANCE



2) Name of peripherals: Type I Volume

3) Address of Peripherals	FS3001 FSD340 FS3003	FS3002
MSD080	NS2001 ; MF0300	MT2009 ; MTU009
	NS2002 ; NS2004	MT200A
KDS001	KD3012 ; KDS002	KD2012 ; PRU005

In a process of modernizing the Customs Administration that guarantees its efficiency and effectiveness, training in the field of data processing is fundamental. For the Sydonia System to be a vital instrument of administration and operational support, it is necessary for Customs personnel to be trained adequately. In the present stage of Niger's development, training is more important than the equipment, facilities, or sophisticated systems. With trained personnel, the process can evolve from one stage to another and receive reliable and up-to-date statistics.

Recommendation: Implement a Training Program to Follow these Principles:

Program Objectives:

- To give continuous and systematic training to Customs human resources, at a management and technical operational level, so that computer resources may be used as a management and technical-administrative auxiliary tool;
- To give those responsible for managing the Customs data processing resources, the proper conditions to perform their duties;
- To train Customs officials who have had technical training in the area of data processing and/or the Sydonia System so that they can work as monitors/instructors;
- To adapt the Customs decision-making process, increasing its flexibility and work routines, evaluating results through the use of information resources.

Subject Matter:

The program must cover three areas: a management area, a technical-operational area, and an area of specialization.

For the management area, the training program would be oriented to the heads of sections in the Office of the Director and the Regional Bureaus, in order to give them a general knowledge of information systems, with emphasis on data processing technology and with a view to verifying the needs of each Unit, handling of products, systems applications and evaluation of employee performance (equipment operators).

For the technical-operational area, the course would be divided into two parts: for the operational level (user), Customs officials should receive training in the operation of the Sydonia System, data maintenance, supply control and equipment maintenance; for the technical level, training of officials who already work with data processing

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equipment to identify needs and implement systems, analyzing the viability of new products.

In the area of specialization, train high-level officials who already have some knowledge of information systems in methods and techniques of system analysis, give permanent aid and assistance to Customs officials who operate data processing equipment and give technical advice to Customs in general.

Below is a suggested list of program content within courses:

MANAGEMENT AREA

Module 1 - Management Information Systems (± 40 hours)

- Background
- Comparison of manual and electronic processing, advantages of each
- Present stages of Data Processing
- Computer Applications
- Customs Applications: the Sydonia System
- Concept of Data Processing
- Computer Classification
- Equipment Engineering
- Software
- Systems Security
- Office Automation
- Operational Support
- Micro-Information Systems
- The Roles of Data Processing Professionals
- Systems Fundamentals
- Process of Developing Systems
- User Participation in Developing Systems

Module 2 - Data Analysis (± 30 hours)

- Introduction
- Types of Systems
- Approach to Organizations and Relations
- Concepts of Data Analysis
- Symbols Used
- Organization Chart - Relations
- Case Studies

Module 3 - Structured Analysis (± 30 hours)

- Background: Programming, Project and Structured Analysis
- Problems in Developing Systems
- Analysis of Traditional System
- Methodology for Developing Systems
- User Participation: Role in the System's Life Cycle
- Basic Principles of Systems Structured Analysis
- Tools for Structured Analysis
- and Decision-Making Tables
- Case Studies

TECHNICAL-OPERATIONAL AREA - Operational Level

Module 1: Introduction to Data Processing (± 30 hours)

- Background
- Manual and Automatic Systems
- Computer Applications
- Example of System involving Data Bank
- Present Stage of Information Systems
- Equipment Engineering
- Software
- Concepts on Information Systems
- Introduction to Micro-Information Systems
- Sydonia System

Module 2: Operational Systems (must be adapted to UNIX System)(± 30 hrs.)

- Introduction
- Basic Commands
- Structure of Directories
- Batch Processing
- Prevention and Recovery of Mistakes in Discs
- Advanced Commands
- Additional Resources

Module 3A: Text Processing (± 30 hours)

- General Characteristics
- Text Drafting and Correction
- Moving the Arrow
- Recording of Edited Text in Floppy Disc

- Deletion of Edited Text from Memory
- File Copy in Floppy Disc
- File deletion from Floppy disc
- Edited Text and Format Text
- Text Printing
- Exercises

Module 3B: Electronic Payroll (± 30 hours)

- Charging to Payroll
- Work payroll
- Keyboard
- Input Data
- Formulas, Functions and Commands
- Command Tree
- Deleting Payroll Content
- Exercises

Module 3C: Data Bank Administrator (± 50 hours)

- Concept of Data Bank
- Introduction of Data Bank Manager
- How to Access the
- Basic Command
- Exercises

TECHNICAL-OPERATIONAL AREA - Technical Level

Module 1: Introduction (± 40 hours)

- Background
- Manual and Mechanical Systems
- Computer Applications
- Example of System involving a Data Bank
- Present Stage of Information Systems
- Systems Security
- Equipment Engineering
- Software
- Programming Language - Characteristics
- Concepts of Information Systems
- Introduction to Data Processing
- Fundamentals of Systems Development

- User Participation in Systems Development
- Sydonia System

Module 2: Data Analysis (± 40 hours)

- Introduction
- Types of Data processing Systems
- Approach to Organizations and Relations
- Concepts of Data Analysis
- Symbols Used
- Organization Chart and Relations
- Branching of Relations
- File Simplification (Normalization)
- Case Studies

Module 3: Structured Analysis (± 30 hours)

- Background: Programming, Project and Structured Analysis
- Problems in Systems Development
- Analysis of Traditional Systems
- Methodology for Systems Development
- User Participation: Role in the System's Life Cycle
- Basic Principles of Systems Structured Analysis
- Tools for Structured Analysis
- Decision-making Diagrams and Tables
- Fundamentals of Programming Technique
- Case Study

Module 4: Training of Instructors/Monitors (± 40 hours)

- Education and Training
- The Role of the Instructor in Training
- Programming Teaching-Learning Situations
 - definition of general objective for programming training
 - analysis of population characteristics and work situation
 - identification and survey of knowledge, ability and aptitudes as a definition of specific objectives
 - drafting and selection of teaching methods and techniques for training
 - selection of audio-visual aids
 - drafting of evaluation tools

- Operationability of Learning Situations
- Evaluation of Teaching Situations

AREA OF SPECIALIZATION (± 650 hours - at a specialized school)

- Introduction to Data Processing
- Sydonia System
- Organization and Methods
- Equipment Engineering
- Operational Systems
- Logic
- General Theory of Systems
- Methodology for Developing Structured Systems
- Input-Output Projects
- Systems Structured Analysis
- Systems Structures Project
- Systems Management
- Programming Techniques
- Data Administration
- Data Structure
- Data Analysis
- Data Bank Management Systems
- Advanced Languages for Data Banks
- File Project and Organization
- Programming Languages
- Management Systems and Advanced Topics on Information Systems
- Teleprocessing
- Data Communications Systems
- Local Networks
- Mini-computers, Microcomputers and Super Microcomputers.

Initially, this program should be conducted by a senior specialist, preferably a specialist from an international organization. The work of organizing and setting up the proposed training system, will require period of approximately 6 months to 1 year. Such a commitment would support the future excellence of the information system, both within the Customs Administration and throughout Niger as a whole. This training program, with support from the Office of the Director General of Customs, could receive subsidy from the Ministry of Finance and the Office of the Director General of the National Information Center of the Planning Ministry.

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In closing this report, I again would like to express my appreciation for the assistance, the cooperation and support given by USAID through Messrs. George Cullen and Michael Kerst, and also for the assistance of Mr. Diallo Mamadou, Director of Accounting and Statistics of Niger's Customs Administration.

It was indeed an honor for me to work on this project for USAID and for the Government of Niger.

ACADEMY FOR EDUCATIONAL DEVELOPMENT

**Niger Economic Reform Program
Computer System and Database Support
Study and Recommendations**

**PART-II
Computer System Requirements and Analysis**

January 15, 1990

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I. Overview

Niger is interested in assessing the impact of the Niger African Economic Reform Program (NEPRP). In order to measure the Program's impact data, information and statistical analysis of Niger's economic trends is essential. Of particular interest is information on import and export activities. It is necessary, therefore to collect and maintain data on all export/import transactions performed by all economic operators in Niger.

The handling and processing of export/import transactions and related functions are the responsibility of the Custom Department (Direction Generale de Douane - the DGD) of the Ministry of Finance (MOF).

In order to evaluate NEPRP, the DGD needs an up-to-date and accurate export and import database. For this reason, the DGD's export/import function, procedure, and data/information are the backbone to the establishment of the Niger Export/Import Database from which statistical and other planning, decision, and policy information can be obtained. Without a complete, accurate, and up-to-date Export/Import Central Database at the the DGD, it will be impossible for any organization to produce accurate reports on the economic trends of the Republic of Niger.

This part of the study provides an overview of the the DGD's organization, functions, procedures and an assessment of the current computer system used by the DGD. The establishment of a central export/import database to track export/import transactions and from which accurate planning, control, and decision making and statistical information can be extracted and provided to by diverse government and private entities.

The establishment of a Central Export/Import Database at the DGD will constitute the central reservoir of all the export/import transaction data of the Country. Once this is accomplished, this data can be used by all government agencies to conduct their operational, planning, and control functions and by Niger to assess the progress of NEPRP.

This study describes the proposed alternative solutions to develop and establish such a Central Database and the strategy to implement an optimal and cost effective solution. In preparing these solutions, we had to take into consideration current computer hardware and software standards for the purpose of upgradability, expandability, and flexibility and the DGD's constraints and application software (SYDONIA). At the same time we will introduce new high performance computer

technology meeting international standards to provide an upgradable hardware and software platform that will support current and future needs and requirements.

II. Objectives and Requirements

Before assessing the hardware and application software currently used by the DGD, the functional requirements of the DGD are presented in part-I of this study. This section of the report presents an overview of the objectives and goals of the DGD, a brief functional description, and data/information requirements of the DGD, MOF, Ministry of Planning and other government agencies. These will constitute the requirements from which an optimal computer solution will be devised.

A. The DGD Goals and Objectives

The primary objectives of the DGD as a general department of MOF are to apply and enforce the taxation law on the export/import transactions conducted by all economic operators whether formal or informal. In other words, the DGD is responsible for the execution of the country's economic policy concerning the export and import of goods. This policy is established by MOF with the assistance of the DGD and reviewed and approved by the Cabinet of Ministers. The DGD executes this policy through the collection of taxes on export and import, protecting the economic territory of the country, protecting the consumer from illegally imported products, and safeguarding the local business from illegal imports.

These goals can only be achieved through an effective organization, well defined and enforced taxation law and regulation, accounting, reporting, and auditing procedures, and trained human resources to execute these procedures.

Furthermore an effective information network and coordination among government agencies such as Treasury, Ministry of Planning, Ministry of Finance, Ministry of Commerce, Chamber of Commerce, etc. is critical to the achievement of these goals.

B. The DGD Organization Structure

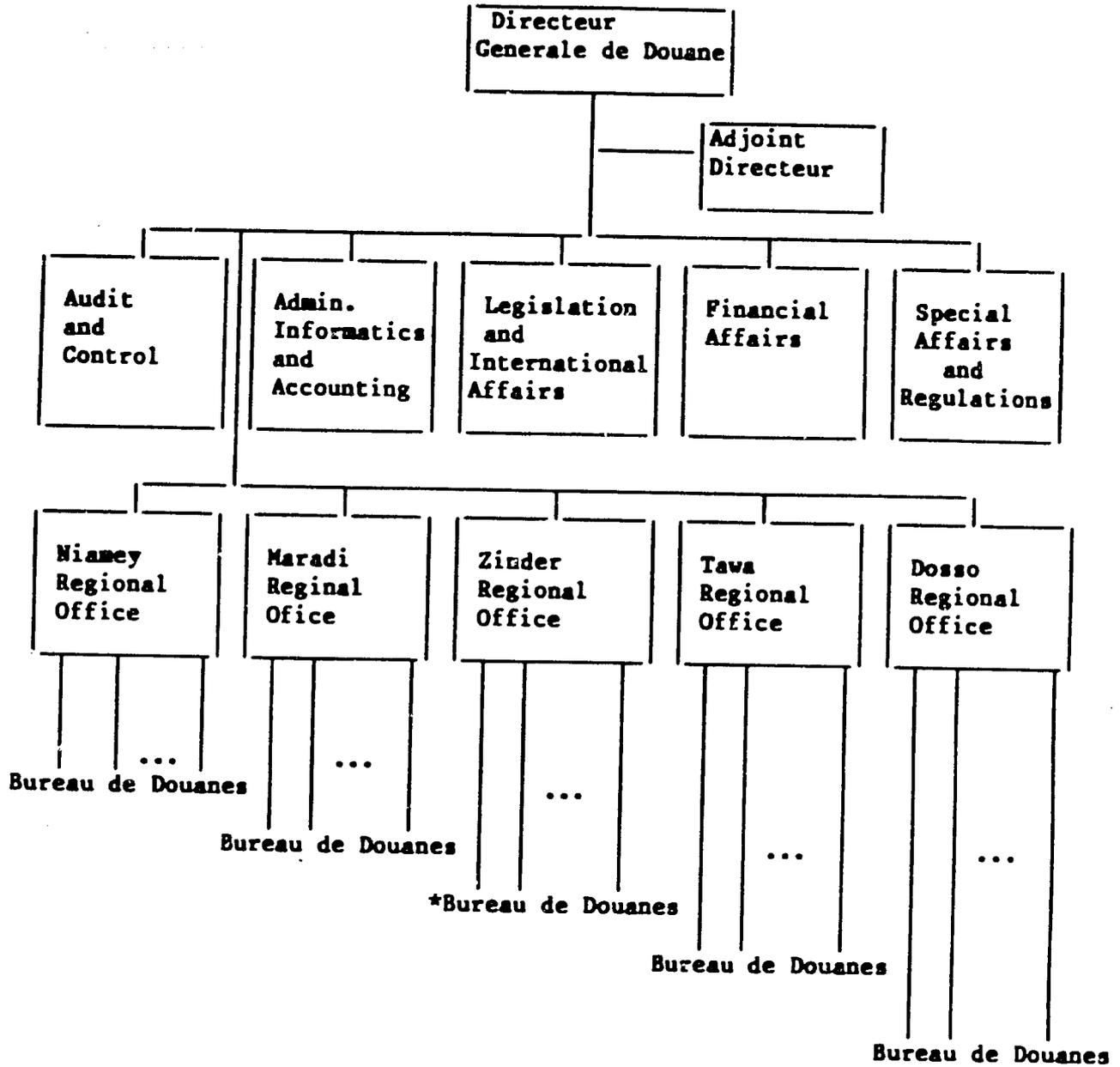
The Direction Generale de Douanes (the DGD) is one of the five general directorates of the Ministry of Finance. As shown in figure-1, the DGD headed by the Directeur General de Douanes has an Assistant Director, five administrative departments (Direction) and five regional departments (Direction Regionale). The five administrative departments are located in the DGD head office in Niamey and include:

- Direction D'Enquetes de Douanes et Inspection de Service/ Audit and Control Department
- Direction de Statistiques Informatique et Comptabilitee/ Statistics, Data Processing and Accounting Department
- Direction d'Affaires Administrative et Financiees/ Administrative and Financial Affairs
- Direction de Legislation and Realations Internationales /Legislative and International Affairs
- Direction de Regimes Speciaux/ Special Affairs and Regulations

These are administrative units, while the regional departments (including Niamey, Dosso, Maradi, Tawa and Zinder) are operational units. These regional departments are responsible for executing policy, guidelines and instructions set by the DGD main office with its administrative departments.

Under each regional directorate, there are a number of Full Authority Offices (Bureau a Plein Exercices) and Frontier Offices (Bureau Frontalier). Both of these operational offices deal directly with the economic operators, process all the export/import transactions and collect export/import taxes on these transactions following the economic laws and policies issued by the DGD head office and channeled through the regional departments.

**DIRECTION GENERAL DE DOUANES
ORGANIZATION CHART**



(*) Bureau de Douanes - Bureau a Plein Exercices
Bureau Frontalier

Figure-1

C. Functions of the DGD

To achieve its objectives, the DGD has a set of well defined functions that are delegated to its organizational units. This section summarizes the functions of each administrative and operational unit of the DGD.

1. Administrative Functions

Administrative, planning and control functions of DGD are conducted by the five administrative directorates located at the DGD main office in Niamey.

Audit and Control Department - This unit is responsible for the performance of the following functions:

- Audit and control of export/import transactions
- Study and evaluation of work procedures of other departments within the DGD
- Periodic audit of processed export/import forms (Declaration de Douanes) to ensure compliance with the tax laws and policies of the country
- Review and audit of all export/import transaction receipts (Quittance) to enforce the execution of export/import laws and prevent any fraudulent transactions
- Archives of export/import forms and receipts
- Inspection of the frontiers and auditing procedures used at the Frontier Offices
- Review and quality assurance of administrative procedures

Statistics Data Processing and Accounting - Headed by its own director, this department is responsible for the following functions:

- Operation and Production of the DGD's Computer System at the head office in Niamey
- Implementation of the DGD's computer system (SYDONIA) at the operational units including regional and operational offices (Full Authority and Frontier Offices)
- Training administrative and clerical staff on use and production of the SYDONIA system at the head office, regional, and operational offices
- Computer technical support to the regional and operational offices
- Management of the Douane central database

- Transaction processing support to the operational offices that are not automated
- Statistical and financial reporting to support internal functions of the DGD
- Provision of export/import statistical data and reports to external government agencies including ministries and other units
- Conduct the accounting and financial operations related to the revenues from the processing of export/import transactions

Administrative and Financial Affairs - This department is responsible for the execution of the following functions:

- Developing administrative and operational procedures for other internal units of the DGD
- Preparing the budget of the DGD and the allocation of the budget after approval
- Conducting the accounting for the operation of the DGD and its units
- Managing personnel
- Managing financial reporting for internal and external use

Legislative Department and International Affairs - This department is responsible for the performance of the following functions:

- Preparation of the export/import laws and amendments with the cooperation of other external government agencies such as Treasury and Internal Revenues (Direction de Contributions Diverses)
- Documentation of the export/import laws and the Douane policies and disseminate such policies to the operational departments of the DGD and other government agencies
- Resolution of tax law problems related to export/import transaction that may arise at the operational level
- Provision of assistance to the audit department and operational departments in the interpretation of the law concerning export and import
- Application of the laws and decisions made at the level of the CEAO and CEDEAO

Department of Special Affairs/Regimes Speciaux - This department is responsible for the following functions:

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- Preparing and reviewing tax tariffs on all export/import products with the coordination of the legislative Department
- Maintaining the export and import tax tariffs guide
- Processing and approval of tax exemptions on export and import

2. Operational Functions

All regional centers/departments including Niamey, Dosso, Maradi, Tawa, and Zinder and their full authority and frontier offices conduct operational functions which include:

- Processing of export/import transactions
- Providing cash receipts and making deposits from export/import taxes
- Maintenance of daily export/import transaction journal/Bureau de Douane only
- Preparing the monthly batch of processed export/import forms and receipts, monthly transaction roster and mailing to the regional office or to the DGD head office
- Preparing statistical and financial reports on export/import transactions processed by the operational office
- Auditing and verifying export/import forms
- Auditing and verifying export licenses
- Patrol of the frontiers under jurisdiction of the center or the office/Frontier Office only

In addition to the above, the regional offices conduct the following functions:

- Operation and production of the SYDONIA system
- Management of the regional export/import database
- Archiving copies of processed export/import forms and receipts. This function is not conducted by the regional offices, all forms are sent to the DGD main office for archive (3 years)
- Accounting receipts from export/import taxes for the region under their jurisdiction
- Auditing and control of the export/import transactions conducted by frontier offices under their jurisdiction
- Coordinating the collection of monthly transactions, export/import forms and receipts from the frontier offices under their jurisdiction and conducting data verification, completion, and entry using SYDONIA system

- Conducting the monthly transaction extract from the regional database and send the extract file to the DGD Data Processing Department in Niamey. Not implemented yet.
- Providing logistical support to the frontier offices under jurisdiction

D. Inter-Department and External Relationships

The inter-department relationships are established through the organizational structure of the DGD and its administrative and operational units. These can be grouped into four types: support, execution, auditing, and information flow. Some of the units such as Administrative, Data Processing and Accounting are related to the regional departments through the computer support provided. The frontier offices are related to the regional departments by executing the guidelines and policies issued by the DGD head office and channeled through the regional departments. The audit department is related to the operational offices through the audit activity performed on export/import transactions. The most important relationship is the information flow between all the DGD units.

The relationship between the DGD and other external government agencies including Treasury, MOF, Direction de Contribution Diverses, and Ministry of Planning are of two types: functional where the DGD and an external unit, i.e. Treasury, share the performance of an operational function and informational, where the DGD provides transactional data/information to other agencies.

E. Procedures and Information Flow

The procedures used to conduct the above administrative and operational function of the DGD organizational units are described in detail in Part-1 of this study. This section provides an overview of the procedure used to process the export/import transactions which is the main function of the regional and frontier offices.

The procedure used to process export/import transactions by all the operational offices of the DGD is semi-automated, i.e. the operation of processing export/import forms is automated. The financial aspect — accounting of revenues, payment of taxes through installments, the control of these transactions, and the linkage to other internal and external functions — is not automated.

The basis for the export/import processing cycle is the Export/Import Form/Declaration de Douanes shown in Appendix-A and associated documents (Installment Agreement, Export/Import License, Invoices, etc). Any export or import transaction must start with this form and applicable supporting documents. However,

the export/import form is not used in informal transactions executed at the frontier offices. Only formal economic operators use the export/import form. A formal economic operator is defined as an entity, person or company who exports and/or imports goods and has an export/import license (Appendix-B).

1. Entities Involved in Export/import Procedure

Handling and processing export/import transactions involves a number of government agencies, private institutions, and economic operators. Each entity has a specific role in the current export/import procedure. These entities include:

Economic operator (EO) - a person or company entertaining the export and/or import of goods to/from Niger. There are two types of economic operators. Formal economic operators have an export/import license and have formally registered their business with the Ministry of Commerce and Chamber of Commerce. Furthermore, a formal economic operator has a unique identification number within the DGD. Informal economic operators or occasional operators are persons who conduct their transactions without any export/import license, such an operator does not have an Identification Number with the DGD.

Custom Operational Offices - The DGD's operational offices including Frontier Offices and Full Authority Offices. These operational units are responsible for processing export/import transactions. There are two types of frontier offices: those that are limited to a certain type of transaction within a certain CFA amount, and those - Full Authority Office that can process any type of transaction without any limit on the value or nature of the merchandise.

Direction de Tresaire/Treasury Department - A general directorate of the Ministry of Finance. It is responsible for issuing Installment Agreements which allow the formal economic operators to establish a guaranteed loan to make payments on the export/import transactions through installments.

Ministry of Commerce - A division within the Ministry of Commerce is responsible for issuing export/import licenses to those persons or companies interested in conducting export and/or import activities.

Banks - Banks are concerned with credit and the financial history of economic operators requesting an installment agreement and the guarantee of loans approved by Treasury.

Direction des Contributions Diverses/Internal Revenue Department - This is a general directorate of the Ministry of Finance responsible for the collection of taxes on the financial revenues of the economic operators.

As shown in figure-2, there is a set of relations that link these entities to make a single operating network. These relations are the result of functional and control responsibilities and are the basis for the current export/import procedure. These relations are established through a formal information flow between these entities. Without this information flow, this network may not operate effectively.

EXPORT/IMPORT ENTITIES AND RELATIONS

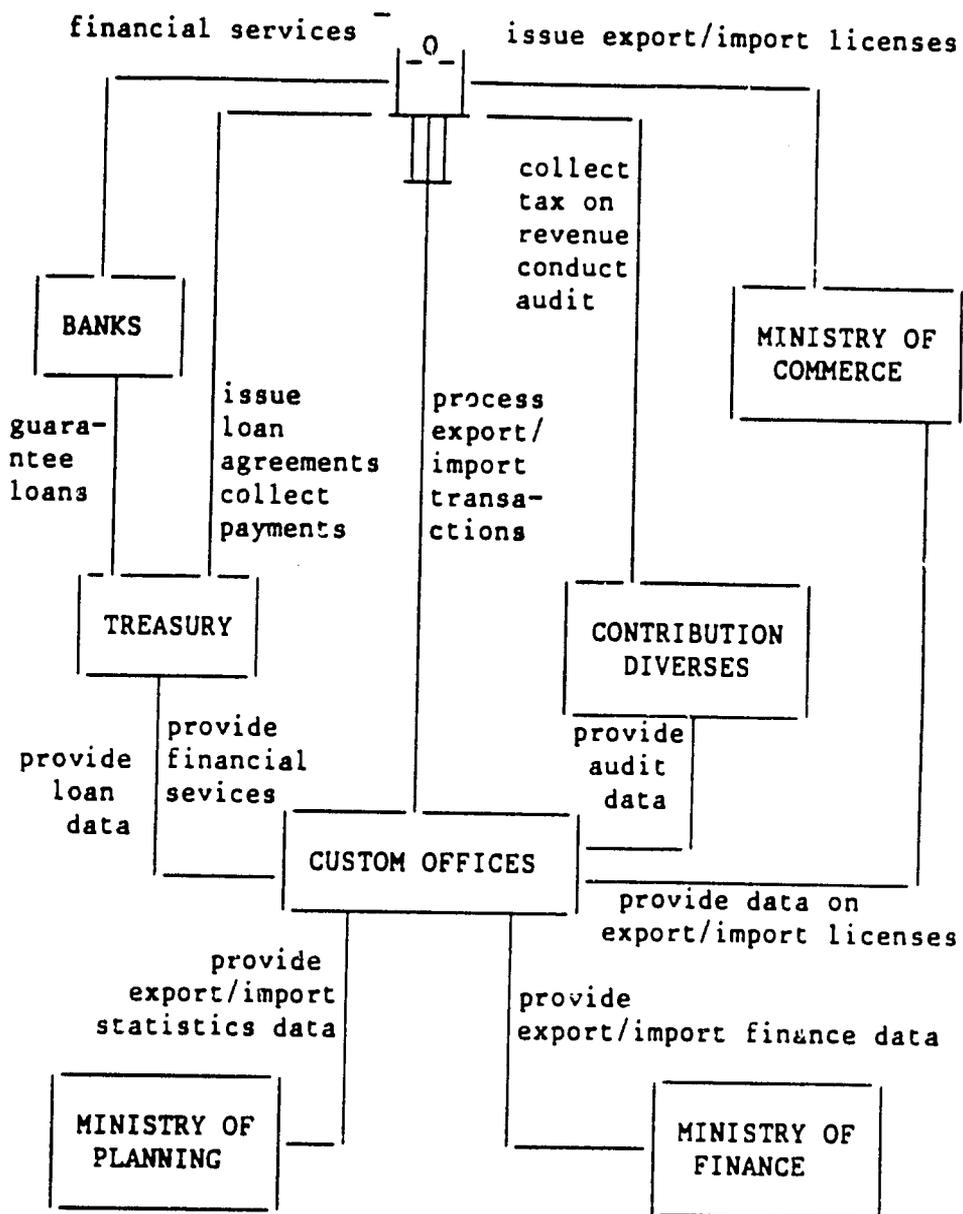


Figure-2

2. Current Export/Import Procedure

The following 12 steps summarize the procedure used to process export/import transactions. The data flow diagram shown in figure-3 provides a global view of the operations used, forms, and data stores. Some of the steps in the procedure are automated through the use of SYDONIA: these apply only to those operational and regional offices that are computerized:

- 1- Economic operator completes the DECLARATION DE MISE A LA CONSOMATION and attaches the required support documents including export import license, installment/loan agreement, and invoices
- 2- Economic operator presents the merchandise at the frontier office with the required documents including: DECLARATION DE MISE A LA CONSOMATION and support documents
- 3- If the transaction amount is not within the authority of the custom office, a Transit Form (Cahier de Transit) is prepared in triplicate and a custom officer escorts the operator with the merchandise to the nearest Full Authority office. Copy of the Transit Form remains in the file until the originating custom office receives a notification from the office handling the transaction
- 4- The documents including export/import form, invoices, and export/import license are registered using a transaction number (No D'ENREGISTREMENT) which is recorded on the export/import form and on a Transaction Roster
- 5- Custom officer verifies the goods against the export/import form, invoices, and export license. In the case of an informal economic operator, the contents of shipment is declared verbally by the operator to the custom officer who, after verification, records the findings on a sheet of paper no standard form is used in this case.
- 6- Once the contents of the shipment are verified and approved, the custom officer calculates the amount of taxes to be paid using the TAX RATE GUIDE (TARIF DES DOUANES) and compares these against the taxes to be paid as recorded by the operator on the export/import form:
 - If there is an unintentional error in the recorded information e.g. quantity, type, unit price, total price, and taxes, then

the custom officer requests the operator to re-issue a new export/import form with the correct information, and the process is restarted at step-1

- If the error is intentional or fraudulent, determined at the discretion of the custom officer, then a fine is assessed and recorded on the form; the form with the supporting documents are sent to accounting/cashier
 - If there is no discrepancy in the form or in the verbal declaration, the form and support documents are sent to accounting/cashier
- 7- The accounting/cashier at the Custom Office prepares the receipt (QUITTANCE, Appendix-C) in two copies: one copy to the DGD file and one copy to the operator upon payment
 - 8- The economic operator pays the tax amount at the cashier and receives a copy of the QUITTANCE. Payment is made either by cash, certified check, or an IOU note. In the case of an IOU note, the economic operator must present the installment/loan agreement.
 - 9- A cash receipt entry is made on the Cash Receipt Register; a copy of the quittance is filed in the DGD QUITTANCE FILE in Office QUITTANCE FILE. The cash, checks, and IOU notes are placed in a safe/vault.
 - 10- At the end of each week, the head of the Customs Office prepares a summary of all cash receipts by tax type and presents the Weekly Summary Sheet with the cash, checks, and IOU to the Treasury Office in the region/Prefecture.
 - 11- The Treasury office issues a Deposit Slip which is pasted on the weekly journal as part of the total deposit for the week
 - 12- At the end of each two weeks, copies of all the processed export/import forms and quittances are sent to the regional office for audit and to merge with the regional file. These forms plus a Regional Transaction Summary are then sent to the DGD main office

EXPORT/IMPORT PROCESSING DATA FLOW DIAGRAM

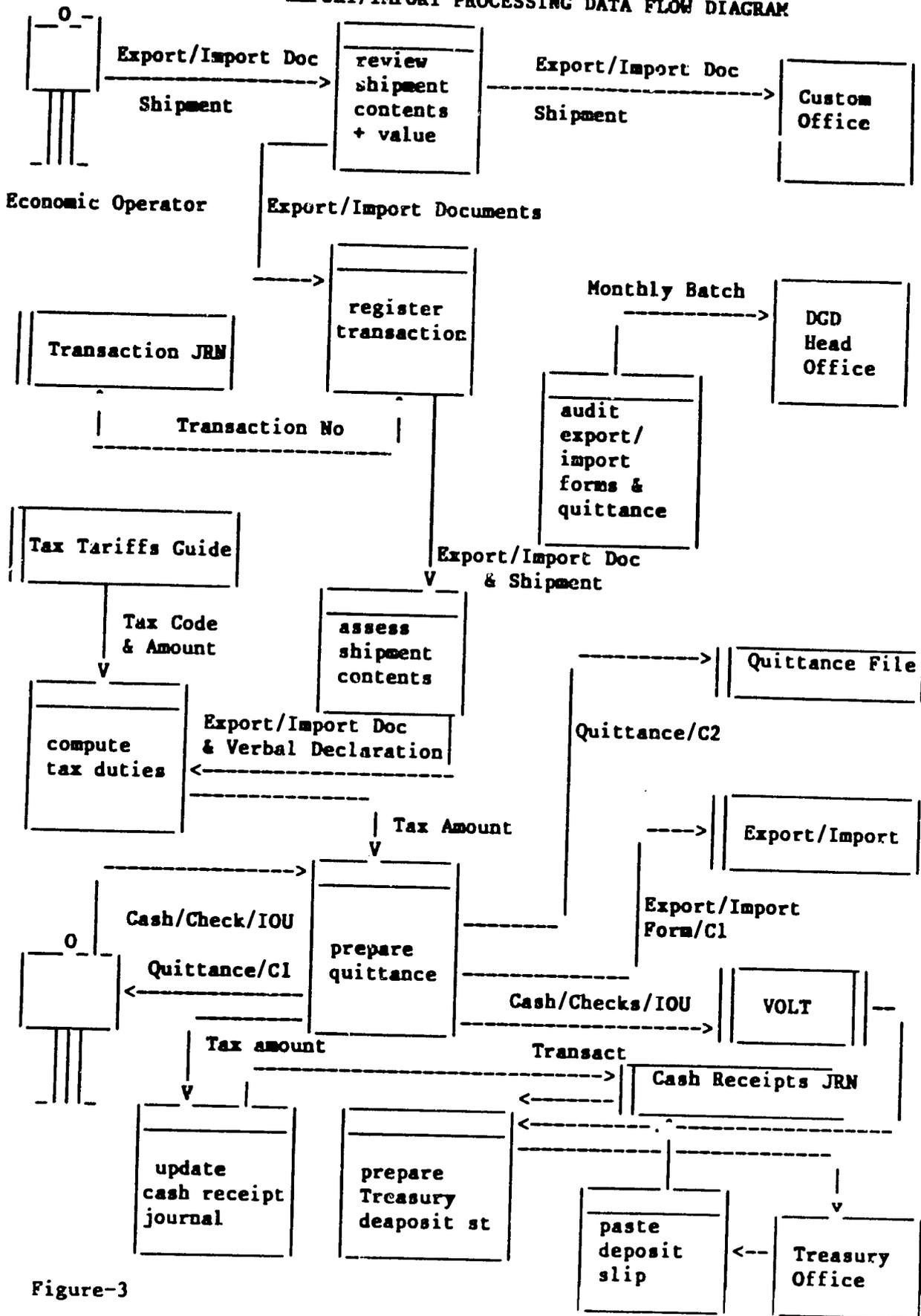


Figure-3

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3. Analysis of Current Export/Import Procedure

The anomalies in the export/import procedure and its application, combined with the lack of resources which prevented DGD from full implementation of SYDONIA, is causing a number of problems:

- Economic Operators exceeding the limit of their Loan
- Erroneous and incomplete transaction data
- Delay in updating the DGD central export/import database
- Erroneous application of the Export/Import Tax guidelines
- Lack of up-to-date and timely financial and audit reports
- Lack of up-to-date statistical data

One major deficiency in the procedure is the non-uniform use of data forms. The export/import form, though it is required, is only used by formal economic operators. In the case of informal economic operators, the verbal declaration of goods to be exported or imported can cause data recording errors, and may not provide an effective application of the tax law.

The export/import form should be used by all economic operators to provide a standard and uniform method of data collect which will ensure the proper application of export/import tax law. To ease the general use of the export/import form, these could be provided free of charge and made available at all operational offices.

Furthermore, the export/import form used by all operators can be used as a receipt as well, and this will eliminate the QUITTANCE. By adding another copy of the export/import form, it can be given as a receipt to the economic operator after processing the transaction.

The second anomaly in the procedure is the lack of a unique and standard identification of economic operators. The concept of formal versus informal economic operator should be eliminated and all economic operators should be properly identified. We recognize that this is a major undertaking. However, it is critical to identify uniquely all economic operators and completely eliminate the division of economic operators into two groups. Presently, only formal operators have an identification number which is issued by the DGD. Informal and occasional operators are identified by the number 99999999. This practice of identifying a large number of operators using one ID is a major drawback to establishing the proper control of the activities of each economic operator and makes it impossible to build an effective accounting mechanism of the business transactions conducted by the economic operators.

The issue of Identification Numbers through the DGD head office (consisting of an 8 digit number where each group of digits has specific meaning) should be eliminated. To facilitate this task, the ID number should no longer be issued by a centralized office; frontier and regional offices should be given the responsibility to issue these IDs. A simple way to do this is to continue using the 8 digit ID number where the first two digits identify the custom office and the last 6 digits are used to identify the economic operator. The last 6 digits are a sequential number and should not carry any meaning. A roster of IDs can be used at each custom's office to keep track of IDs issued by the office.

When an economic operator presents his/her merchandise to conduct an export/import transaction, (if this is the first transaction conducted by the economic operator) then an ID will be issued by taking the last ID from the roster and adding one to the last 6 digit number. The new ID with the full name and address of the economic operator will be entered on the Operator Roster. Once the ID is issued, then the transaction can be processed. A policy should be established that no transaction can be made without an ID.

The third anomaly is the way the data is recorded on the QUITTANCE. It shows a large number of transactions in contrast to those initiated through an export/import form. The data recorded on the export/import form is typed. The data recorded on the Quittance is hand written in script. This script recording of data should be replaced by a hand printed data preferably in capital letters.

Furthermore, since the quittance is a receipt resulting from the processing of the transaction, this document should not be used as the source of data. As previously stated, all export/import transactions should be conducted using the current export/import form or another standard form. Technically, the Quittance is an output from a process and should not be used as the initial input.

The fourth anomaly is in the recording of data. There are a number of instances where a transaction that consists of a number of different items that are recorded as one item. This is incorrect and may constitute a violation of the export/import tax law. Other transactions are recorded with improper item number. The third type of recording error is incompleteness. Very important statistical data such as weight, type, description are missing from the quittance.

It is important to provide proper training to custom officers and make them aware of the serious nature of such a problem. An audit mechanism should be established

within each custom office to review the Export/Import and Quittance forms to ensure the accuracy and completeness of data.

Furthermore, automating the processing of export/import transactions through the implementation of SYDONIA at all custom offices will ensure data completeness and validity, and eliminate most of the data recording problems.

The fifth anomaly is in the time required to consolidate/merge the regional export/import transactions and the submission of these transactions to the DGD main office in Niamey to update the central database. Since only two regional offices are using the SYDONIA computer system and DOSSO's regional office is not yet operational, the main office has to conduct all the data entry for these offices. This is causing a large backlog of data. The DGD main office is two years behind in the completion of this task.

To solve this data backlog problem, we are recommending the immediate implementation of SYDONIA system at all regional offices and the frontier offices with a number of transactions exceeding 200 per month. Furthermore, a task force of at least 8 operators should be hired to complete all entry of export/import transactions of 1987 through 1989.

The transfer of data between the frontier and regional offices, and between the regional and the head office should be consistent. Part of the production schedule of SYDONIA should include the periods of data transfer between these offices. All offices should transfer the data/forms within scheduled dates.

The sixth anomaly is in the use of an export/import license. The export/import license is issued by the Ministry of Commerce to control the quantity and type of products to be imported to or exported from the country. Since the license is not used by all economic operators, there is no benefit from using such a license. However, if it is desired to continue using the license, a more effective and integrated procedure with the export/import process should be established to issue and maintain these licenses.

The export/import procedure conducted by custom offices and the issuance and management of export/import licenses by the Ministry of Commerce are not linked; it is impossible, therefore, to ensure proper application of the export/import license.

Since the DGD is responsible for the processing of export/import transactions, and the export/import license is used to control such transactions, then it is logical to transfer the issuance and the management of export/import licenses to the DGD or establish an effective interface between the two procedures.

The seventh anomaly is in the issuance and maintenance of the installment/loan agreements. The current procedure -- where by Treasury issues installment agreements to economic operators and custom offices to control such loans -- is impossible to execute without timely flow of information between Treasury and custom offices. For custom officers to ensure that the economic operator did not exceed the allowable loan, Treasury must provide the custom offices with a financial statement for each loan.

At present, the Treasury is not providing any information on the status of these loans to custom offices, so customs cannot ensure the limit on the loans. The only requirement for processing a transaction through an IOU note is the original loan agreement. This makes it impossible to ensure that the economic operator does not exceed the approved amount of the loan. Furthermore, there is no way for the custom office to know the balance of the loan and outstanding payments.

As in the case of the export/import license, an effective interface should be established between the loan processing and maintenance procedure and the export/import procedure. One solution is for Treasury to provide periodic financial statements on the loans to DGD custom offices.

F. Data/Information Requirements

As previously stated, the export/import data/information required by the concerned government agencies originates at the DGD operational offices when export/import transactions are processed. The sources of this data are the export/import transaction documents which include:

- DECLARATION DE MISE A LA CONSOMATION/Export/Import Form
- QUITTANCE/ Export/Import Duty Receipt
- Export/Import License
- Installment/Loan Agreement
- Invoices
- Traite de Doaune (IOU Note)

In addition to the above documents, the Export/Tax Guide (Tarif des Douanes) is used to determine the tax duty to be paid on the goods to be imported or exported.

I. Data Entities

The entities on which data is collected through the export/import or quittance and supporting documents include:

- economic operator

- export/import form
- export/import companies
- export/import products
- export/import Licenses
- custom officers
- tax rates/tariffs
- banks
- credit agencies
- creditor
- modes of transportation
- custom offices/bureau de douanes
- countries
- regions

A number of data attributes on each of these entities are used to gather data on relevant to export/import transactions. This set of attributes defined in the forms is sufficient to support the data requirements of the DGD and other government agencies.

2. Data Model

The export/import data as currently maintained by the DGD, if completed and updated, will support not only the needs of the DGD but will provide the information required by all other government agencies. The conceptual model as currently used by the DGD is represented by the entity relationship model (ER MODEL) shown in figure-4.

To provide the required export/import data/information to all concerned users, a central database should be developed to implement and support this model.

From a conceptual view, and without addressing the physical design of the database/files used by SYDONIA, SYDONIA database could support the required data model and associated data attributes.

In addition, an integrated computerized information system should be provided to maintain the central export/import database. This information system should provide all the necessary modules and tools to conduct the functions related to the processing of export/import transactions.

CEIDE Conceptual Model

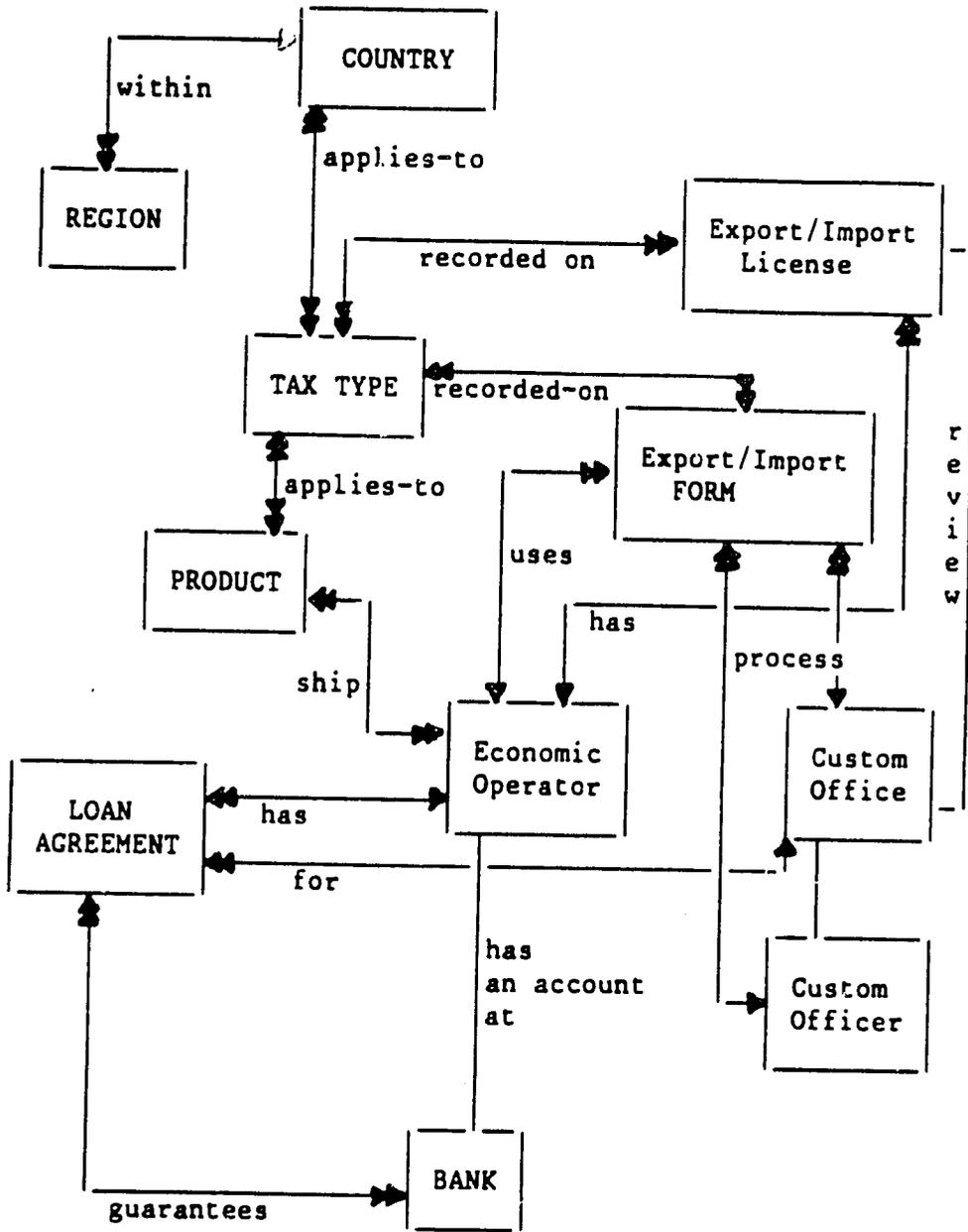


Figure-4

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G. Constraints and Limitations

The above sections addressed functional and data/information requirements and provided some recommendations to solve the current procedural problems associated with the processing of export/import transactions and the effective development of an export/import database.

Before discussing the proposed solution, it is important to understand the constraints and limitations which must be taken into consideration when devising an optimal solution.

1. **Financial** - The financial resources of the country are limited; the budget of the DGD does not provide for the acquisition and implementation of a large computerized export/import information system, and its operation, staffing, and maintenance. Large mini or mainframe computer based solutions require a large budget and a long term financial commitment, which the DGD does not have.
2. **Technological** - Large centralized computer systems that support remote sites require a minimum technological foundation which is vital to the implementation of such systems. Such requirements include electricity (continuous electric power source), reliable telephone lines dedicated/public, and a special facility equipped with air conditioning and a fire extinguishing system. Electricity is very expensive and the electric system in the capital Niamey is interrupted frequently. The public telephone system is not reliable enough to support data transmission; on the other hand the cost of dedicated/leased lines is prohibitive and not within the budget of the DGD.
3. **Manpower** - Highly skilled Computer manpower in Niger is very limited. In addition, if such technical expertise is to be hired from other countries, it will be very costly and not within the budget of the DGD. Large computer installations require highly specialized computer personnel including operators, systems programmers, network programmers, systems analysts, and application programmers. Personnel with these skills are almost non-existent in Niger.
4. **Building Facility** - Although building facilities are available to the DGD and are equipped with local air conditioners, these are not sufficient to support large computer systems.
5. **Distances** - Niger has a territory that runs a distance of about 1200 km

and the custom frontier offices are spread along the frontier. The smallest distance is 140 KM between Niamey and Dosso and 900 KM between Niamey and Zinder. These long distances between frontier and regional offices and the head office in Niamey contribute to the high cost and difficulty in establishing an effective and timely information flow.

The above constraints are critical considerations which were taken into account in the proposed solution described in the next section of this report. These constraints will not allow us to investigate some attractive solutions based on large central and distributed computer systems supporting local and remote sites.

III. The Douane Current Computer System

The DGD has the primary responsibility of executing the Country's policy regarding the export and import of goods. Such a policy is implemented by monitoring and processing all export and import transactions conducted by all Economic operators. To ensure that the export/import policies are properly carried out, a procedure is established by the Douane to process all export/import transactions. This section describes the hardware, network, and software currently used to support this procedure.

A. Hardware Configuration

The hardware configuration used by the DGD to support the production of the application software consisting of 18 Honeywell-Bull Micral-60. These are IBM PC/AT Compatible machines using an INTEL 80286 processor. Some of these machines are running at 6 MHZ and others at 8 MHZ. Each machine is equipped with 640 Kbyte of RAM, one hard disk (40 MB or 60 MB), one Dual Density 1.2 MB Floppy Disk Drive, a 40 MB cartridge tape backup, one parallel port and one serial port, a network interface card, a monochrome monitor, and a dot matrix printer.

No study or RFP was made available to us to assess whether these machines have satisfied the requirements defined prior to the acquisition of these systems. However, given the time (January 1987) when these machines were acquired, better price/performance machines could have been purchased.

These machines were originally purchased to operate in a network environment; some are used as file servers; others as workstations. However, while some of them are connected through a star network, they are operating as stand-alone machines.

System and application software, and support data and control files are installed on each machine to support data acquisition, processing, and maintenance of export/import transactions. As shown in Table-1, some of these machines are installed in the head office of the DGD in Niamey and the remaining at 3 regional and 5 operational offices.

DGD CURRENT HARDWARE DISTRIBUTION

Office	Type	Number of WS and Type	Number of Printers
1. Niamey/MCC	H *	4 M2 ** 1 M1	3
2. Niamey/Route	F	2 M2	2
3. Niamey/Airport	F	3 M2	3
4. Niamey/Hydro	F	2 M2	1
5. Niamey/Rive	F	2 M2	2
6. Maradi	R	2 M2	1
7. Zinder	R	2 M2	1
8. Tawa/Arlite	F	1 M2	1
Total		18	14

* (F) Operational Office ** M1 Micral 60/6 MHZ
 (R) Regional Office M2 Micral 60/8 MHZ
 (H) Head Office

Table-1

B. Network Overview and Configuration

As previously stated, the Micral-60s at the Douane were acquired with the intention of linking these systems through a local area network, Honeywell-Bull SPR (System de Partage de Ressources). Some of the Micral-60s were equipped with a server network interface card, others with a terminal interface card. SPR is a star topology based LAN used by Honeywell-Bull to support a network application running under a Prolog operating system.

An SPR network configuration is established through a single file server and a number of workstations attached to the file server through a RS422 or X.25. The file server must be equipped with a SPR server card which provides four connections; each workstation to be connected to the file server must have a SPR terminal interface card. SPR operates at a transmission speed of 256 Kbits per second. From the specification provided in the manual, SPR was designed to support small LANs (4 to 16 users).

Again there is no requirements definition document or RFP available which could be used to assess whether SPR supports such requirements. At the time SPR was acquired (January 1987), there were other LANs with better performance and at a lower price.

SPR was acquired and installed to run the Customs Applications in a Network environment. Contrary to what was planned and although the Micral-60s are equipped with network interface cards to run the application in a network environment, the application is used in a stand-alone fashion, whereby each machine runs its own application software, system tables and data files.

C. System Software

The operating system installed on the Micral-60s is Prolog which is a proprietary operating system of Honeywell-Bull developed to run on 808x and 80286 machines compatible with IBM PC/XT or AT.

Prolog was used on the Micral-60s because the application software was developed under Prolog and can only run under this operating system.

D. Application Software

Functional Overview

The application software used to conduct the processing of the export/import transactions at the DGD is SYDONIA (Systeme DOuaNier Automatise). This system was developed by United Nations Conference on Trade And Development (UNCTAD), Project

SYDONIA. Based on the presentation documentation of version 1.1, SYDONIA was implemented to promote the economic advancement of developing countries and to achieve the following objectives:

- Provide timely and accurate statistics necessary for the implementation of an effective economic policy
- Modernize and automate export/import procedures of these countries to simplify the custom procedures and to implement a simple model of payment and collection of export/import duties
- Promote international standard norms and procedures of conducting import/export transactions
- Facilitate the collection and dissemination of export/import statistics
- Integrate custom training with use of the computer system
- Provide automated tools and effective information to countries with minimum resources and a budget deficit to enhance the performance of their administrative functions

The system was developed jointly by FAC and UNCTAD at the request of CEDEAO. The system was specifically designed to handle small custom operations with one million or less transactions per year. It was developed as a result of the recommendations made in a number of studies, including Rapport Du Mission Colombie FAL-06/06/07/82, Rapport de Mission Comores FAL-06/16/07/82, Recommendation of the Secreteriat General of ALADI, which set as an objective the automation of export/import procedures of the CEDEAO countries.

The SYDONIA system was developed over a period of 2 years (from 1982 through 1984) based on a functional requirements study conducted in each of the 16 CEDEAO countries.

Functional Description

The system was planned to provide the tools necessary to conduct the basic functions of the custom offices (Bureau de Douanes). These functions as described in the presentation document of SYDONIA version 1.1 include:

- Maintenance and processing of Custom/Douane accounting and statistical data as collected on the export/import forms (Declaration the Douane)
- Accounting of cash receipts and revenues collected by Custom Offices, and maintenance of export and import documents: Export/Import Forms (Declaration de Douane), Transaction Register (Bulletin de Liquidation) and Accounting Journals/Registers (Regitres Comptables)

- Maintenance of export/import tax rates (Tarif Douanier)
- Capability to extract statistical data from the export/import database which can be used by all concerned government agencies of the country
- Creation and maintenance of a Custom/Douane Database allowing simple queries regarding internal commerce trends
- Management and maintenance of Licenses and Credits by the Custom Office
- Maintenance of custom duty rules, regulations, and bylaws
- Training through an on-line help facility built in the system and through simulation of custom procedures

The other functions of the Douane such as Storage (Magasin) Management, Personnel, and others were not planned as part of the first implementation of SYDONIA.

Production Environment and Operation of SYDONIA

The system as described in the presentation manual was to be used in the principal offices of the Douane by custom officers who receive and process export/import forms.

SYDONIA Hardware and System Software Requirements

SYDONIA was designed and implemented to be run on microcomputers compatible with IBM PC/AT with a minimum of 256 Kbytes of memory. Version 1.0 and 1.1 were implemented to run under CP/M which is running under Prolog (Honeywell-Bull micro operating system). Version 2.0 which is currently used by the DGD was implemented using BAL under Prolog. The system was designed to operate in a single user mode and in a network environment where the database files reside on a file server and the application resides on the user work-station.

Modules Overview

SYDONIA is an on-line interactive system consisting of the following modules:

- Export/Import Form Processing
- Accounting
- Tax Rates Maintenance
- Table Management
- Database Maintenance
- Documents Maintenance
- System Utilities

- System Configuration
- Simulation of Sydonia

Export/Import Form Processing - This module is used to process customs forms (Declaration de Douane) and maintain the data collected on these forms in the declaration files. This is the most important module in the application since it is used to process export/import transactions which constitute the primary function of the Customs Offices.

Basically it is used to enter the data recorded on the form, then compute the taxes, and print the receipt (QUITTANCE). The DGD regional and operational offices that are already automated are using this module. Once the export/import data is collected through this module and stored in the declaration files, it is used by all other modules of the system.

As stated in the presentation document version 1.1, this module supports the processing of 5 types of export/import forms (declaration the douane) as specified by UNCTAD, Bureau de Facilitation de Procedures, a result of a project conducted for CEDEAO. The form used by the DGD is of type C (Appendix-A).

This module provides all the standard operations - add, modify, delete, and edit - to support the maintenance of all the export/import data as recorded on the export/import form. In addition, using already predefined tax tables, it automatically computes the taxes imposed on the goods and generates a printed receipt which is used by the cashier/accounting to conclude the transaction. Data/information maintained by this module, if entered and completed properly provides the base data to allow the Douane to conduct its operational functions and to build the export/import central database that can be used by other government agencies to assess and monitor the economic development and progress of the country.

Accounting - This module is used to maintain all the cash receipts and to generate the daily cash register and monthly financial statements. This module is not used by the Custom Offices.

Tax Rates/Tariffs Maintenance - This is used to maintain the tax/tariff tables. It allows the user to define all the tax rates applied to the export/import transactions in accordance with the tax laws of the country. Once the export and import tax rates for each product are defined, these are stored in the tax/tariff files and used by the system to process export/import transactions.

Table Control - This module is used to maintain all the control tables used by the system. It allows the user to add new entries, modify, delete, and view existing entries in the system control tables. System control tables include user, economic operator, countries, regions, custom offices, creditor, import/export companies, mode of transportation, custom types, tax codes, export/import licenses, budget allocations, and banks. Once defined, these tables are used by the other modules of the system. Entries in the table are identified by unique codes.

Database Management - This module is used to integrate the database files of all the export/import transactions processed at the regional and/or frontier offices to generate one central database. This merging is done on a monthly and yearly basis. Since each automated custom office (frontier or regional) has its own independent export/import transaction files, these must be merged at a Central Office (Direction Generale de Douane) to update the central export/import database of the country. This module provides the utilities to conduct the database merge operation. The utilities provided by this module include monthly export/import transaction merge, database restore, database backup, and reporting. The reporting function of this module provides a number of transactional, financial, and statistical reports. Reports may be provided by country, office, and product category.

Documents Maintenance - This is a document management module with a word processing facility. It provides the necessary facilities for the Central Custom office to manage its procedural, technical, and regulations manuals and documents which can be accessed by other offices to conduct their administrative functions. Documents are grouped into four categories: technical, rules and regulations, tax rates, and general. All the documents are maintained and updated at the DGD central office and the files are sent to the regional and operational offices. An inquiry facility is provided to allow the operational offices to view the contents of these documents. Currently this module is not used by the DGD.

System Utilities - This module provides a set of utilities to tailor the application menus and their use.

Simulation of Sydonia - The system provides the simulation of the application where custom officers can use SYDONIA without updating the production database. This simulation facility is provided to train custom officers on the use of SYDONIA.

Sydonia Database

The database of Sydonia is implemented using indexed sequential and direct access files/ data structures. A number of indexed sequential and direct access files (Appendix-D) are used to store and maintain the application data relevant to the entities used by the system which include:

- economic operator
- export/import form
- export/import companies
- export/import products
- export/import Licenses
- custom officers
- tax rates/tariffs
- banks
- credit agencies
- countries
- creditor
- modes of transportation
- custom offices/bureau de douanes
- regions

The number of data attributes built into SYDONIA database/files is extensive and covers all the data requirements of the DGD and other government agencies. Specifically all the data attributes required to generate the statistical and management report regarding the export/import activities of the country are included in the SYDONIA database.

Though the system may not be using a general purpose DBMS (e.g., ORACLE, INFCRMIX, etc) which is a major drawback from a technical and operational point of view, utilities can be developed to access SYDONIA databases/files to extract the required data for statistical and management reporting.

E. Current Use of the Application and Problem Areas

SYDONIA was developed to automate regional and frontier custom offices where the export/import transactions are processed and transaction files are stored on diskettes and sent to a central operation to update the Central Export/Import Database of the Country. A database merge facility is provided as part of the system to facilitate this task. The Central Database is maintained at the Custom Head Office.

By processing the export/import transactions at the source, frontier offices or at least at the regional offices, the system can be used to validate the data and ensure its accuracy. Complete and accurate transactions are stored and used to update the central database in a timely fashion.

Given the financial constraints of the DGD, only the central office, 2 regional and 5 operational offices are using the system. The other operational offices are not automated, they process the export/import transactions manually and send copies of the receipts (Quittance/Appendix-C) to the head office for data entry. The receipts are collected in batches and sent every month to the DGD head office in Niamey. The current use of the system which does not follow the production procedure of SYDONIA is causing three major problems:

1. **Backlog Data** - The regional offices that are not automated/ computerized have to collect the export/import receipts from the operational offices, verify the data recorded on the receipts, sort the receipts by frontier office and send the monthly batch to the central office for data entry. This creates a large volume of backlog data and given the limited resources available at the head office, it is impossible to complete the data entry of all batch transactions prior to the end of the following month which causes the backlog data to increase every month. Though the system has been installed and made operational at the central office back in 1987, data entry of receipts from 1987 and 1988 are not yet completed.

This increase in the volume of backlog data will continue every year unless and at least until all the regional and the operational offices with a large volume of transactions are automated.

This backlog data will prevent the country from building its central export/import database from which correct, up to date, and complete statistical and management reports can be generated.

2. **Data Integrity** - SYDONIA system has the built-in feature of data validation and control which is a standard facility in any computer information system. The data validation and control function ensures that the critical data elements are properly completed and valid, and all required data are entered prior to the processing of the transaction. Tax calculations that are done manually which can cause computation errors, are conducted by the system when the required data are entered.

Changes in tax rate/tariffs and laws are usually updated in the system tax tables and automatically used to prevent the use of old tax laws. However since most of the frontier offices and 3 regional offices are still processing the export/import transactions manually, a large number of transactions contain erroneous and incomplete data and sometimes outdated tax tariffs are used to calculate tax duties.

To provide maximum data integrity, it is important to automate as many custom offices as possible. If resources are available, it is strongly recommended to automate all regional and operational offices. The minimum requirement is the automation of all the regional offices and operational offices with more than 200 transactions per month.

3. **Timeliness** - The backlog data and incompleteness prevents the timely provision of information to management of the DGD and other government agencies; hence making their functions impossible to conduct. Periodic Statistical and Economic reports produced by the DGD, Ministry of Planning, and Ministry of Finance are delayed because of incomplete data.

To alleviate, this problem and provide all concerned government agencies with the required export/import information, the export/import central database at the DGD head office must be complete, up to date, and accurate. Furthermore, an automated mechanism/interface should be established between these agencies and the DGD to access/transfer data from the central export/import database. Without such a database, the country will always lack sufficient, authentic, and timely statistical reports necessary for the monitoring of the country's economic development.

4. **Data Redundancy** - Because of incomplete data at the DGD, government agencies such as the Ministry of Planning and Ministry of Agriculture are collecting and maintaining their own export/import data. This duplication of data collection and maintenance creates redundant data which is the cause of erroneous reports, in part due to the difficulties involved in maintaining all of these databases. Such redundancy creates tremendous waste of resources and it is costly to a country which has enormous financial constraints.

IV. Computer Support at Related Government Agencies

As in any country, Niger's ministries are linked by a network of information which must be effective, timely and reliable. These entities cannot execute their functions as expected otherwise. Without such a network of information the system will not operate as planned.

Specifically, for a country to plan and monitor changes in economic policies, it needs an up-to-date central statistics database. Access to the database by concerned government entities and economic development committees/institutions will allow them to generate periodic statistical reports and economic studies which they can use to adjust the economic policies to support the needs of the country using a planned decision based on accurate and timely information.

A. Ministry of Finance

The Custom Generale Directorate (Direction General des Douanes/DGD) is an organizational unit of the Ministry of Finance. The Ministry of Finance (MOF) is responsible for execution of all the financial and economic policies of the country. For the MOF to perform its functions, it requires information from its General Directorates including the DGD and other related government agencies.

Since most of the economic activities (export/import trades) are done through the DGD's custom offices, statistical and financial data are required by MOF to monitor the economic policies of the country effectively and for preparing long term budget plans and economic reforms for the development of the country.

Internally, the MOF developed a set of public accounting applications which are running on a Honeywell-Bull DPS-4000 mini-computer under a GCOS operating system. These transactional applications are used to conduct the country's accounting and budgeting functions. There are no management information or decision support systems in use to assist in monitoring economic policies and reforms.

Statistical and financial information on export/import activities of the country are tabulated manually and sent at the end of each month by the DGD to the MOF. This information is collected and tabulated on a large spreadsheet (Bordereau Mensuel de Recettes) by the DGD main office, and sent at the end of each month to the MOF head office. Once the MOF receives the statistical reports, data from the reports is entered on a micro-computer using Multiplan. From this base, statistical reports and economic studies are generated.

Because of the backlogged data and the non-use of the accounting module of SYDONIA, the monthly spreadsheets sent to the MOF are prepared manually by consolidating all offices' Monthly Statements (Bordereau Mensuel de Recettes). If information is missing, it is collected by phone. Such a manual operation should not be necessary if the central export/import database is complete and up to date. By developing this central database, the MOF spreadsheets can be generated automatically

from the SYDONIA database and sent on diskettes in an ASCII or other required format and sent to the MOF. The MOF in turn can import the spreadsheet data for their application without having to re-key the data.

This mode of computerized transfer of information will provide a timely and effective information flow between the DGD and the MOF head office. Currently no one knows the level of authenticity of the information sent by the DGD to the MOF. Since this data is generated manually, there is always the possibility of making errors.

B. Ministry of Planning

The Department of Statistics at the Ministry of Planning is responsible for developing and preparing the annual statistical report of the country; included in this report are financial and statistical data regarding the export and import activities of the country. Additionally, it provides statistical reports on request for government and private institutions. Some of these reports require data from the DGD as well.

Before the implementation of SYDONIA; copies of the processed export/forms were sent monthly to the Department of Statistics at the Ministry of Planning. An application was developed on a Honeywell-Bull DPS-4000 and run under GCOS to collect and process these transactions. By the time this system was made operational, SYDONIA was already in operation at the DGD and the Department was having problems with the frequent down-time of the DPS-4000. The system was abandoned for a new solution.

The new solution adopted resulted in the development of a PC based application system (TRACE) using CLIPPER (Dbase III compatible DBMS with a compiler) under MS-DOS. This application has an extract/load module which interfaces SYDONIA with TRACE. Every month the DGD head office runs extract/load module against the SYDONIA database to extract all export/import transactions. The transactions are stored on a diskette and sent to the Department of Statistics. The extract/load module is used to load the export/import transactions from the extract file to TRACE database. The TRACE reporting facility is then used to generate the desired statistical reports.

In addition to its reporting function, TRACE has a data collect module developed to collect and enter data from the export/import forms used by the DGD. The Department of Statistics is using this data collect module to enter the data from forms of 1982 through 1987 for which there are no data in a computer readable form. This will allow the Department of Statistics to build a TRACE database containing all the export/import transactions from 1982 to the present.

There are two problems; first, the information received by the Department of Statistics through the TRACE/SYDONIA interface is incomplete since the DGD is behind in completing the data entry of 1987 through 1989. Second, the DGD is carrying out a major task of entering the backlog data. This effort of building the central export/import database should be coordinated and centralized at the DGD. This data entry operation of the same transactions at both sites will otherwise create redundancy. Also the two databases may not reflect the same information. It will be difficult and costly to maintain these two databases.

Again, it is more effective and efficient to centralize the maintenance of the export/import database at the DGD under a single application (i.e. SYDONIA). All the statistical and financial information can then be extracted using an extract/load module as the case of the TRACE/SYDONIA interface module. This single responsibility and ownership of the export/import database will ensure the accuracy and completeness of the data.

C. Ministry of Agriculture

The Ministry of Agriculture requires information on the export and import of agropastoral products. This information is accessed by a number of departments within the ministry to conduct agricultural studies.

In addition, a simple DBASE screen was developed to support data entry of export/import transactions processed by the DGD. Since copies of the export/import forms processed by the DGD are not sent to the Ministry of Agriculture, the ministry designed a roster (Appendix-E) to collect the required data from the forms archived at the DGD head office. The task of recording data on these rosters can generate erroneous information and is time consuming and costly.

This redundant data collection and entry operation may cause the same problems as at the Department of Statistics. It is strongly recommended that these resources be consolidated to build a central database at the DGD.

D. Single Central Export/Import Database

Since the DGD has the primary responsibility of processing all the export/import transactions, and since data relevant to such transactions originates at the DGD's Custom Offices, it is logical that the DGD serve as the clearinghouse of this data to ensure its accuracy and integrity. Thus it should be the responsibility of the DGD to build and maintain the country's central export/import database. Once this database is developed, then all authorized users including the ministries and other government agencies can have access to the database.

Access to the export/import database should be planned as part of the application used to process the export/import transactions. Extract modules should be among the tools available to the DGD so that the required data by government agencies can be extracted from the database and sent to the user. A single extract data structure with all the required elements can be agreed upon by all users, and an ascii file can be extracted periodically, i.e. monthly, and sent to the users.

V. Proposed Solution

The computer solution proposed in this section was carefully devised to support the functional requirements of the export/import function of the DGD and its interfaces to other internal and external functions. The basis of the proposed solution is the business model shown in figure-5 which consists of the implementation of a central export/import database which will reside in the DGD Head Office in Niamey. In addition to the implementation of the business model, the proposed solution will support the following requirements:

- Computerized central export/import database to store and maintain all the data/information relevant to all export/import transactions conducted by the economic operators of the country and to support the implementation of the data model described in this study
- Automated support of the processing of export/import transactions and related functions including accounting, document control, and management and statistical reporting through the use of an integrated information and management information system
- Provision of proper interfaces and linkages to other functions conducted by the DGD or other government agencies and the automation of these interfaces to reduce manual operations and ensure timely information flow
- Automated query and reporting tools to provide timely financial and statistical data required by various government agencies and by USAID to monitor the economic reform program
- Use of standard hardware and network architecture and operating system
- Compatibility with current hardware and upgrade of current application software
- Vendor independent hardware through use of multiple platform operating system
- Use of ready made applications - DBMS, spreadsheet, statistical and graphics packages
- Highly reliable, easy to use and maintain hardware and network devices
- Cost effective and upgradable hardware and network devices

FUNCTIONAL/BUSINESS MODEL

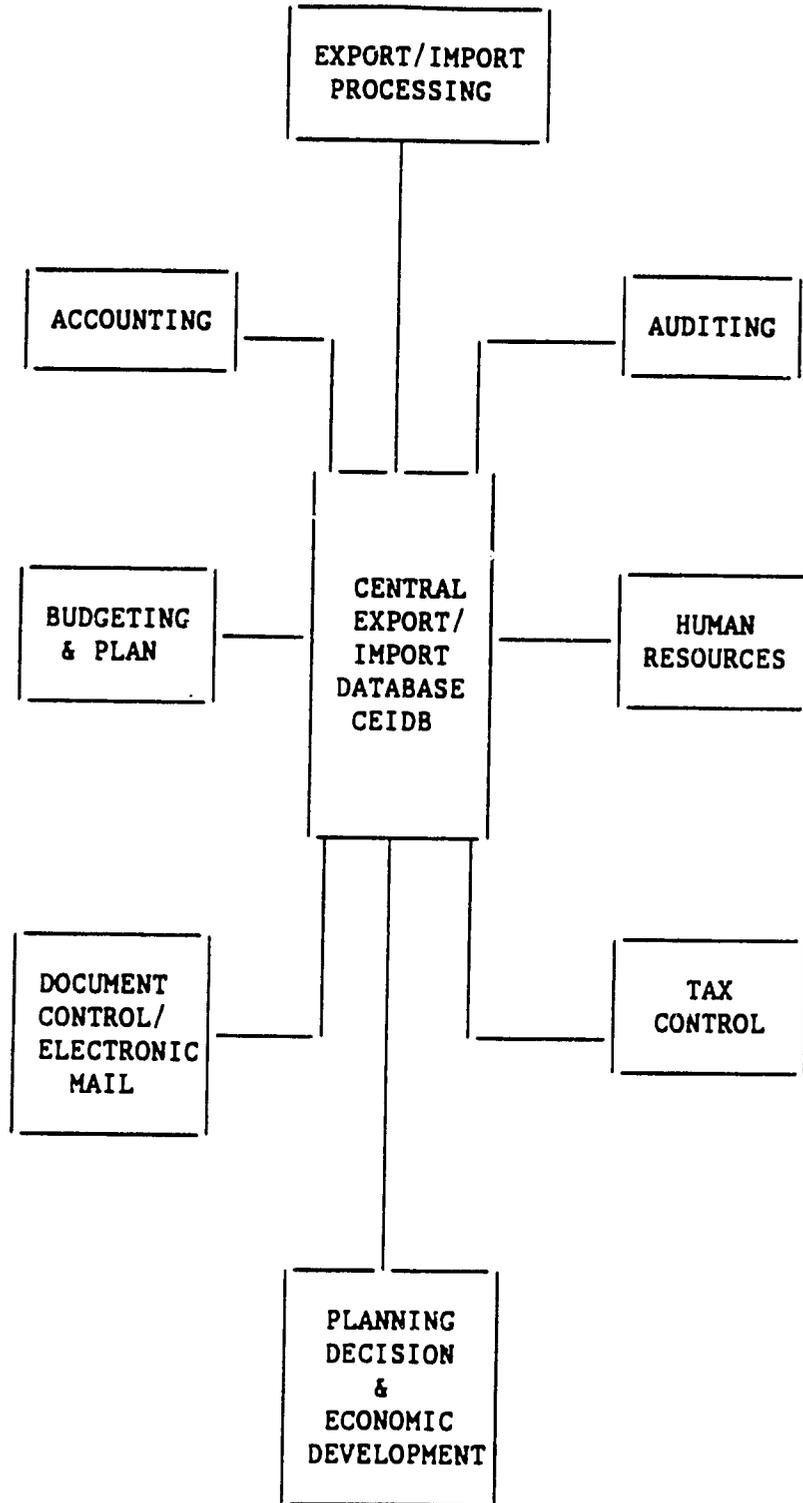


Figure-5

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A. Alternative Solutions

Given the above requirements and the financial, technological, manpower, and geographical constraints of Niger, there are not many alternative solutions. However, it is worth mentioning some of the solutions that can be implemented in the future when the current constraints are alleviated.

1. **Centralized System with Remote and Local Terminals** - This solution is based on one or more large mini-computers located at the DGD head office. The central computer system(s) will serve a network of local and remote terminals and printers. The remote terminals and printers will be connected through high speed dedicated telephone lines and modems while the local terminals at the main office will be connected directly to the IO interface of the system. All regional and operational offices will be equipped with the required remote terminals and printers.

The application system (e.g. SYDONIA) will be running on the central system under an operating system like UNIX. The application will maintain the central database which resides on a number of high speed disk drives and the database services will be provided to the application system through a general purpose Data Base Management System (DBMS) such as ORACLE, INFORMIX, or INGRES. This solution is very effective, because it centralizes the management of the database, the production of the application, and the operation of the system.

If there were no financial constraints, this solution would be the most effective and reliable solution to support the system's requirements. We are recommending this solution as a long-term goal which can be implemented in the future. Any solution to be implemented should take into consideration this long-term goal.

2. **Decentralized Computer Systems** - This is a variation of the first solution. This solution consists of small multiuser systems installed in the regional offices. Each regional system will service a number of local and remote terminals and printers located in the regional and related operational offices. A larger system will reside in the DGD head office serving the local terminals, and will be connected to all the regional systems. The connection between the regional systems and the central system at the DGD will be used for data transfer only.

The central export/import database will be maintained at the DGD central computer, while each regional system will be used to maintain its own regional database. The daily transactions of each regional office will be transferred at the end of each day to the central system, and a merge operation will be conducted to update the central database. Update and maintenance of control tables and other shared data will be done using the central system, and transferred to the regional offices through the network. Upgrade of the software and electronic mail will be done in similar fashion.

The primary advantage of this solution is the hardware redundancy and distribution which provides higher up-time than the centralized system. With the first solution, if the central computer system goes down, all the terminals and printers will come to a halt. This solution allows regional systems to remain operational. The drawback of this solution is increased operational and production overhead and complexity.

3. Decentralized Systems with No Central Network - This solution is the same as the second solution, however the data transfer between the central computer system in the head office and the regional systems is conducted through the mail. The regional export/import transactions are stored on diskette or tape and sent by mail to the DGD to update the central database.
4. Decentralized Systems with No Remote Links - This solution consists of a combination of single-user workstations and small multiuser systems. The multiuser systems will be installed at the head office, the regional offices, and operational offices with more than 500 transactions per month. The other frontier offices will have one or two stand alone workstations with a shared printer. The multiuser systems will serve local terminals and printers. Each regional office will have its own regional database, and each frontier office will have its frontier database while the central database will reside on the system(s) in the head office. Each regional office will be responsible for consolidating the periodic transactions from the frontier offices. These periodic transaction files will be sent by mail using a diskette or a cartridge tape.

The central computer facility in the head office will contain a larger multiuser system which will be used to maintain the central database. This office will receive periodic regional transactions on diskette or cartridge

tape and merge these to update the central database. Updates of system control tables and shared data and mail will be sent periodically to the regional offices using diskettes or tapes. The regional offices will be responsible for distributing these updates on the operational offices.

This solution is less expensive than the previous solution because there is no telephone cost. However, the disadvantage of this solution is the delay involved in mailing the diskettes and coordinating the data transfer. This requires organization and effective coordination.

5. Local Area Network Based Solution - This solution consists of a number of LANs including one LAN in the head office in Niamey, one LAN in each regional office, and in those operational offices with transactions around 500 per month. The other operational offices each will have one workstation and one printer.

The size of the LAN, i.e. number of file servers, number of workstations, and printers, will depend on the number of transactions processed by the regional office. The head office will have the largest LAN and will maintain the central database, while the regional offices will maintain the regional databases. The regional and the central database update will be conducted using periodic transaction diskettes or tapes.

In addition to its low cost because of no telephone connection, this solution provides higher uptime because the workstations can be set up to operate in a stand alone mode when a file server crashes. However, the network can add another level of complexity and operation overhead in addition to the difficulty of managing and coordinating the databases' updates using transaction diskettes, depending on the LAN.

The DGD started implementing this solution using Honeywell-Bull equipment and STARLAN (known as DPS in Bull's terminology). However, the LAN did not perform as conceived because of improper selection of file servers and workstations that did not satisfy the performance requirements.

Given financial limitations, we are proposing to implement the least costly solution structured to upgrade to one of the other solutions at any time by acquiring more hardware and software. Upgradability can only be achieved through the use of multi-platform and open operating systems such as UNIX.

B. Recommended Solution and Strategy

The recommended solution is based on the assumption that the SYDONIA will continue to be used. A number of the DGD staff are already trained on the use of SYDONIA. Furthermore, and although there may be a need to build interface modules to other functions, SYDONIA supports most of the functional and data requirements described in this study. It is also provided free of charge.

As previously stated, SYDONIA was developed to run under the PROLOG proprietary operating system which runs on IBM PC/AT compatible machines. PROLOG runs only on this platform of machines with an extension to support STARLAN local area networks.

To provide an upgradable solution with better price/performance, it is strongly recommended that PROLOG be phased out and replaced by a standard open architecture operating system such as UNIX.

1. SYDONIA/UNIX Solution

The UNIX operating system is attractive because it has an open architecture. It is a multiuser operating system which runs on a variety of machines, from micros to mainframes, and can be used on a single-user workstation, a LAN, a multiuser environment or combination of these.

UNIX as differentiated from MS DOS or PROLOG, requires more computing resources - processing power, memory, and high speed, high capacity drives and dedicated and intelligent IO interfaces if it is to support a multiuser application. Depending on the selected configuration and the number of users to be supported, the UNIX solution can be cost effective.

The advantage of UNIX, however, is its portability and its availability on a variety of machines. This advantage should not be overlooked, because if the DGD implement the UNIX solution, then it can upgrade to any of the alternative solutions we have previously discussed. If the DGD continues implementing the PROLOG solution, upgradability cannot be achieved.

As stated by UNCTAD/SYDONIA Project, UNIX port of SYDONIA version 2.3 which is under test runs 4 to 5 times faster than SYDONIA under PROLOG. As stated by UNCTAD, the test was conducted using an IBM compatible 80386 machine running at 25 MHZ with 4 MB of RAM, and 100 MB hard disk with three users.

2. SYDONIA/PROLOG Solution

PROLOG is a multitasking and multiuser operating system developed to run on INTEL 8080 and 8086 or compatible processors. This operating system does not provide the same functionality as UNIX and does not support the number of platforms that UNIX support. Very few computer vendors use PROLOG.

Currently, the DGD is using SYDONIA version 2.0 under PROLOG on 80286 machines running at 6 or 8 MHZ. The performance of the application running in a single user mode is very poor. Although we have not conducted any benchmark tests, if SYDONIA was running under UNIX on an 80386 machine, this would provide a higher performance.

PROLOG may provide multiuser support on a small machine but a tremendous performance trade-off has to be made.

Another disadvantage of PROLOG is its lack of support of high performance LANs currently available on the market.

C. Hardware Requirements

As previously stated, we have not conducted any benchmark test of SYDONIA under UNIX System V; however, based on the tests conducted by UNCTAD the following is the minimum hardware configuration to run SYDONIA under UNIX and support three users:

- INTEL 80386/25 MHZ IBM Compatible System
- 4 MB RAM
- 100 MB Hard Disk
- 60 MB Cartridge Tape Backup
- 1.2 MB 5.25" or 1.44 MB 3.5" Floppy Drive
- 2 Terminals

1. Basis for Hardware Requirements

As previously discussed, it is desirable to automate all the DGD operational offices including regional and frontier offices. However, given the financial constraints, the short term and minimum requirements are to automate the following offices:

- The DGD head office Main Computer Center (MCC) /Niamey
- The DGD head office Accounting/Niamey

- **Five Regional Offices including:**
 - Niamey
 - Maradi
 - Zinder
 - Dosso
 - Tawa

- **Any Operational office with 300 or more transactions per month. The operational offices recommended for automation include:**
 - Niamey Route
 - Niamey Airport
 - Niamey Rive Droite
 - Niamey Hydrocarbure
 - Maradi Dayssa
 - Maradi Madarofa
 - Zinder Magara
 - Zinder Mattame
 - Dosso Gaya
 - Tawa Arlite
 - Tawa Konnie

The automation of these offices will be done in phases starting with the MCC and regional offices in the first phase and operational offices in the second implementation phase.

2. Number of Users/Workstations and Printers

Based on the above requirements, Table-2 provides the required number of workstations and printers by office. Using an 80386 machine as a multiuser system, we recommend that the the keyboard and monitor attached to the system be used as a console to start the system and to conduct system administration tasks. All systems will be equipped with intelligent IO interface cards to which dumb terminals (eg, Hayes, Wyse, etc) will be attached and used for data entry. This will insure higher uptime.

**WORKSTATIONS AND PRINTER DISTRIBUTION
BY OFFICE**

Office	Workstations	Printers
1. DGD MCC	12	4
2. DGD Accounting	2	1
3. Niamey Regional	4	2
4. Maradi Regional	4	2
5. Zinder Regional	4	2
6. Dosso Regional	3	2
7. Tawa Regional	3	2
8. Niamey Route	2	1
9. Niamey River Drte	2	1
10. Niamey Airport	3	2
11. Niamey Hydrocarb	1	1
12. Maradi Dayssa	2	1
13. Maradi Maradofa	2	1
14. Zinder Maggara	1	1
15. Zinder Mattame	1	1
16. Dosso Gaya	2	1
17. Tawa Arlite	2	1
18. Tawa Konnie	3	2
Total	51	28

Table-2

3. System Requirements and Configuration

As provided by UNCTAD, the minimum hardware configuration to support SYDONIA under UNIX with 3 users includes an 80386 IBM AT compatible machine running at 25 MHZ, 4 MB hard disk, a high density floppy drive, and a 60 MB cartridge tape backup.

Though UNCTAD is recommending a 25 MHZ machine to support a UNIX solution, we prefer the use of INTEL 80386 machines running at 33 MHZ with EISA or AT bus. These machines with dumb terminals and printers will be used to support sites with two or more users. All machines will be equipped with 4 MB of RAM and an intelligent IO interface board which will be used to connect terminals. Printers will be connected to the parallel or serial port that comes with the machine.

Lower speed and configuration 80386/20 or 25 MHZ machines will be used to support the sites requiring one workstation. Table-3 shows the proposed distribution of systems by type and site/office.

UNIX SOLUTION SYSTEMS DISTRIBUTION BY OFFICE

Office	System and Type	Number
1. DGD MCC	80386/33 MHZ	3
2. DGD Accounting	-	-
3. Niamey Regional	80386/33 MHZ	1
4. Maradi Regional	"	1
5. Zinder Regional	"	1
6. Dosso Regional	"	1
7. Tawa Regional	"	1
8. Niamey Route	80386/33 MHZ	1
9. Niamey Rive Drte	"	1
10. Niamey Airport	"	1
11. Niamey Hydrolic	80386/25 MHZ	1
12. Maradi Dan-Issa	80386/33 MHZ	1
13. Maradi Maradofa	80386/33 MHZ	1
14. Zinder Maggara	80386/25 MHZ	1
15. Zinder Mattame	80386/25 MHZ	1
16. Dosso Gaya	80386/33 MHZ	1
17. Tawa Arlite	80386/33 MHZ	1
18. Tawa Konnie	80386/33 MHZ	1
Total		19

Table-3

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4. Storage Requirements

Before we can provide more accurate storage requirements, we still need to assess the application requirements including tables, database files, configuration files, and others. However, if we make the assumption that the application files used under UNIX are the same as the ones used under Prolog, then the minimum storage requirement is shown in Table-4 and for backup purposes, each system will have a minimum of two hard disks.

**PRELIMINARY STORAGE REQUIREMENTS BY OFFICE
BASED ON A UNIX SOLUTION**

Office	Hard Disk Type	Number
1. DGD MCC	150 MB	6/3 per sys
2. DGD Accounting	-	-
3. Niamey Regional	150 MB	2
4. Maradi Regional	150 MB	2
5. Zinder Regional	150 MB	2
6. Dosso Regional	150 MB	2
7. Tawa Regional	150 MB	2
8. Niamey Route	100 MB	2
9. Niamey River Drte	100 MB	2
10. Niamey Airport	100 MB	2
11. Niamey Hydrolic	100 MB	2
12. Maradi Dan-issa	100 MB	2
13. Maradi Maradofa	100 MB	2
14. Zinder Maggara	100 MB	2
15. Zinder Mattame	100 MB	2
16. Dosso Gaya	100 MB	2
17. Tawa Arlite	100 MB	2
18. Tawa Konnie	100 MB	2
Total Drives		38

Table-4

Note that the above storage requirements will be modified in view of the tests that will be conducted using SYDONIA version 2.3 under UNIX systems V.

D. Power Supply Requirements

Most of the offices have power; however the power is frequently interrupted. Thus, there is a requirement to have at least one UPS (Uninterrupted Power Supply) in each site where computer hardware will be installed. Such a power supply should provide at least one hour of backup in case of power interruption.

E. System and Development Software

SYDONIA runs under UNIX system V. We recommend SCO UNIX System V with all the development UTILITIES, and depending on SYDONIA version 2.3 DBMS support, there will be a need for a general purpose DBMS such as ORACLE with SQL. NFS will be required to network the 3 systems in the head office. In addition, C language will be required if changes are to be made to the software. DOS interface utility will be needed to interface DOS to UNIX.

F. Application Software

As previously stated, the currently used application software SYDONIA supports most of the functional and data requirements of the DGD. Hence, we are recommending the use of SYDONIA version 2.3 under UNIX System V. Furthermore, we are recommending the use of SYDONIA with a general purpose DBMS such as ORACLE or INFORMIX. In addition, it is strongly recommended that all modules of SYDONIA are put in production to integrate all the related functions of the DGD.

To support the statistics data requirement by the Ministry of PLANNING we recommend continuing the use of TRACE with STATGRAPH or similar statistical package and LOTUS 123 or EXCEL. These same packages can be used by other government agencies and USAID to monitor the progress of the economic reform program. If standard reports are required, these can be developed using these packages. Note that TRACE is implemented in CLIPPER and if any modification is required, this will require CLIPPER and DBASE III along with the TRACE source code.

Support for the interface between Ministry of Finance Application running on DPS-4000 for effective maintenance and management of the economic operator's loan/installment accounts will depend on whether the maintenance of these accounts will be under SYDONIA or an application running under DPS-4000. In the latter case, an interface module has to be developed which will be used to extract accounts data, downloaded to a PC and sent to the DGD to update SYDONIA database. If loans are to be maintained by the DGD, SYDONIA has a module which will support such a function. We recommend the maintenance of the loans using SYDONIA. This task does not have to be

conducted by the DGD. The loan maintenance module of SYDONIA can be used by Treasury and a periodic extract file sent to the DGD.

G. Maintenance and Spare Parts

Given the high cost of computer equipment maintenance, we are recommending INTEL 80386/80286 with AT bus. This type of hardware is rugged and easy to trouble shoot and maintain at the board level. If these machines are used we see no need for maintenance contracts. However, it is strongly recommended that spare parts are acquired to be kept at the head office and the regional offices. In addition, one person in each regional office and the head office will be trained on hardware installation, simple trouble shooting, and replacement and installation of parts such as memory boards, disk interface cards, disk drives, and IO interface cards.

VI. Manpower Requirements and Training

To put the proposed systems in production requires three types of computer skills. System administrators or production managers, hardware installation and maintenance specialists, and data entry operators.

In case of data entry operators, there are already a number of operators who are trained on the use of SYDONIA in processing export/import transactions. In addition, part of the custom officer training involves the use of SYDONIA. To prepare more operators, we recommend that the DGD continues the current practices of training new officers on the use of SYDONIA as part of the Custom Training program. At the same time, we recommend complementing this training by weekly or monthly training sessions to be provided at the regional offices and the head office. These training sessions will be conducted by SYDONIA system administrators.

There are currently a number of system administrators who are responsible for the management of the systems running under PROLOG. However, these system administrators must be retrained to administer SYDONIA under UNIX. There will be a need of at least 20 system administrators and it will take about 1 to 3 months to train the current system managers on the administration of UNIX. It is recommended to train 5 experienced system administrators and have them train the remaining junior staff.

Presently the maintenance of the Honeywell-BULL PCs is done on a call basis by Honeywell representative in Niamey. The computer staff at the DGD do not conduct any hardware trouble shooting or maintenance. Similar to the training of system administrators, 6 persons from the current computer staff can be selected and trained on hardware installation and trouble shooting. Depending on their computer hardware knowledge, this training may take from three to six months.

In addition to the day-to-day production staff, there is a short term requirement of 10 data entry operators. This task force will be used for a period of six months to complete the data entry of the backlog transaction from 1987, 88, and 89. Under the supervision of the director of the computer center, this task force will be responsible for sorting, data entry, and archiving all Custom forms including export/import and quittance forms.

VII. Budget and Cost Considerations

The initial investment in automation may seem expensive and prohibitive to management. However, we should not overlook the return on the investment and its benefits. In the case of the DGD which is responsible for the collection of all tax duties on exports and imports, automation of its operational offices is vital to the effective performance of this function. Furthermore, since all the export/import data originates at the DGD, without such automation it is impossible to develop the country's central export/import database which is required for the monitoring of the economic progress of the country and the impact of economic polices on the development of the country.

As previously stated, to develop CEIDB it is imperative to implement SYDONIA at all 18 DGD units including the DGD Computer Center, the five regional offices, and operational offices with 300 or more transactions per month. This automation is the building block for the development of the country's central export/import database. Asssuming that the DGD will continue using SYDONIA, the cost for such automation can be categorized into the following:

- Hardware and Software
- Installation and Testing
- Data Migration
- Production Procedures
- Training

In this section we shall furnish an estimated cost of the hardware and software and provide alternative hardware configurations and estimated cost. The cost of installation and testing, data migration, production procedures, and training will be provided in the implementation plan, Part-III of this study.

Before we can give an estimated cost of the hardware it is worth mentioning that the prices of 80386 AT compatible machines vary depending on a number of parameters. These parameters include reliability, performance, ease of use, and others. Prices for an 30386 machine vary from 3,000 to 10,000 US dollars for the same base configuration depending on the manufacturer.

Though UNCTAD recommends a 25 MHZ 80386 to run SYDONIA under UNIX and support three users, we recommend a 33 MHZ 80386 system. The following provides an estimated budget cost of the hardware and software using 33 MHZ and 25 MHZ solution.

A. INTEL 80386/33 MHZ Solution

This solution consists of high end reliable 80386 AT compatible machines running at 33 MHZ. Each system consists of an 80386 running at 33 MHZ with 4 MB of RAM, 2 hard disks - 150 MB for the head office and 100 MB for the regional and operational offices, one cartridge tape backup, two high density floppy drives (5.25" and 3.5"), one parallel port and one serial port, and a keyboard. Table-6 shows the hardware configuration to support the 18 sites and cost estimate for this configuration.

The prices of this configuration are based on Compaq GSA schedule for Compaq 386/33 systems and other Compaq parts. The prices for other devices including hard disks, terminals, printers, and UPS were estimated by selecting three best performance brands. We have selected Compaq 80386/33 system as the base for this solution because of its high performance, reliability and durability. Other systems at a cheaper price could have been selected.

Note that we have built an additional hard disk drive for backup to ensure higher uptime. Eliminating such a backup decreases the cost of this configuration to \$ 291,000.

33 MHZ CONFIGURATION AND ESTIMATED COST

Description	Unit Price	Quantity	Total
1. System/150	\$ 12,900	16	\$ 206,400
- INTEL 80386/33 MHZ			
- 4 MB RAM			
- 150 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 1 Serial Port			
- 1 4 Ports IO Interface			
2. System/100	11,900	3	35,700
- INTEL 80386/33 MHZ			
- 4 MB RAM			
- 100 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 1 Serial Port			
- 1 4 Ports IO Interface			
3. 150 MB Hard Disk	1,500	8	12,000
4. 100 MB Hard Disk	1,000	11	11,000
5. ASCII Terminal	295	51	15,045
6. 200 CPS DOT MATRIX Printer	210	28	5,880
7. UPS	800	22	17,600
8. UNIX System V	587	19	11,053
9. MS DOS	55	3	165
Total Hardware and System Software Cost			\$ 314,843 =====

Table-6

B. INTEL 80386/25 MHZ Solution

This solution consists of 80386 AT compatible machines running at 25 MHZ. Each system consists of an 80386 processor running at 25 MHZ with 4 MB of RAM, 2 hard disks - 150 MB for the head office and 100 MB for the regional and operational offices, one cartridge tape backup, two high density floppy drives (5.25" and 3.5"), one parallel port and one serial port, and a keyboard. Table-7 shows the hardware configuration and system software to support the 18 sites and cost estimate for this configuration.

This configuration is based on Dell 386/25 MHZ. The other devices' cost is estimated in a similar way as the configuration provided in section-A. The cost of this configuration can be reduced if the additional hard disks are not included, this would bring down the cost to \$206,063.

This cost can be reduced further by eliminating some of the sites and automating only the DGD Computer Center and the regional offices. This solution would reduce the cost of hardware and software by 50%. However, such a solution may not achieve effective results. If such a solution is to be implemented, we recommend that the current 80286 machines be used at the frontier offices, while the new 386 systems be used at the DGD Computer Center and regional offices. Since the 80286 will be using Prolog while the 386 machines will be running UNIX System V, an interface has to be established to migrate data from SYDONIA under Prolog to SYDONIA under UNIX.

VII

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25 MHZ CONFIGURATION AND ESTIMATED COST

Description	Unit Price	Quantity	Total
1. System/150	\$ 8,700	16	\$ 139,400
- INTEL 80386/25 MHZ			
- 4 MB RAM			
- 150 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 2 Serial Ports			
- 1 4 Ports IO Interface			
2. System/100	8,500	3	25,500
- INTEL 80386/25 MHZ			
- 4 MB RAM			
- 100 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 2 Serial Port			
- 1 4 Ports IO Interface			
3. 150 MB Hard Disk	1,300	8	10,400
4. 100 MB Hard Disk	900	11	9,900
5. ASCII Terminal	295	51	15,045
6. 200 CPS DOT MATRIX Printer	210	28	5,880
7. UPS	800	22	17,600
8. UNIX System V	587	19	11,053
9. MS DOS	55	3	165
Total Hardware and System Software Cost			\$ 229,063 =====

Table-7

critical to the development of CEIDB, hence we are recommending additional resources and equipment to complete this task within the next six months.

Fifth, to support the production and operation of new systems will require new procedures and training of the DGD staff on the use of the systems and associated procedures. The required Training should be conducted parallel with the implementation/installation of the new systems.

A. Proposal

The strategy that we are proposing to complete the automation of the DGD which will result in the development of CEIDB is to:

1. Continue use of SYDONIA under UNIX running on higher performance machines
2. SYDONIA database will constitute CEIDB
3. Implement the other modules of SYDONIA
4. Implement SYDONIA in all the DGD operational offices
5. Complete all the backlog data from 1987 through 1989
6. Develop the proper interfaces to other systems including MOF, Ministry of Plan and Contribution Diverses
7. Redesign Production and operation procedures to support the production of new hardware and software
8. Train the DGD personnel on the operation and administration of the new system

B. Project Phases

1. **Study and Planning Phase** - This phase consists of the functional requirement definition, proposed solution, and implementation plan. The output from this consists of a 3 parts - Part-I: Functional Requirements Definition and Analysis, Part-II: Computer System Requirements and Analysis, and Part-III: Implementation Plan.
2. **Data Completion Phase** - This phase is already under implementation at the DGD head office. However, we recommend the increase of resources and additional hardware to complete this task within the next 6 months. There are currently 4 dedicated data entry operators who are conducting this task; these should be increased to 10.

3. **RFP/Evaluation and Hardware Acquisition Phase** - Once the hardware configuration proposed in this study is agreed upon, then an RFP for hardware and software acquisition will be prepared and submitted for bids. Bids will be evaluated and submitted to USAID for approval. This phase will take about 6 weeks to complete.
4. **Implementation Phase** - This phase consists of hardware and software acquisition, shipping, installation, testing, data migration, production, and training. The activities and time schedule of this phase will be detailed in the implementation plan, Part-III of this study.

ACADEMY FOR EDUCATIONAL DEVELOPMENT

**Niger Economic Reform Program
Computer System and Database Support
Study and Recommendations**

PART-III

Implementation Plan

Nasser E. Abdelilah

January 31, 1990

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I. Overview

Part-I of the study to develop the base data for the evaluation of the Niger African Economic Reform Program (NEPRP) covered the functional requirements of the Customs Department of MOF and related government agencies, in Part-II of the study we have provided an analysis of the current export/import procedures, evaluated the hardware and software used by DGD and provided alternative solutions and hardware and software configuration to automate DGD administrative and operational offices leading to the development of the Niger's Central Export/Import Database.

This part of the study provides a detailed plan which can be used to implement the recommended solution as described in Part-II.

The implementation plan described in this report should help the concerned parties understand the objectives of the project, scope of work and resources required to achieve these objectives. At the same time, the plan will be used by the project team leader to organize the project team and plan and schedule each task to achieve the project goals within the allocated resources and time.

Although we have tried to take into consideration most of the requirements and constraints in designing this plan, there are certain tasks and/or requirements that may arise before or during the implementation which will require change in the plan. Upon approval of this plan, the team leader assigned to the project should review the plan and make the necessary changes in view of the data available to him/her. Furthermore, during the implementation, the project team leader should update the plan to reflect changes in implementation tasks and schedule.

II. Project Objectives

The objective of the GDG automation project is to complete the implementation of the SYDONIA system initiated back in 1987. Such automation will result in the development of the Niger's Central Export/Import Data Base (CEIDB) which is the primary goal of this project. The project objectives are:

- Full implementation of SYDONIA at DGD Computer Center in NIAMEY
- Implementation of SYDONIA at all Regional Centers including Niamey, Maradi, Zinder, Dosso, and Tawa
- Implementation of SYDONIA at the following DGD's Operational Offices:

-- Niamey Route

- Niamey Airport
- Niamey Rive Droite
- Niamey Hydrocarbure
- Maradi Dayssa
- Maradi Madarofa
- Zinder Magara
- Zinder Mattame
- Dosso Gaya
- Tawa Arlite
- Tawa Konnie

- Development and establishment of the procedures to maintain and update the central export/import database at DGD in Niamey
- Development of the interfaces required to provide the information flow between DGD and related government agencies
- Development of standard export/import extract files/databases to provide export/import data to concerned government agencies
- Development of production and operation procedures
- Training on all production phases and system administration

III. Implementation Phases

The project was initiated back in November 28, 1989. The first phase of the project was the study phase conducted to define the needs and requirements of DGD, to propose an optimal solution to the implementation of SYDONIA and to develop a project plan to implement the proposed solution. This section of the plan describes the five implementation phases of the project.

A. Hardware and Software Acquisition

This phase consists of preparing a request for quotation based on the proposed hardware and software configuration described in Part-II, evaluating the bids, and acquiring and shipping the hardware and software. Since the hardware and software are cheaper in the States, we are recommending that all hardware and software be acquired in the US and shipped to Niger. If this recommendation is accepted, then this phase will be conducted in the US.

The time required to complete this phase depends on the approval of USAID of the recommended bid and the delivery time of the hardware. It takes about 30 days from the day of issuance of the purchase order (PO) to receive the hardware and 30 days for shipping. If we assume another 30 days for approval, this phase will take about 90 days to complete.

B. Hardware and Software Installation and Testing

This phase consists of hardware installation, and system and application software installation and testing. There are two approaches to execute this phase.

The first is to wait until all the hardware and software is acquired and shipped, then conduct the installation and testing tasks in Niger. If we use this method the hardware installation cannot be initiated until three months from the start of the project.

The second approach is to acquire an installation/prototype machine when the PO is issued. This machine can be rented or some other arrangement can be made with the dealer to provide such a machine. The system and application software can be installed and tested on the prototype machine in the US. Once the hardware is received and prior to shipping, an image of the installed software on the prototype machine will be created and tested on the production machines. This approach will expedite the project life cycle and ensures that all systems are tested and operating prior to shipping. Furthermore this prototyping method can be extended to cover the data migration phase as well, which will decrease the project cycle further. We strongly recommend that this phase be conducted using the prototype approach.

The time required to complete this phase depends on the approach used. Assuming that we use the prototype approach and UNCTAD/SYDONIA Project is willing to provide the application software, then it will take about 60 days to complete this phase. Note that 20 days of installation and testing will be conducted on the prototype machine parallel to the acquisition phase and 20 days of installation and testing will be conducted on the production machines before shipping. The last segment of this phase, which consists of installing the production systems will be conducted in Niger. This segment will take about 20 days to complete. The total time to complete the installation and testing phase is about 60 days.

C. Data Migration and Completion

This phase consists of migrating the data from Prolog/SYDONIA database to UNIX/SYDONIA database and the completion of the backlog data from 1987.

We are proposing to conduct all data migration tasks in the US. This approach will consist of acquiring all database files from DGD and migrating data from Prolog to UNIX using the prototype machine. This can be initiated after the system and application software is installed on the prototype machine. This will further decrease the implementation cycle and ensures that all components including the data are tested and complete. This task will take about 15 days to complete.

The second segment of this phase is the data completion which consists of data entry of the backlog transactions from 1987. This activity is already under execution. However, and as already stated, we are recommending that the current task force be increased to complete this activity prior to the installation of the production systems. Currently, there are 4 contracted data entry operators, if these are increased to 8, the backlog data from 1987 to the present can be completed by May 30, 1990.

D. Training

This phase consists of training the local staff on the production of the application, system administration, and basic hardware installation and maintenance.

This phase will be initiated in parallel with the hardware installation. The training approach that we are recommending is to select four DGD technical staff to participate in the performance of the installation and testing tasks. System administration activities will be conducted in Niamey and trained systems administrators will be sent to the regional centers to train additional staff on production and system administration.

This phase will be conducted in parallel with the installation and testing phase and will take about 3 months to complete.

E. Integration and Production

This phase consists of developing and documenting integration and production procedures necessary to ensure the effective production of SYDONIA and implement the required information flow and linkages between DGD and other government agencies.

Assuming that the Ministry of Planning will continue using TRACE and other ministries will be using LOTUS or other spreadsheet or statistical package, data required by these systems will be provided through TRACE extract module and DIF or ASCII files. In addition, assuming that Treasury will use SYDONIA to manage the Economic Operators (EO) loans, then the integration phase will not require any software development and will be less costly to implement. If this solution is acceptable, then the required time to complete the integration is about 15 days.

The production documentation will take about 10 days to complete.

IV. Milestones and Tasks

A. Hardware and Software Acquisition

The tasks to be conducted in this phase include:

- Review hardware and software configuration

- Prepare request for quotation for the acquisition of hardware and software
- Evaluate bids and make recommendation to USAID
- USAID review and approve bids and issuance of PO
- Test and ship hardware and software

B. Hardware and Software Installation and Testing

Assuming that the prototyping approach will be used to conduct this phase, the following are the tasks and milestones required to complete this phase:

- Acquire a prototype system including hardware and system software
- Acquire UNIX/SYDONIA version 2.3 from UNCTAD
- Install and test UNIX system V
- Install and test SYDONIA under UNIX System V
- Receive hardware and system software
- Install and test system software on all production systems
- Install and test SYDONIA version 2.3 on production systems
- Ship all production systems including hardware and software
- Install and Test production systems at DGD Head Office
- Test regional systems at DGD head office
- Ship, install, and test Niamey production system
- Ship, install, and test Maradi production system
- Ship, install, and test Zinder production system
- Ship, install, and test Tawa production system
- Ship, install and test production systems at the following operational offices:
 - Niamey Route
 - Niamey Airport
 - Niamey Rive Droite
 - Niamey Hydrocarbure
 - Maradi Dayssa
 - Maradi Madarou'a

- Zinder Magara
- Zinder Mattame
- Dosso Gaya
- Tawa Arlite
- Tawa Konnie

- Ship, install, and test DOSSO production system

C. Data Migration and Completion

The following are the tasks and milestones required to complete this phase:

- Acquire PROLOG/SYDONIA database files from DGD
- Run PROLOG/UNIX data migration against DGD database using the prototype system
- Verify that the UNIX database is complete
- Copy UNIX/SYDONIA database files to production systems and test
- Continue data entry of backlog data under PROLOG
- Run second PROLOG/UNIX data migration against DGD database using the prototype system
- Phase out PROLOG from the head office and phase-in UNIX production systems to complete backlog data entry
- Perform data migration at the regional centers

D. Training Tasks

The following are the training tasks which will be conducted in parallel with the installation and testing activities:

- Conduct Unix Installation and Administration training
- Conduct SYDONIA installation and administration training
- Conduct SYDONIA production training
- Conduct hardware installation and basic trouble shooting and maintenance

E. Integration and Production Tasks

The following are the integration and production tasks:

- Install MS DOS Partition under UNIX
- Install TRACE extract module under DOS

- Copy UNIX database files to DOS and run TRACE extract module
- Define DIF and/or ASCII extract structure
- Run and test SYDONIA extract module
- Document procedure to extract TRACE and DIF/ASCII files
- Develop and document database extract/merge procedure
- Develop database backup and recovery procedure
- Develop and document database archive procedure
- Develop and document production cycle

V. Project Team Organization

To conduct the implementation tasks described in this plan, a project team must be organized and will be responsible for the performance of these tasks. As shown in figure-1, this project team will consist of a team leader, 3 installation specialists, a data specialist, and 2 production specialists. The team leader will be assisted by a technical advisor who will be provided by AED. We recommend that the team leader and all other staff be selected from DGD staff.

PROJECT TEAM ORGANIZATION

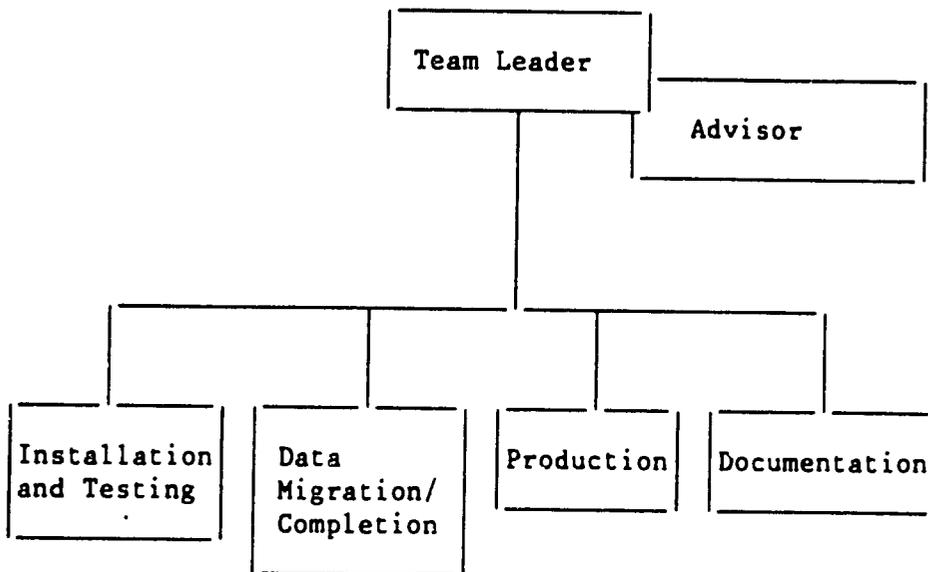


Figure-1

Technical Advisor - will be provided by AED and will be responsible for developing, reviewing and updating the project/implementation plan. The technical advisor will conduct all the implementation tasks to be performed in Washington; these include hardware and software acquisition, prototype hardware and software installation and testing, pre-shipment testing, communication with computer vendors and UNCTAD/SYDONIA project. In addition, the technical advisor will assist in all project phases to ensure that all tasks are conducted as planned and to solve any technical problem that may rise during implementation. The technical advisor will interact directly with the team leader and reports to the USAID program officer on the project progress.

Team Leader - The team leader is a senior computer specialist to be selected by DGD. We recommend that the head of the computer center at DGD be selected as the team leader. His responsibility is to coordinate the execution of the project plan with the assistance of the technical advisor.

Installation Testing - This team of 2 computer specialists under the supervision of the team leader will be responsible for hardware and software installation and testing. This team will be trained by the technical advisor on hardware and software installation. In addition, they will be responsible for providing hardware and software installation training to other staff members of DGD.

Data Migration and Completion - This team consists of one data specialist and 8 data entry operators. Once the data migration procedure is completed the data specialist will be trained by the technical advisor on the use of the migration procedure and he/she will be responsible for performing the data migration tasks. Furthermore, the data specialist will be responsible of supervising the data entry operators to complete the entry of the backlog transactions from 1987. The data specialist will be selected from DGD staff. The 8 data entry operators can be contracted or selected from DGD personnel.

Production Team - This consists of 2 computer specialists from DGD. These two specialists will be trained by the technical advisor on UNIX and SYDONIA production procedures and will be responsible for all production tasks at the head office and training of other production personnel at the regional and operational offices.

Documentation - One documentation specialist will be selected from DGD personnel and will be responsible for all project documentation and correspondence.

The team organization is designed to provide on the job training to DGD staff, and maximize involvement of the local personnel from the project inception to ensure smooth

implementation and successful transition from the current to the new system. Furthermore since only one technical advisor will be hired from the US, this lowers the implementation cost.

VI. Resource Requirements

In addition to DGD's personnel who will be part of the project team, other resources are required to conduct the implementation tasks specified in this plan. These resources include:

Hardware and Software - Acquisition of the necessary hardware and software as described in Part-II of the technical study. Two solutions were proposed (Appendix-A) for USAID review and approval.

Technical Support - In addition to the local staff to be selected from DGD's personnel, one technical advisor will be required for a period of 8 months. Three months of the advisor's time will be spent in the US and 4 months in Niger. Three trips of one week each will be made to GENEVA to consult with the UNCTAD/SYDONIA project.

Shipping and Communication - Since all hardware and software is to be acquired in the US, funds should be allocated for shipping. Application software will be shipped from GENEVA to Washington. During the implementation telephone communications, telefaxes, and mail (DHL and other type) are required. The communications will be between Washington, UNCTAD, and NIGER - USAID and DGD.

Administrative Support - Administrative and secretarial will be provided from Washington. The administrative and secretarial support will assist in acquisition of equipment, followup, shipping, and other administrative support.

VII. Budget

The initial investment in automation may seem expensive. However, we should not overlook the return on the investment and its benefits. In the case of DGD which is responsible for the collection of all tax duties on exports and imports, automation of its operational offices is vital to the effective performance of this function. Furthermore, since all the export/import data originates at DGD, without this automation it is impossible to develop the country's central export/import database which is required for the monitoring of the economic progress of the country and impact of economic policies on the development of the Republic of Niger.

As previously stated, to develop CEIDB it is imperative to implement SYDONIA at all 18 DGD units including DGD Computer Center, the five regional offices, and operational offices with 300 or more transactions per month. This automation is the building block for the development of the country's central export/import database. Assuming that DGD will continue using SYDONIA, the cost for such automation can be categorized into the following:

- Hardware and Software
- Technical Support
- Shipping, Communication, and Travel
- Administrative Support

This section provides estimated costs for each of above budget categories. Note that two budgets are provided, the first is based on lower cost hardware and the second on higher cost hardware solution as described in Part-II of the technical study. These budgets are estimate only and not a proposal.

1. Budget/Lower Performance Hardware Solution

The estimated cost in this budget is based on the use of low cost low performance hardware as described in part-II of the technical study:

ITEM	COST
1. Hardware and Software	
- Hardware and Software Purchase	\$ 229,063.00
- Hardware and Software/Prototype Rental	3,000.00
- Acquisition Overhead (5% of 232,063)	11,603.15
Subtotal:	243,666.15
2. Direct Labor	
- Technical Advisor (350/day x 240)	84,000.00
- Per Diem (120/day x 150)	18,000.00
- Benefits (26%)	26,520.00
- Local Staff	20,000.00
Subtotal:	148,520.00
3. Shipping, Communication and Travel	
- Shipping (10% of purchase)	23,206.30
- Telephone and Fax	4,000.00
- Mail/DHL	3,000.00
- Travel (3 RT DC/Niger @ 2,500)	7,500.00
(3 RT DC/Geneva @ 2,000)	6,000.00
- In-Country Travel (30/day x 150)	4,500.00
Subtotal:	48,206.30
4. Other Direct Costs	
- DBA Insurance (3.99)	5,925.95
- Medical Evacuation	30.00
- Translation	2,000.00
- Photocopying	500.00
- Expendable Supplies	600.00
Subtotal:	9,055.95
5. Administrative and Secretarial	
- Administrative (1 month x 5000)	5,000.00
- Secretarial (4 months x 2000)	8,000.00
- Benefits (26%)	3,380.00
Subtotal:	16,380.00
6. Overhead (2%)	62,205.43
TOTAL:	\$ 528,033.83 =====

2. Budget/Higher Performance Hardware Solution

The estimated cost in this budget is based on the use of high performance hardware as described in part-II of the technical study.

ITEM	COST
1. Hardware and Software	
- Hardware and Software Purchase	\$ 314,843.00
- Hardware and Software/Prototype Rental	3,000.00
- Acquisition Overhead (5% of 232,063)	15,892.00
Subtotal:	333,735.15
2. Direct Labor	
- Technical Advisor (350/day x 240)	84,000.00
- Per Diem (120/day x 150)	18,000.00
- Benefits (26%)	26,520.00
- Local staff	20,000.00
Subtotal:	148,520.00
3. Shipping, Communication and Travel	
- Shipping (10% of purchase)	31,784.30
- Telephone and Fax	4,000.00
- Mail/DHL	3,000.00
- Travel (3 RT DC/Niger @ 2,500)	7,500.00
(3 RT DC/Geneva @ 2,000)	6,000.00
- In-Country Travel (30/day x 150)	4,500.00
Subtotal:	56,784.30
4. Other Direct Costs	
- DBA Insurance (3.99)	5,925.95
- Medical Evacuation	30.00
- Translation	2,000.00
- Photocopying	500.00
- Expendable Supplies	600.00
Subtotal:	9,055.95
5. Administrative and Secretarial	
- Admin (1 Month x 5,000)	5,000.00
- Secretarial (4 months x 2,000)	8,000.00
- Benefits (26%)	3,380.00
Subtotal:	16,380.00
6. Overhead (28%)	64,607.27
TOTAL:	\$ 629,082.67
	=====

As described in the technical report (Part-II) the implementation cost can be lowered by 25%, if the implementation is done in phases. Where phase-1 will consist of implementing UNIX/SODONIA at the head office, 5 regional offices, and some of the operational offices, phase-2 will encompass the implementation of the remaining operational offices. In this case and depending on the type of the hardware used, phase-1 will cost about \$396,000 or \$478,000. USAID can elect to implement phase-II at a latter stage when funds become available.

VIII. Recommendations

As described in part-II of the technical study, we would like to reiterate that the development of the central export/import database at DGD constitutes a fundamental base of Niger's information infrastructure. Without this database, it is impossible for any entity whether government or private to study, research, and/or assess the economic trends and reforms of the Republic of Niger. Though it may seem costly to develop the central export/import database of Niger, the returns on such an investment are very high.

This plan provides the guidelines and requirements necessary to build Niger's Central Export/Import Database (CEIDB). The plan was devised to conduct most of the implementation tasks in the US so to lower the implementation cost. Furthermore, we have provided two hardware solutions, one based on high performance 80386/33 MHZ machines and the second is using 80386/25 MHZ machines. Though we recommend the 33 MHZ based solution, the 25MHZ based solution is viable and will provide the same functionality with lower performance.

The proposed UNIX solution is an optimal solution and allows for upgradability at a latter time and with minimal cost. Additionally, and since UNIX runs on a variety of machines, this makes DGD independent of any specific hardware vendor.

To make the proposed solution effective, it is critical to automate the head office, the regional offices, and the proposed 18 operational offices; however if funds are not available to undertake such effort; then we recommend the following phase-out implementation:

- Install one system at DGD head offices
- Install 5 systems at the regional offices including Niamey, Maradi, Tawa, Zinder, and Dosso
- Install one system in each of the following operational offices:

- Niamey Route
- Niamey Airport
- Niamey Rive Droite
- Niamey Hydrocarbure
- Maradi Dayssa
- Zinder Magara
- Tawa Arlite
- Tawa Konnie

- The remaining operational offices will be automated in the second implementation phase when funds become available

This phase-out implementation will decrease the hardware and software cost by 25%. As previously stated, to further lower the cost, we strongly recommend that most of the implementation tasks be conducted in the US; these tasks include Hardware, system and application software testing and data migration.

APPENDIX-A

**HARDWARE AND SOFTWARE CONFIGURATION SOLUTIONS
AND ESTIMATED COST**

33 MHZ Configuration and Estimated Cost

DESCRIPTION	UNIT PRICE	QUANTITY	TOTAL
1. System/150	\$ 12,900	16	\$ 206,400
<ul style="list-style-type: none"> - Intel 80386/33 MHZ - 4 MB RAM - 150 MB Hard Disk - Cartridge Tape Backup - 1 5.25" Floppy Drive - 1 3.5" Floppy Drive - 1 Parallel Port - 1 Serial Port - 1 4 Ports IO Interface 			
2. System/100	11,900	3	35,700
<ul style="list-style-type: none"> - Intel 80386/33 MHZ - 4 MB RAM - 100 MB Hard Disk - Cartridge Tape Backup - 1 5.25" Floppy Drive - 1 3.5" Floppy Drive - 1 Parallel Port - 1 Serial Port - 1 4 Ports IO Interface 			
3. 150 MB Hard Disk	1,500	8	12,000
4. 100 MB Hard Disk	1,000	11	11,000
5. ASCII Terminal	295	51	15,045
6. 200 CPS DOT MATRIX Printer	210	28	5,880
7. UPS	800	22	17,600
8. UNIX System V	587	19	11,053
9. MS DOS	55	3	165
Total Hardware and System Software Cost			\$ 314,843 =====

** If the phase out implementation is used the hardware and software cost for phase-1 is \$ 227,508.

25 MHZ Configuration and Estimated Cost

DESCRIPTION	UNIT PRICE	QUANTITY	TOTAL
1. System/150	\$ 8,700	16	\$ 139,400
- Intel 80386/25 MHZ			
- 4 MB RAM			
- 150 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 2 Serial Ports			
- 1 4 Ports IO Interface			
2. System/100	8,500	3	25,500
- Intel 80386/25 MHZ			
- 4 MB RAM			
- 100 MB Hard Disk			
- Cartridge Tape Backup			
- 1 5.25" Floppy Drive			
- 1 3.5" Floppy Drive			
- 1 Parallel Port			
- 2 Serial Port			
- 1 4 Ports IO Interface			
3. 150 MB Hard Disk	1,300	8	10,400
4. 100 MB Hard Disk	900	11	9,900
5. ASCII Terminal	295	51	15,045
6. 200 CPS DOT MATRIX Printer	210	28	5,880
7. UPS	800	22	17,600
8. UNIX System V	587	19	11,053
9. MS DOS	55	3	165
Total Hardware and System Software Cost			\$ 229,063 =====

** If the phase out implementation is used the hardware and software cost for phase-1 is \$ 168,708.

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APPENDIX-B

IMPLEMENTATION PLAN TASKS GANTT CHART

PROJECT GANTT CHART/HARDWARE ACQUISITION PHASE

CALENDAR	
Phase/Task Description:	
A. Hardware Acquisition	
1. Prepare request for quotation for the acquisition of hardware and software	.. 2/15/90-3/20
2. Evaluate bids and make recommendation to USAID	... 2/21-2/27
3. USAID review and approve of bids and issuance of PO	..... 2/28-3/15
4. Receive Hardware in Washington	m 4/15
5. Pre-Shipping Hardware Test	..... 4/16-5/5
6. Hardware and Software Shipping	..... 5/6-6/6

(*) m = milestone
 . = task

PROJECT GANTT CHART/HARDWARE AND SOFTWARE INSTALLATION & TESTING PHASE

CALENDAR

Phase/Task Description:	
1. Acquire a prototype system including hardware and system software	... 3/16-3/22
2. Acquire UNIX/SYDONIA version 2.3 from UNCTAD	m 3/17
3. Install and test UNIX system V	.. 3/16-3/17
4. Install and test SYDONIA under UNIX System V	..... 3/17-3/30
5. Receive hardware and system software	m 4/15
6. Install and test system software on all production systems	..... 4/16-4/25
7. Install and test SYDONIA version 2.3 on production systems	..... 4/18-5/15
8. Ship all production systems including hardware and software	..... 5/16-6/16
9. Install and Test production systems at DGD Head Office	.. 6/17-6/19
10. Test regional systems at DGD head office	.. 6/20-6/22
11. Ship, install, and test Niamey production system	. 6/23
12. Ship, install, and test Maradi production system	.. 6/24-6/25
13. Ship, install, and test Zinder production system	.. 6/26-6/28
14. Ship, install, and test Tawa production system	.. 6/29-6/30

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PROJECT GANTT CHART/HARDWARE AND SOFTWARE INSTALLATION & TESTING PHASE
(Continue)

CALENDAR

Phase/Task Description:

15. Ship, install, and test Niamey Route production system	.. 7/1-7/2
16. Ship, install, and test Niamey Airport production system	.. 7/3-7/4
17. Ship, install, and test Niamey Hydrocarbure production system	.. 7/5-7/6
18. Ship, install, and test Niamey Rive Droite production system	.. 7/7-7/8
19. Ship, install, and test Dayssa production system	... 7/9-7/11
20. Ship, install, and test Maradofa production system	... 7/12-7/15
21. Ship, install, and test Magara production system	... 7/16-7/17
22. Ship, install, and test Mattame production system	... 7/18-7/19
23. Ship, install, and test Gaya production system	... 7/20-7/21
24. Ship, install, and test Arlite production system	... 7/22-7/23
25. Ship, install, and test Konnie production system	... 7/24-7/25
26. Ship, install, and test DOSSO production system	... 7/26-7/28

PROJECT GANTT CHART/DATA MIGRATION AND COMPLETION

CALENDAR	
Phase/Task Description:	
1. Acquire PROLOG/SYDONIA database from DGD	m 3/17
2. Run PROLOG/UNIX data migration against DGD database using the prototype system	.. 4/1-4/3
3. Verify that the UNIX database is complete	..... 4/4-4/10
4. Copy UNIX/SYDONIA database files to production systems and test	... 4/20-4/25
5. Continue data entry of backlog data on PROLOG	..... 6/19
6. Run second PROLOG/UNIX data migration against DGD database using the prototype system	.. 6/20-6/22
7. Phase out PROLOG from the head office and UNIX production systems to complete backlog data	m 6/23
8. Perform data migration of regional databases 6/24-6/30

(*) m = milestone
 . = task

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PROJECT CANTT CHART/TRAINING PHASE

CALENDAR	
Phase/Task Description:	
1. Conduct Unix Installation and Administration training 6/17-7/30
2. Conduct SYDONIA installation and administration training	..... 6/20-7/30
3. Conduct SYDONIA production training	..... 6/25-8/30
4. Conduct hardware installation and basic trouble shooting and maintenance	..... 6/17-8/15

PROJECT GANTT CHART/TRAINING INTEGRATION AND PRODUCTION PHASE

CALENDAR

Phase/Task Description:

1. Install MS DOS Partition under UNIX	. 7/5
2. Install TRACE extract module under DOS	. 7/5
3. Copy UNIX database files to DOS and run and test TRACE extract module	... 7/6-7/10
4. Define DIF and/or ASCII extract structure	..... 7/10-7/18
5. Run and test SYDONIA module	..... 7/20-7/25
6. Document procedure to extract TRACE and DIF/ASCII files	.. 7/25-7/28
7. Develop and document database extract/merge procedure	.... 7/28-8/3
8. Develop database backup and recovery procedure	..... 8/4-8/10
9. Develop and document database archive procedure 8/11-8/15
10. Develop and document production cycle 8/25-8/30

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