GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

Date: 1/10/80

Project Title: NSF Management Support for Aid-Funded Development of Egyptian Scientific and Technical Information Services

Project No: G-36-644 (Sub-project is A-51-604/Dodd-Library)

Project Director: Dr. Vladimir Slamecka

Sponsor: National Science Foundation; Washington, D.C. 20550

Agreement Period: From 10/15/79 Until ~~10/14/81~~ 1/31/82 (Perf. Period)

Type Agreement: Contract No. INT-7924187

Amount: $400,453 (G-36-644)
83,721 (A-51-604)
$484,174 TOTAL

Reports Required: Monthly Progress Reports; Final Report

Sponsor Contact Person (s):

Technical Matters

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Contractual Matters
(thru OCA)

Mr. H.D. Wolff, III
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National Science Foundation
Washington, D.C. 20550
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Defense Priority Rating: None

Assigned to: Information and Computer Science (School/~~Laboratory~~)

COPIES TO:

- Project Director
- Division Chief (EES)
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CA–3 (3/76)

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION SHEET

Date 1/18/83

Project Title: NSF Management Support for Aid-Funded Development of Egyptian Scientific & Technical Information Services

Project No:
G-36-644 (subproject is A-51-604/Dodd/Library)

Project Director:
Dr. Slamecka

Sponsor:
NSF

Effective Termination Date: 1/31/82

Clearance of Accounting Charges: 1/31/82

Grant/Contract Closeout Actions Remaining:

- [x] Final Invoice and Closing Documents
- [ ] Final Fiscal Report
- [x] Final Report of Inventions
- [x] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Assigned to: ICS (School/Laboratory)

COPIES TO:

Administrative Coordinator	Research Security Services	EES Public Relations (2)
Research Property Management	Reports Coordinator (OCA)	Computer Input
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Procurement/EES Supply Services	Library	Other _____

FORM OCA 10:781

G-36-644

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

February 5, 1980

Mr. Eugene Pronko
Senior Program Manager
Africa and Asia Section
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This monthly progress report on NSF Contract INT-7924187 covers the calendar period of January 1-31, 1980.

1.0 Major Activities

1.1 The project director and two consultants (Messrs. McDonald and Sarasohn) met on January 2, in Washington, D.C., to discuss the design of the survey of Egyptian national information requirements.

1.2 In accordance with the project schedule, the project director departed for Cairo on January 15. He was subsequently joined in Cairo by six project consultants. The duration of stay of the US team in Cairo is shown below:

Name	Arrival	Departure
Scott Adams	Jan. 26	Feb. 2
Henry Camp	Jan. 20	Feb. 5
David Hersey	Jan. 20	Jan. 29
Davis McCarn	Jan. 20	Feb. 1
Dennis McDonald	Jan. 20	Feb. 7
Homer Sarasohn	Jan. 20	Feb. 5
Vladimir Slamecka	Jan. 16	Feb. 2

1.3 The technical objectives of the Cairo visit were as follows:

a) Specify the population of organizations for survey of national information resources and requirements, and for the R/D inventory survey.

b) Determine survey sampling method(s).

c) Specify form and contents of questionnaires.

d) Select and train survey instructors.

RPD G-36-634

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

March 7, 1980

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

File:

Dear Mr. Pronko:

This monthly progress report on Contract INT-7924187 covers the calendar period of February 1-29, 1980.

1.0 Major Activities

1.1 As of February 29, the following nationwide surveys in Egypt were underway and on schedule: R&D inventory; analysis of information requirements of the 5-year plan; and interviews at selected research institutes. Two major surveys (of information resources and requirements), scheduled to start on February 16, have not yet begun, although intensive training of some 60 potential surveyors is underway at CAPMAS. The expected delay of these two surveys is three weeks. The delay is due to several factors: the length of time required to negotiate a contract between ASRT and CAPMAS for survey data collection; the absence of financial resources at the ASRT to fund these surveys; and the time required to negotiate funding by NSF/AID. The effect of this delay on the project schedule will be evaluated once the surveys are underway. The preparation of other interim reports due in April is on schedule.

1.2 The itinerary has been firmed up for the Georgia Tech training for Mr. Loutfy and Mrs. Gabran. The itinerary is as follows:

Time	Place	Activity
March 22		Arrival in Atlanta
March 24-April 6	Atlanta	Training at Georgia Tech
April 7-11	Denver	Training for SCD Orbit
April 12-14	Palo Alto	Training for Lockheed Dialog
April 15-18	Atlanta	Planning for Cairo seminar and subsequent activities
April 19		Depart for Washington
April 20		Depart for Cairo

Training manuals, thesauri, etc. have been ordered. Hotel reservations for the Egyptian visitors have been made, and study spaces at Georgia Tech assigned for their use. The ASRT has been requested to begin planning and budgeting the Cairo seminar scheduled for June 23-July 16.

A51-604

G26-644

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

June 5, 1980

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This monthly progress report on NSF Contract INT-7924187 covers the calendar period of May 1980.

1.0 Major Activities

1.1 Project office in Cairo reports that as of the end of May CAPMAS survey has covered approximately 200 organizations, or 50 percent. The data collected is being checked for completeness and quality by project staff, and forwarded for computer processing at Cairo University Computer Center.

1.2 U.S. contractor continued to review preliminary products and outputs prepared by the Egyptian team, including: study by Mrs. Nazli Madkour, survey computer outputs, R&D survey outputs, and policy/legislation document drafts. Feedback comments were, or will be, forwarded to Cairo.

1.3 Cairo reports intensive preparation for the June course, including the effort of designing a system for information search services in Egypt.

1.4 Mr. Gene Palmour visited Cairo as scheduled during May 6-19. The objectives of the trip were accomplished, as described in Palmour's memorandum to Slamecka dated May 30, 1980.

1.5 Mr. Aadel El-Duweini, of NIDOC, arrived in the U.S. on schedule. His visit follows the itinerary jointly prepared by the contractor and NSF.

2.0 Urgent Matters

2.1 NSF approval of budget amendments dated February 12, March 14, and May 7 is still pending. The contractor would greatly appreciate a response by the NSF contracting office, as the delays affect project schedule. In particular, the vendor of the planned project hardware has informed us that unless an order is placed immediately he will be unable to adhere to the initially promised delivery time. As a consequence, the computer hardware cannot be installed in Egypt prior to the Holy Month, forcing further rescheduling of activities and trips.

3.0 Administrative Matters

3.1 Egyptian project team headed by Dr. Mohamed A.D. Madkour has secured office space in the ALECSO building in Cairo, adjacent to NIDOC.

3.2 Project director Slamecka plans a visit to Cairo for June 17-July 2. The purpose of the visit is described in memorandum VS/21 (attached).

Respectfully submitted,

Vladimir Slamecka
Project Director

VS/al
Attachment: (VS/21)
cc: Drs. Gad/Madkour
Mr. Davenport
Mr. Dobb
Ms. Weber

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

June 3, 1980

MEMORANDUM (VS/21)

To: Dr. Mohamed A.D. Madkour

From: V. Slamecka

Subject: Cairo Trip Activities

Looking ahead to my arrival in Cairo on June 17, I have come up with a list of items which, in my opinion, require our joint attention. Please feel free to schedule these to suit your convenience and that of any other Egyptians who should join us for appropriate discussions.

Technical Activities

1. Review the design of bibliographic search/document delivery system for Egypt.

2. Review the status of the surveys and preparations for data analysis.

3. Review draft report on NIDOC (I shall bring a copy).

4. Discuss goals and strategy for beginning resource sharing activities in Egypt.

5. Outline manpower development programs prior to and for phase 2.

6. Revise project schedule.

Administrative Activities

1. Begin outlining the broad strategy for "selling" a national STI program at the top decision-making levels of government and industry.

2. Identify tentatively major nodes of such a program in and outside of Cairo.

3. Reconstitute the Advisory Steering Committee.

4. Press for the establishment of a fund for supporting Egypt-based project activities.

5. Examine and modify, if appropriate, Phase 2 budget draft.

GEORGIA INSTITUTE OF TECHNOLOGY
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April 1, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF Contract INT-7924187 covers the period of February and March 1981.

A. STATUS OF CURRENT ACTIVITIES

1. Major Survey and Data Analysis. Following the discovery of some inconsistencies of outputs from survey data analysis in January, Cairo Project Manager and his staff conducted a detailed review of this aspect of the project. The findings indicate that a) the survey of information resources has collected data from less than half the population of 400 organizations, and that some of the data collected is spurious; and b) the computer programs for processing the data of both the resources and requirements surveys contained logic errors, thereby invalidating the outputs. In late March, the revised Egyptian Steering Committee resolved to amend the situation as follows:

a) As regards the resources survey, all questionnairs are being visually inspected against the original quality control criteria. Those passing the review will be retained, others discarded. Approximately two dozen key Egyptian information organizations not included in the retained sample will be surveyed again, so as to assure that the final sample of this survey is meaningful. This procedure revises the nature of the survey, from one intended to be nearly exhaustive to one that will be "indicative" of the information resources in Egypt (although not in a strictly statistical sense).

b) As regards the requirements survey, the 1200 completed questionnaires appear to have no major defects, and shall therefore be again processed and analyzed by computer, under strict quality control and supervision. Since suitable statistical software such as SPSS is not available in Egypt, the Egyptian effort will include computer programming.

The Steering Committee is aware that these efforts are essential to the successful completion of Phase I, and it is striving to complete them by the end of June. The same deadline holds for all other Egypt-based activities in Phase I, as listed in items A.1.c-f in my monthly report for January 1981. Consequently, the schedule for completion of all reports that depend on these surveys is moved into summer 1981.

2. Survey of Libraries. An Egyptian consultant to the Cairo project team, Dr. Zeheery, has drafted conclusions from this survey, discussed them with me and is currently finishing his report. King Research continues to develop the selection algorithm for supplementing Egyptian collections.

3. Database search services. The SDI services at NIDCC is operational; total requests number 350 as of mid-March, with a 1-day high of 17 requests. The turnaround time continues to be less than satisfactory, with no inherent obstacles to its improvement. The Cairo-Atlanta data transmission test has been delayed once more, on account of the inability of ASRT to obtain a direct telephone line to the U.S. Project consultant Dr. Banaa El-Hadidy has been requested to begin devising criteria and procedures for evaluating this search service experiment.

B. OTHER TECHNICAL ACTIVITIES

1. The microcomputer system at the ASRT has been programmed to begin generating three databases: the ASRT scientific personnel, a correspondence file index, and a bibliographic reference file on Sinai. A fourth database on patent citations is planned. Dr. Hosny is developing a proposal for implementing full Arabic capabilities on this microcomputer.

2. A draft of system design concepts was prepared by the undersigned for discussions with Egyptian project members. The draft document will be given limited distribution in April.

3. The Egyptian project team began issuing a public newsletter featuring project goals, ctivities, and personnel.

C. ADMINISTRATIVE MATTERS

1. The Egyptian Steering Committee was reorganized in March 1981 by ASRT President Prof. Badran. Two new members were appointed to the Committee: Prof. Dr. Ali Selmy, and Prof. Aziz El-Kholy, M.D. The Committee is chaired by Prof. Badran, and Dr. Osama El-Kholy (member of JCC) has been appointed as a consultant to the Committee and to Prof. Badran. Three former members of the Committee were not reappointed: Prof. Hasrassy, Prof. Younis, and Mr. El-Dweini.

2. An Egyptian project team of 19 professionals has been assigned to work on the delayed Phase I activities, under the direction and supervision of three members of the Steering Committee (Drs. Gad, Madkour, and Selmy).

3. The undersigned visited Cairo on March 19-26 and held discussions with Prof. Badran, the new Steering Committee, and with project staff members. Presentations were given to the director of CAPMAS and to the director and staff of the Military Medical Academy. Brief consultancies were offered to several other projects sponsored by USAID.

Respectfully submitted,

Vladimir Slamecka
Project Director

VS/al

cc: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Reports Coordinator, OCA
Mr. Rumiano
US Consultants

Feb., 1981

ASRT NIDOC newsletter

Bi-Monthly
no. : 1

The Egyptian Scientific and Technological Information Services. Academy of Scientific Research and Technology

Editorial

The Scientific and Technological Information Project is actually going through a very critical phase in its life span.

Indeed, being to day at the cross roads whereby - as a polaroid shot - the various contours and basic configuration of the overall system are starting to emerge as a result of Phase I of the project's activities; critical decisions and orientations are to be decided upon and endorsed for Phase II.

Even the most basic concepts are to-day put to question :

* *What does 'Scientific and Technological Information' really encompass?*

* *What are the relative weights of its components?*

* *Are we going to opt and confine ourselves to the 'easy bibliographic research support oriented type of data-file? or*

* *Are we to address ourselves to the more intractable, polemical, sets of factual data?*

* *Are we to concentrate on the acquisition of readily, commercially available, data bases FOR Egyptian S & T ? or*

* *Shall we have the courage to orient our efforts towards the development of indigenous data files ON Egypt ?*

* *Should our target community of users be the modest easy to satisfy "Egyptian Researchers" who having LITTLE - will thus appreciate any LITTLE MORE?*

* *Or should our privileged users be the "almighty" Decision Makers at the top level of the hierarchy?*

* *Who are our users?*

Do they know that they need information? ...
If yes, do they know, what types? ..
Where to fetch for them?...
Once available, if ever, will they use it ?...
Will they allow its usage?...
* *Can this project materialise?...*
* *Will it be allowed to materialise?.*
* *Can we hope for a self-sufficient all-Egyptian entity?..*
* *Will it live after Phase II? ..*
* *Will it live through Phase II? ....*
... Indeed we are at a very critical phase of the Project's life span...

Dr. M.A.K. MADKOUR
PROJECT MANAGER

In-Service Training for Information Specialists

The in-service training to provide mastery of special skills, procedures and techniques in information handling — entrusted to the Catholic University of America — is progressing according to plan. Two groups have already completed their training in the USA and have started work in Egypt. Another group of trainees, due to return in February 1981, will be responsible for the project's acquisition policy, database design and union catalogues.

A group of four trainees left Cairo to join the Catholic University of America in Washington early January 1981 to be trained in the following fields for 6 months :

- Bibliographic database design.
- Budgeting of information centres and services.
- Descriptive and subject cataloguing.
- Development of training programs in information network.

These trainees on their return to Egypt will join the nucleus of information officers formed through the project, and that are to make the project come through.

Collection Assessment Project

The King Research Inc., of Maryland USA, is jointly working with members of the STI Project to determine the best means for strengthening the information and data resources in Egypt.

To accomplish this, three surveys are being undergone :

1. Information requirements survey which will provide a broad overview of the kinds of information and data resources needed in Egypt, e.g.

   a) types of resources needed;
   b) subject disciplines; and
   c) geographical distribution of information users and resources.

2. Information resources surveys which will gather information on the current data and documents resources available within specific organizations, providing us with an overview of :

a) geographical distribution of existing resources,
b) available access tools to information resources,
c) existing information services,
d) existing document delivery schemes;

3. Collection assessment survey on a specific sample of 25-30 libraries and information centres in Egypt.

Micro Computer-Maxi Impact....

Quote

«It is said that the days of huge main frame computers are over, the smart thing nowadays is to think small and opt for the micro option. Granted that a L.E. 5,000 machine would not have the capabilities of a L.E. 2.000.000 one, but it is getting to be more and more likely that five or ten of L.E. 5,000 micros in a properly designed distributed system would be able to do the job of the two million pound biggy, in a far more efficient way with tremendous positive impact on the whole organization's «modus opperandi».

Unquote

Any polemical veleities ? ....

News Items

* Prof. Dr. V. Slamecka, Project Director, and Dr. Madkour, Project Manager, have recently (12-17 December 1980) presented a paper concerning «Organization Structures of National Information Systems» at the «International Congress on Applied Systems Research and Cybernetics» in Acapulco, Mexico.

The paper dealt with the major topics relating to the design of a national information system and policy to support the socioeconomic development. It reviewed the Egyptian STI project experiences in terms of :

1. Distinctions between evolutionary national information systems and policies and those that are planned and engineered de novo;
2. Issues of feasibility and acceptance of planned information policies and systems;
3. Differences between the more traditional systems of «scientific and technical information» services and those intended to support the broader mission of socioeconomic development:
4. Approaches to organizational structures of information systems and services at the national level.

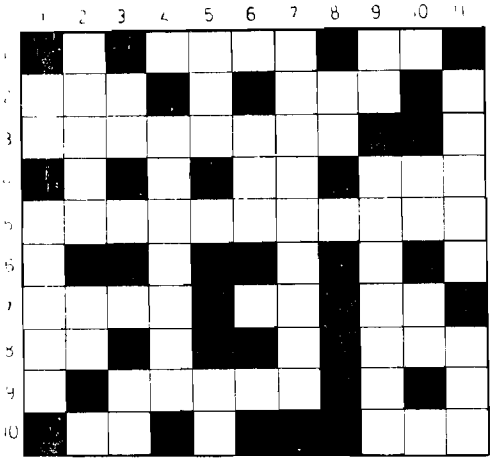
* Our Mexican data link has informed us that in Acapulco men never need to wear either ties or jackets unless they are planning to get married or buried.

Last Flash News

We are happy to announce the appointment of Dr. Aziz El Kholi as a member of our Project's Steering Committee.

Dr. El Kholi (Ministry of Health) has acquired a vast amount of experience in the field of information in his own domain.

Debugging



Across

1. Acronym of Egyptian Scientific brain tank; James Bond's class number
2. To ... is human (reversed); past tense of «have».
3. Machine that answers all .
4. Similar; take my hand.
5. Our field.
7. Spherical-shaped roof; either ...; type of circuit (abbr.).
8. Example (abbr.) ; an American agency (abbr.).
9. Our clients in informatics.
10. The British CIA ; positive reply.

Down

1. Type of circuit (abbr.) ; an entry.
2. A colour ; proceed (reversed).
3. Middle East (abbr.) & (reversed) ; America (abbr.).
4. Information cooking.
5. Back up for power shut down (reversed) ; I (reversed).
6. Rug (reversed).
7. Descriptors reservoir.
8. Pharaonic God (reversed).
9. Accomplish (reserved) ; knowledge abode.
10. Two vowels ; CIA with no agency.
11. A key (reversed) ; opposite of happy.

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ll subscribers of our Newsletter, in fact to all concerned, we will be happy to receive any comments or estions that will add to the prosperity of the project, at the following address :

STI Project, ASRT, National Information and Documentation Centre (NIDOC), Tahrir Street, Dokki, Cairo, Egypt.

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

May 1, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF Contract INT-7924187 covers the period of April 1981.

A. STATUS OF CURRENT ACTIVITIES

1. Major Survey and Data Analysis.

The reassessment of survey forms and data was completed by Cairo project Team during April, and re-keying of all data into the computer has begun. All data will be recomputed in Egypt; a backup provision, allowing for the computer processing of the data under the SPSS software at Georgia Tech, has been investigated and its cost estimated. Cairo project management estimates that computer outputs should become available by the end of May. The effort is well-organized and proceeds with a sense of urgency. Meanwhile, U.S. consultants continue structuring and drafting the narrative content of the reports on information policy (Mr. Adams) and national information requirements (Mr. Sarasohn). U.S. consultant Dr. Hersey has completed his project commitment, but will review the compilation of Egyptian R&D projects, when published by NIDOC.

2. Survey of Libraries.

Final report from Egyptian consultant Dr. Zehery was completed in April and is underway to the U.S. The report reviews and summarizes findings of the library surveys and makes extended recommendations relative to the strengthening of STI resources in Egypt. Kins Research has begun formulating a decision rule and a selection process for the identification of acquisitions of STI materials by Egypt. The actual selection will require, as input, analysis of the information requirements of Egypt. Since preparing the selection list is not independent of the readiness of Egypt to go ahead with the acquisitions, a joint decision will be made not later than June 1981 whether the selection process should be deferred to Phase II.

C. ADMINISTRATIVE MATTERS

1. Two additional executives were appointed to the Egyptian Executive Committee: the president of the Military Medical Academy and the director of CAPMAS. Both organizations exhibit substantial interest in collaborations with the project.

2. The Cairo Project Manager Dr. Madkour and the undersigned attended and addressed the JCC meeting in Washington, April 1-2. Subsequently, Dr. Madkour and Professor O. El-Kholy, member of the JCC, visited Georgia Tech.

3. A paper on the project, submitted to and delivered at the December 1980 International Congress on Applied Systems Research and Cybernetics, held in Acapulco, Mexico, won a Meritorious Award of that conference. It will appear in the Proceedings, to be published by Persamon Press.

Respectfully submitted,

Vladimir Slamecka
Principal Investigator

VS/al

cc: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
Reports Coordinator, OCA
US Consultants

3. Database Search Services.

The STI service at NIDOC is operational with supplemented staff, and the project experiment is in full progress. Georgia Tech Library has carried out a preliminary and informal review of the US costs of the service, based on over 300 SDI and retrospective searches; the results indicate that the costs related to vendor charges and communications are most reasonable. The design for the overall evaluation of the experiment is overdue, and steps will be taken in May to correct this situation.

2. OTHER TECHNICAL ACTIVITIES

1. Various elements of the design study which do not depend entirely on the analysis phase were begun or continued during April. They have to do with the conceptualization of the national network of information resources and services, the specification of desirable characteristics and obligations serving as nodes in the network, and with a beginning specification of the functions and technical processes. The timeliness of these efforts is underlined by the intensive publicity given to the project by the Egyptian Executive Committee and by the existence of organizations prepared to explore affiliation with the national information network.

2. The ASRT computer facility continues to demonstrate need for an Arabic interface. Although this effort is outside our Phase I statement of work, both Cairo and Atlanta are anxious to pursue it. Cairo project team member Dr. Hosny has outlined in April a technical approach to implementing high quality Arabic output as well as an Arabic query language to the database software, and he plans to visit the US in early summer.

G 36-644

GEORGIA INSTITUTE OF TECHNOLOGY
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June 1, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF Contract INT-7924187 covers the period of May 1981.

A. STATUS OF CURRENT ACTIVITIES

1. Major Survey and Data Analysis

All survey data aggregations initially specified have been generated at the Cairo University Computer Center, and as of this date are enroute to the US Contractor. The Contractor forwarded specifications for several additional computer outputs; these will be generated by Cairo in June. Other materials prepared by the Egyptian project team and received in Atlanta by the end of May include: a) a report descriptive of Egypt's demography, government, economy, etc., intended as a general introduction to documents emanating from Phase I; b) a summary of Egyptian vocational training programs in information work; c) a draft of the survey reports on foreign assistance in information work; and d) a report on the information manpower infrastructure in Egypt, based on data from the main survey. On the US side, a statement of national information policies and an outline of discussion themes for each such policy has been completed in late May and forwarded to Cairo for comments.

2. Survey of libraries.

Dr. Zehery's report on this survey was submitted to Dr. Madkour and forwarded by him to the US Contractor at the end of May. Comments on the report will be prepared by King Research.

3. Database Search Services

As of the end of May, Georgia Tech has processed 291 retrospective searches (10 of which were re-run), 109 of which are continued on an SDI basis. Approximately 300 additional search requests had been received by the end of May;

their processing was delayed until notification of a budget increase for this activity is received from the contracting agency. (An informal assurance of such an increase has been received on May 30, via copy of a letter from Mr. Riley to Prof. Badran, and the Georgia Tech Library has begun processing this large backlog.) The significant and urgent fact is, however, that this backlog of search requests encumbers and fully exhausts the budget increment (calculated to cover 300 additional searches); consequently, Egypt should immediately request further funds if this activity is to continue.

The document delivery service to Egypt has increased very considerably in volume; data on this service will be reported next month.

Project consultant Dr. El-Hadidy has begun drafting evaluation procedures. A modification of the user feedback form has been suggested to NIDOC. Tentative date (mid-June) has been set for testing the data link Cairo-Atlanta.

B. OTHER TECHNICAL ACTIVITIES

1. The following excerpts from a status report by Cairo, received on May 31, pertain to activities on the ASRT microcomputer:

   a. Database of ASRT projects: The database structure has been specified, including the coding scheme for technical terms and the transliteration of Arabic names. The Arabic directory of projects, published by the ASRT, is being translated into English, for computer entry. Data entry has begun.

   b. Database on project correspondence: The database structure has been specified, and some 100 pieces of correspondence have been entered into the computer following the translation of Arabic names and entries.

   c. Database on patents: A database structure for the patent collection of the ASRT has been designed and demonstrated. The ASRT officer in charge of the patent office is currently visiting INPADOC in Vienna, Austria, investigating possibilities of collaboration.

d. Database on Sinai research: The database format has been specified, as has the data entry form for each research document. In general, document titles and other information must be translated, and Arabic names transliterated. A transliteration scheme has been devised, but the Library of Congress scheme is being considered.

2. Dr. Hosny, Cairo project team computer expert, prepared a memorandum containing proposals for adding Arabic language facilities to the ASRT machine software.

3. The US Consultant approached informally some 30 firms for data regarding computational facilities suited to information services envisaged for Phase II.

C. ADMINISTRATIVE MATTERS

1. Deliberations have continued in Cairo during May regarding Egyptian organization for Phase II.

2. Professor Badran requested USAID Cairo to amend the Georgia Tech contract, so as to allow uninterrupted continuation of NIDOC service operations, and to support Dr. Hosny's visit and work in the US. The request has been approved.

3. Drs. Madkour and Hosny are tentatively scheduled to come to Atlanta in early July for a period of three weeks. A request for travel authorization has been submitted by US Consultant to NSF.

4. Georgia Tech extended the subcontract with King Research through October 1981.

Respectfully submitted,

Vladimir Slamecka
Principal Investigator

VS/al
cc: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCA Reports Coordinator
US Consultants

G 36-64

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

August 3, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF contract INT-7924187 covers the period of June and July 1981. We appreciate the Foundation's consent to submit a two-month report.

A. STATUS OF CURRENT ACTIVITIES

1. Data Analysis

The survey data processed by Cairo University Computer Center was received in Atlanta in late June and early July. The Requirements Survey data forms an adequate basis for completing the report on this survey; Mr. Homer Sarasohn has forwarded a partial draft of the report in mid-July, and expects to complete the entire draft during August. Some output tables from the Resources Survey contain inconsistencies which are currently being clarified in Cairo; once they are resolved, the Resources Survey report can be completed. The data in hand is useful in the design effort. Since the U.S. Contractor's emphasis has shifted to the design activity (as a result of the ASRT President's desire to have the U.S. Contractor make an initial presentation on the system design in September), the completion of the Resources Survey report is likely to be delayed.

2. Survey of Information Collections in Egypt.

On July 17, King Research, Inc. presented results of calculations concerning alternative strategies for strengthening information resources of Egypt. The report will be completed in August. Dr. A. Selmy, a member of the Egyptian Advisory Committee, requested that the report also include an assessment of the quality of the holdings of the Egyptian libraries surveyed. King Research will consider the implications of this request on their workload after they receive the original questionnaires from Cairo.

3. Database Search Services

Due to the regulations of the State of Georgia, the Georgia Tech Library had to suspend processing of bibliographic searches requested by Cairo until an official notification of approval of the incremental contract budget. The work was resumed in the last week of July, and the Library is attempting to rapidly reduce the backlog of more than 300 search requests. Meanwhile Cairo has decided to freeze accepting new search requests until after the backlog is substantially reduced.

Consultant Dr. El-Hadidy has submitted a list of factors to be taken into consideration in his evaluation of the search service experiment. The undersigned has verbally informed Dr. El-Hadidy that while the list of factors was acceptable, the scope of the evaluation appeared too ambitious for the resources available for this effort.

A test was carried out on June 4 to transmit digital data via telephone from Cairo to Atlanta. The test was not successful: the Cairo modem showed data being transmitted from the ASRT computer, but no data was received in Atlanta. It is theorized that the data is being filtered out somewhere between the two endpoints. General Electric Company, which assisted the U.S. Contractor in monitoring the transmission, suggested one additional experiment using a different modem; this is scheduled for September.

B. OTHER TECHNICAL ACTIVITIES

1. Cairo project member Dr. M. Hosny and the U.S. Contractor studied, during July, the problem of Arabizing the ASRT computer software. Dr. Hosny's visit to Atlanta clarified the nature of Arabic functions desirable in the information processing facilities of the Egyptian information system. Arabizing the ASRT computer will involve an enhancement of its CPU, and manpower effort in programming.

2. A database on literature relating to information systems and socioeconomic development, compiled by U.S. Contractor, was made available to Dr. Hosny for loading on the ASRT computer.

3. The U.S. Contractor continues to assess a large range of hardware and software for possible application in Egypt during Phase II.

C. ADMINISTRATIVE MATTERS

1. Drs. A. Selmy and A. Gad, members of the Egyptian Steering Committee, and Cairo Project Manager Dr. M. Madkour visited the Contractor in Atlanta on July 15-18, along with Dr. Hosny. The agenda of the Contractor's two-day presentation is attached to this monthly report. NSF Project Officer Mr. E. Pronko attended the presentation.

2. The visiting members of the Egyptian Steering Committee informed the U.S. Contractor that his initial presentation on the system design would be scheduled for mid-September in Cairo. Due to the changes over the past year in the original project schedule, it appears inevitable that unless the work scope of the project is modified, the contract period will have to be extended beyond the currently scheduled termination date.

Respectfully submitted,

Vladimir Slamecka
Project Director

Enclosure
cc: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCA Reports Coordinator
US Consultants

Suggested Agenda
for Drs. Selmy and Gad

Thursday, July 16

9:00	Leave hotel
9:30	Project status (V. Slamecka)
10:45	Tour of School facilities
11:30	Tour of library
12:30	Lunch
1:30	Egyptian STI system design (V. Slamecka)
4:30	Adjourn

Friday, July 17

9:00	Leave hotel
9:30	Mr. J.W. Dees, Director, Office of Contract Administration
10:00	Dr. Joseph Pettit, President
10:45	Evaluation of alternate acquisition schemes (McDonald)
11:30	Database access from Egypt (J. Dodd)
12:30	Lunch
2:00	Computer technology for STI system (H. Camp)
3:00	Results of requirements surveys (H. Sarasohn)
4:00	Open
7:00	Dinner

Ladha Continental Hotel 892-6800
Dr. Slamecka's office 894-3156
Dr. Slamecka's home 874-1337

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

September 5, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF contract INT-7924187 covers the period of August 1981.

A. STATUS OF CURRENT ACTIVITIES

1. Major Survey and Data Analysis. A report on the Requirements Survey has been completed by Mr. Sarasohn. Revised, final computer outputs of data from the Resources Survey were received from Cairo August 30; however, work on the report of this survey was temporarily halted, due to the request of Cairo to complete first a draft of the design study.

2. Egyptian STI Holdings. Final report by King Research, Inc. is in preparation, scheduled in draft for September.

3. Database Search Services. Georgia Tech Library was notified in August of the approved budget amendment, and resumed searches. The entire backlog of 300 searches was processed in two weeks, and finished by August 29. New search requests have begun arriving, and Cairo was informed that there now are virtually no contract funds to process them.

4. System Design. Following Prof. Badran's request, in August, for a mid-September presentation in Cairo on the proposed system design, all efforts by the undersigned were directed to this goal. A first draft of the design study report was sent to Cairo by courier on August 30, for internal review by the Advisory Committee.

B. OTHER TECHNICAL ACTIVITIES

1. Further study of the issues of Arabizing the ASRT microprocessor software suggests that at this time the most propitious solution is to purchase a proprietary operating system fully compatible with the full version of UNIX.

2. Technical inquiries into the problem experienced in data transmission from Cairo suggest that an X.25-compatible modem should be tried. Another experiment will be run in September or October.

C. ADMINISTRATIVE MATTERS

1. The Georgia Institute of Technology has requested NSF to extend the expiration date of this contract through January 1981, to provide more time to accomplish the project's objectives. Contract funds will expire by the end of December, however.

2. The undersigned is scheduled to travel to Cairo on September 20, to present recommendations and schedule for implementing a design of a national STI system.

3. Copy of correspondence between presidents of the ASRT and Georgia Tech is enclosed, as is that of a communication from Prof. Badran to the undersigned.

Respectfully submitted,

Vladimir Slamecka
Project Director

Enclosures
c: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCS Reports Coordinator (2) ✓
US Consultants

ARAB REPUBLIC OF EGYPT
ACADEMY OF SCIENTIFIC RESEARCH
AND TECHNOLOGY

101, Kasr El Eini St. Cairo

Dear Professor Pettit,

I am writing to convey my appreciation for all the constructive efforts Georgia Tech.'s School of Computer and Information Sciences has undergone towards the success of our ambitious National STI project.

We are looking forward to this continous harmonious association in the coming Phase II of the project.

Prof. Slamecka has as expected, played a major role towards the success of this project and I would appreciate you extending him my warmest gratitude.

We sincerely hope that your schedule in the coming year would permit you spending a few days in Egypt.

Looking forward to an extension of a mutually fruitful cooperation, I remain,

Sincerely yours,

Dr. I. Badrah,
President.

Prof. Dr. J. Pettit,
President,
Georgia Institute of Technology,
Atlanta,
Georgia, 30332,
USA

c.c. Ms. J. Weber, AID Cairo

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332

OFFICE OF THE PRESIDENT

August 24, 1981

Dr. I. Badran
President
Academy of Scientific Research and Technology
101, Kasr El Eini St.
CAIRO,
ARAB REPUBLIC OF EGYPT

Dear President Badran:

Your letter concerning the cooperative effort between our institutions was most appreciated. I will certainly contact Professor Slamecka and tell him of your gratitude for his leadership in the National STI project.

Thank you again for your thoughtfulness in writing to me.

Sincerely yours,

J. M. Pettit
President

JMP:jg
cc: Dr. H. C. Bourne, Jr.
Dr. H. S. Valk
Dr. Raymond Miller
Dr. Vladimir Slamecka

ARAB REPUBLIC OF EGYPT
ACADEMY OF SCIENTIFIC RESEARCH AND TECHNOLOGY

101, Kasr El Eini St. Cairo

Dear Dr. Slamecka,

I have been very favourably impressed and genuinely pleased by Drs, Selmy, Gad and Madkour's report on their facts-finding and evaluation mission.

I am looking forward to your next visit to Cairo sometime towards September 21, 1981 and I hope your schedule will permit for a two-week stay as there is much to discuss and do.

I believe that draft reports concerning all points and subjects to be discussed should be sent sometime ahead of your arrival to give all parties concerned enough time to read and study.

I would like to take this opportunity to inform you that it would give me great pleasure to have you jointly implementing with us Phase II of the STI project. I shall be writing to the parties concerned in this repect in a matter of days.

Finally please extend to your staff and other members my apreciation for all the good work they are undergoing on our behalf.

Truly yours.

Dr. I. Badran,
President.

Dr. V. Slamecka,
Georgia Institute of Technology,
School of Information and Computer Science,
Atlanta,
Georgia 30332,
USA

c.c. Ms. J. Weber - AID, Cairo

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

October 7, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF Contract INT-7924187 covers the period of September 1981.

A. STATUS OF CURRENT ACTIVITIES

1. System Analysis

A draft of the report "Information Needs and Uses in Egypt" by Homer M. Sarasohn has been issued; the report summarizes the findings of the national survey of information requirements in Egypt. Data from the second survey (of information resources in Egypt) has been aggregated in Cairo and received in Atlanta, and work on the report will resume in October. The first draft of the document on national information policy, by Scott Adams, has also been received in mid-September, and will be issued during October.

2. Survey of Egyptian Library Holdings

A portion of recalculated cost figures relating to the objective of strengthening document collections of Egypt has been received from King Research, Inc. on September 20. The complete report is expected in October.

3. Database Search Services

Following the elimination of the backlog of search requests, Cairo continues to receive new requests for searches at a rate of 10-17 per day. Since Georgia Tech has exhausted the contract funds allocated for this purpose, a new backlog of searches is being accumulated. Mrs. Gabran, ASRT/NIDOC, is aware that no new searches are being processed. I made an urgent appeal to Dr. Madkour, Cairo Project Manager, to have ASRT/NIDOC initiate a request for supplementing contractual funds for this purpose if the service is to continue beyond the experiment. No such action has been taken as of September 30.

Consultant Dr. El-Hadidy visited Cairo between September 21 and October 6, to evaluate the search service experiment. He interviewed several dozen users, analyzed the feedback data collected by ASRT/NIDOC, and reviewed the Egypt-based procedures associated with this service. Dr. El-Hadidy's report is expected toward the end of October.

B. OTHER TECHNICAL ACTIVITIES

1. System Design and Implementation Reports

I completed and delivered to Egypt, on September 21, drafts of two technical documents: "The Egyptian National System for Scientific and Technical Information: A Design Proposal" and "The National STI System of Egypt: Implementation." At Prof. Badran's request I visited Egypt from September 21 to October 5, to present the design and implementation reports to the project's Executive Committee. Several meetings were held, the minutes of which were prepared by Cairo and are attached. The following major conclusions were reached during these discussions:

a. The Executive Committee has endorsed the proposed STI system's structure, functions, and governance. Further assessment of the system design is intended, partly through a two-day invitational roundtable that is to include representation of three parties: system designers, system implementers, and users. The ASRT requested USAID-Cairo assistance in organizing such a roundtable.

b. The Executive Committee has endorsed the implementation plan, noting that its schedule seems too optimistic. The Committee will require more time to study the details of the implementation plan.

c. Upon recommendation of the Executive Committee, ASRT President formally requested USAID-Cairo to contract with the Georgia Institute of Technology for the system implementation (Phase II), on a sole-source basis. A copy of Prof. Badran's letter is attached.

d. ASRT has issued a decree establishing the Egyptian project management structure for Phase II. It consists of a Board of Directors, a Project Manager, and a technical implementation team. Members of the Board of Directors were named, and they include several ministers. Dr. Mohamed Madkour has been proposed for the post of Egyptian Project Manager. Members of the technical implementation team remain to be identified. The effort in Phase II is housed as a project of the new organizational element of the ASRT, the "National STI Center"; Dr. A. Selmy, a member of the current Executive Committee, has accepted the directorship of this Center. He and the Egyptian Project Manager shall have the full authority over Egyptian activities and budgets of Phase II; the Board of Directors is not to be involved in day-to-day decision-making.

2. Miscellaneous

a. The undersigned presented a seminar to staff members of ASRT/NIDOC, and answered questions concerning the national system design.

b. At the invitation of NIDOC, the undersigned visited the new computer center of the National Research Council (NRC). The center, equipped with a Perkin-Elmer computer, has taken over the responsibility of building certain ASRT-related databases which had been initiated on the TERAK computer at the ASRT.

c. I urged the Executive Committee to press on with the early introduction to Egypt of a packet-switching data communications facility. The Executive Committee intends to discuss two proposals (from TELENET and TYMNET) with the national telecommunications agency.

d. Dr. Madkour and I have discussed the schedule of activities for the next three months, including completion of the US Contractor's reports, the process of identifying and evaluating candidates for the information services and document repositories in the national STI system, and the recruitment, appointment, and training of the Egyptian technical implementation group for Phase II.

e. Assuming the concurrence of USAID to contract for Phase II with Georgia Tech, it is essential for Georgia Tech and Egypt to hold discussions regarding the division of their respective responsibilities. For that purpose, an Egyptian executive should visit the Georgia Institute of Technology for a period of at least one week, at the earliest possible time.

Respectfully submitted.

Vladimir Slamecka
Professor

Enclosure
cc: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCA Reports Coordinator
US Consultants

Executive Committee Meeting
Session No. 13

The meeting started at 5.30 p.m. on Tuesday 22, 1981.

Attendance

*	Prof. Dr. A. El Salmy	Executive Committee Member
*	Dr. A.M. Hallouda	" " "
*	Prof. Dr. A.A. Kamal	" " "
*	Dr.M.A.K. Madkour	" " " (Project Manager)
*	Prof. Dr. V. Slamecka	Project Director Georgia Tech.
*	Ms. Janice Weber	AID Project coordinator
*	Dr. M. Hosny	STI Project consultant
*	Dr. M. Mikhail	STI " officer
*	Mr.N. Elewa	STI " "

both :

*	Prof. Dr. A.M. Gad	Executive Committee Member
*	Dr .A. El-Kholy	" " "

(Did not attend being on mission abroad).

Agenda

The project Manager Dr. Madkour opened the Session by presenting the meeting's agenda in the following items :

- Scheduling the meeting with Prof. Slamecka for the next fortnight.
- Detailed discussion of the Design Proposal.
- Discussion on the implementation plan.
- A plan of specific tasks for the forthcoming 3 months
- Discussion of the scope of work for Phase II

6 - Series of specific meetings on issues such as : telecommunications / (Telenet, Tymnet and their potential joint users:broadcasting, Banking ...).

7 - The projects institutionalization and organization.

Ideas presented and discussion

* Professor Slamecka presented copies of the three reports he prepared entitled :

1 - The National STI system of Egypt : a design proposal.
2 - The National STI system of Egypt: Implementation.
3 - The Needs and uses of Egypt.

A brief explanation was given to describe their contents.

Dr. Slamecka stated that the following contractor's reports are still due : Information Resources of Egypt, being the analysis of data collected in the resources survey; Manpower Development Proposal, whose preparation had to await the results of the resources survey; and the National Information policy Report, which is now available as first draft and can be completed within two weeks after Dr. Slamecka's return. A fourth report stipulated in the contract has to do with NIDOC redesign; Dr. Slamecka pointed out that the function of N.DOC in the forthcoming National STI system must be determined first before its redesign is undertaken.

* Through one hour and half the committee reacted to the following items:

. How can we plan to make this system work?

(Janice Weber)

We need time:

- To review and evaluate our activities.
- To inventory the manpower, e.g. the r trainees, what they gained their qualifications, their experiences.. etc.
- To determine the potential users, resources and services.
- To read, summarize and translate the interim reports "into Arabic".
- To arrange a meeting with Dr. Nabeel Ali to discuss application aspects.

(Prof. El Salmy)

An intermediate stage between the two phases may be desirable to prepare ourselves. We need:

- Time to introduce our ideas to the top levels of decision makers.
- A series of meeting to discuss the system proposal.
- An appropriate entity to sponsor and house the National services nodes.
- To develop and procure the necessary cadre of professional expertise.

(Dr. Hallouda)

Decisions and Recommendations

The committee agreed on the following :

* The schedule of the forthcoming meetings will be as follows : -

*	WED. 23/9	12 noon	Enlarged Meeting, ASRT Main Conference Room. Presentation by Dr. Slamecka, General Discussion.
*	FRI. 25/9	8 a.m.	Executive Committee Meeting. Design Proposal. General overview. The Rationale.
*	SUN. 27/9	5 p.m.	Executive Committee Meeting. Design Proposal. The users subsystem. The Resources subsystem.
*	WED. 30/9	5 p.m.	Executive Committee Meeting Design Proposal. The Services subsystem. The Governance.
*	SAT 3 /10	5 p.m.	Executive Committee Meeting. The implementation Plan
*	SUN. 4 /10	5 p.m.	Executive Committee Meeting,. implementation Plan
*	MON. 5 /10	5 p.m.	Executive Committee Meeting. Schedule of Activities over the remaining period. October - December, 1981.

* Prof. El Salmy will arrange a meeting between the Committee and Dr . Nebeel Ali to discuss issues related to implementation.

* The meeting adjourned at 7.00 p.m.

* The next session will be on Friday Sept, 25, 1981 (8 a.m.) at Al Ahram Building.

THE STI PROJECT

Executive Committee Meetings
Session No. 14

The meeting started at 8.30 a.m. on Friday 25, 1981.

Present:

Dr. A.M. Hallouda	Executive Committee Member
Prof. Dr. A.A. Kamal	" " " " "
Dr. M.A.K. Madkour	" " " " " (Project Manager)
Prof. Dr. V. Slamecka	Project Director Georgia Tech
Ms. Janice Weber	AID Project Coordinator
Dr. M. Hosny	STI Project Consultant
Dr. M. Mikhail	STI Project Officer

Absent:

Prof. Dr. A. El Salmy	Executive Committee Member (indisposed)
Prof. Dr. A.M. Gad	Executive Committee Member (on mission abroad)
Dr. A. El Kholy	Executive Committee Member (on mission abroad)

Agenda

Dr. Madkour introduced the session by stating that its main purpose is to discuss the system design proposal of Prof. Slamecka.

Prof. Slamecka opened the discussion by a presentation on the developmental trends of national information systems over the past 25 years. Subsequently, he treated the following topics of the design proposal:

- Information Users:
  - 60% of the managers surveyed confirmed their awareness of and need for introduction
  - Only 47% of the teachers and researchers confirmed such an awareness.

.../2

* *Nature of Databases:*
  - *Bibliographic*
  - *Textual*
  - *Factual*

* *Role of Information Technology in the national system.*

Considerable discussion concerned the relative emphasis on bibliographic vs non-bibliographic databases. Dr. Slamecka felt that since one of the three major objectives of the national system is to organize Egypt's published research literature, it is essential that a bibliographic database of such literature be developed during Phase II. Examples of non-bibliographic databases were discussed, and it was agreed that large numeric databases (such as economic input/output matrices, demographic databases, etc.) were beyond the initial capability of the system's information services, and dealt with actually by CAPMAS. The need for including CAPMAS as one of the Priority entities to house one of the proposed network nodes. It was considered essential that the priorities for database development be determined in conjunction with the user communities of each information service.

To clarify the issue of databases in the national system Dr. Slamecka agreed to add to the proposal a section on non-bibliographic databases, in as much as the proposal currently emphasizes bibliographic database, even though by the way of example. Dr. Slamecka will also review the manapower requirements of the information services in this light.

Other issues briefly discussed included the following: salaries of Egyptian personnel in Phase II; organization of the Egyptian project team for Phase II; appointment of the Egyptian Project Director, and vesting in him the necessary authority; and the urgency of informing AID - before the end of September - whether Egypt recommends a sole-source U.S. contractor for Phase II.

The meeting adjourned at 12:15 p.m. Discussions of the design proposal will continue at 5 p.m., September, 27 in the Academy.

The Minute of the Executive Committee Meetings•Session No. 15

The meeting started at 5.30 p.m. on Sunday Sept. 27, 1981 at the Academy.

Present:

Prof. Dr. A.El Salmy	Executive Committee Member
Dr. A.M. Hallouda	" " "
Prof. Dr. A.A. Kamal	" " "
Dr. M.A.K. Madkour	" " " (Project Manager)
Prof.Dr. V. Slamecka	Project director Georgia Tech.
Ms. Janice Weber	AID Project Coordinator
Dr. M. Hosny	STI Project Consultant
Dr. M. Mikhail	STI Project Officer
Ms. N. Elewa	STI Project Officer

Absent:

Prof. Dr. A.M.Gad	Executive Committee Member (on mission abroad)
Dr. A. El Kholy	Executive Committee Member (on mission abroad)

Agenda

1- To approve Minutes of two previous meetings.

2- To complete the presentation and discussion of system proposal.

3- To begin presentation and discussion of the implementation proposal.

Prof. Slamecka completed his presentation of the Design Proposal, specifically of information technology to be used in the STI system and of the system's governance.

Regarding the hardware/software recommendations Dr.Hosny expressed the opinion that the proposal was somewhat too optimistic, and that a substantial amount of work was necessary to develop the system described.

Prof. Slamecka asked Dr. Hosny to critique especially sections dealing with Arabic software. The recommended functional specifications of the computer technology were generally acceptable to the Committee, but would be studied in more depth.

Subsequently Prof. Slamecka outlined the structure of the Implementation Report draft, and explained the details of the cost and schedule estimates. Regarding schedules he contained that they were possibly too optimistic. The Committee observed that the "implementation" effort was, in large part, system "development" and suggested that as much it should be differentiated from system "operation"; funding the latter was seen as Egyptian responsibility, whereas "development" (or "design implementation") would require US financial assistance.

Dr. Madkour presented several arguments endorsed by the Committee favoring the US support of senior Egyptian professionals heading the development phase.

Dr. Hallouda emphasised that the "development phase" should inevitably start with the following series of activities:

i) Detailed evaluation and subsequent detailed break-down of the designed system, additional foreign expertise in the area of: STI systems design, operation and usage being seeked.

ii) Concentrated training program addressing the various strata of users and operators coupled with a concerted advising/ awareness campaign.

iii) Institutionalisation of the Egyptian interim body entrusted with the technical/managerial responsibilities of the "development" phase.

The committee requested Dr. Madkour to:

1. Draft a letter to AID recommending contracting of Georgia Tech. for Phase II, with Prof. Slamecka as principal US consultant for the project.

2. Develop a job description profile of the Egyptian project manager.

3. Develop a list of the organizational and infrastructural pre-requisites, that are "conditia sinoe qua non" to

consider the start-up of the development/design implementation phase.

These proposals will be presented to the President of the Academy at 10 a.m. on thursday Oct.1, 1981.

The meeting adjourned at 8 p.m. The next session will be held at 11 a.m. Tuesaday 29, Sept. 1981 at CAPMAS instead of Wed. 30/9 to continue the discussion of Implementation plan.

THE STI PROJECT

Executive Committee Meeting
Session No.16

The meeting started at 11.30 a.m. on Tuesday Sept. 29, 1981 at CAPMAS

Present :

Dr. A.M. Hallouda	Executive Committee Member
Dr. M.A.K. Madkour	" " " (Project Manager)
Prof. Dr. V. Slamecka	Project Director, Georgia Tech .
Dr. Mamdouh Awny	CAPMAS EDP Consultant
Dr. M. Mikhail	STI Project officer
Mrs. N. Elewa	" " "

Absent :

Prof. Dr. A. El Salmy	Executive Committee Member
Prof. Dr. A.M. Gad	" " " (on mission abroad)
Prof. Dr. A.A. Kamal	" " "
Dr. A. El Kholy	" " "

AGENDA

* To discuss the implementation plan.

Members of the Executive Committee requested from Prof. Slamecka additional details regarding cost of database search services in the US, and discussed the issue of licensing foreign databases for Egyptian operations.

Dr. Slamecka stated that there was a possibility that information storage technology development in the next 5 years may provide for the distribution of digital databases in different forms (e.g. optical discs). He discusses with Dr. Hallouda the sectors priority i.e. Energy (Electricity, housing .....) as well as the cost estimate of SDI services.

The committee further addressed the issue of Phase II contracting and suggested that Dr. Slamecka spend at least a month in Egypt immediately after signing phase II contarct, to cover with Egyptain personnel the technical details and schedules of implementation. The joint mode of software development, by Egyptain and US experts was clarified.

The committee recommended an Egyptian US joint team group as technical implementation group.
Further, the committee reviewed with Dr. Slamecka the various points he had raised and a consensus was reached on all issues outlined.

Dr. Madkour presented the following drafts, requested in the previous session:

1. A draft of letter to be sent to AID for contract of phase II (attached 1)

2. Job description profile of the project director (attached 2)

3. Infrastructure pre-requistes for phase II.
All drafts were endorsed by the committee.

The session adjourned at 1.15 p.m. The next meeting being scheduled at 5.30 p.m. Saturday Oct.3,1981.

Dear Mr. Riley,

With reference to your letters dated January 20/81 , May 18/1981, we hereby confirm our agreement for the selection of Georgia Institute of Technology to pursue their consulting efforts during the STI Project Implementation (Phase II), on a sole-source basis. We feel confident that predominant capabilities for such a selection have been amply demonstrated throughout Phase I .

It is our understanding however, that a substantial part of the technical lesign and development responsibilities have to be endeavoured to Egyptian consultants.

We are putting the last touches to a work statement document, that shall :pecifically define the various programs and activities that the implementation process ncompasses, with a clear definition of the party of group of experts entrusted with heir execution responsibility.

We would however, ask you to kindly initiate the Georgia Tech's selection nd notification procedures with AID Washington to avoid any hiatus in the project's nplementation.

Thanking you, and AID Cairo's project staff for a constructive dedicated ipport throughout Phase I. We remain,

yours sincerely,

Dr. I. Badran.

II

مدير المشروع القومى للمعلومات العلميه والتكنولوجيه " مرحلة التصميم التفصيلى ـ والتطبيق الاختبارى "

" المواصفات "

١ـ شخصيه مصرية ذات رصيد أدبى وعلمى واسعين ، تتمتع باحترام عام يتيح لها الاتصال المباشر بالقيادات التنفيذيه بمختلف المواقع والأجهزة التنفيذيه المعنية بأنشطة المعلومات العلميه والتكنولوجيه فى قطاعات : ـ
الانتاج / الخدمات / التعليم والبحث العلمى .

٢ـ عدم الارتباط بوظيفة حكوميه ، وقبول مسئولية التفرغ لادارة المشروع لفترة الثلاث سنوات قبل المرحلة القادمه .

٣ـ خبرة مؤكدة فى مجال ادارة الافراد ومجموعات العمل من جانب ، وعلى تنسيق الجوانب الاداريه للتشغيل الدورى لمشروعات كبيرة من جانب آخر .

٤ـ خبرة واسعة فى مجالات نظم وتكنولوجيا المعلومات .

٥ـ الملم تام باللغه الانجليزيه ، وقدرة متميزه على الصياغه بها .

ـ المقومات الأساسيه "الحتميه" الواجب توافرها قبل البدء فى تنفيذ المرحله الثانيه

أولا ـ الأفـراد

١ـ مدير للمشروع بالمواصفات المحددة ، يفوض تفويضا كاملا (اداريا وفنيا وماليـــا) من قبل هيئة الاشراف والمتابعه على أن يكون مسئولا أمامها مباشرة .

وينسحب التفويض على حرية اختيار مستشاريه ومعاونيه والتعاقد معهم ، وفقـا لاحتياجات العمل وفى اطار الخبرة العلميه والعمليه المطلوبه ، فضلا عن مطلـــق صلاحيات تسيير الاعمال الفنيه والاداريه .

(لن يقل المرتب عن : ١٠٠٠ ـ ١٥٠٠ جنيها شهريا فضلا عن سيارة للانتقالات) .

٢ـ مجموعة من الخبراء التخصصيين فى مجالى :

* تصميم نظم المعلومات .
* تصميم وبرمجة نظم المعالجه الالكترونيه للبيانات .

وهى خبرات وكفاءات نادرة وشحيحه جدا ، سيصعب حتما اجتذابها والابقاء عليهـا (نظرا لقصر التكليف : حد أقصى ٣٠ شهر) . بل أن بعضهم قد يحتاج فتـــرة تدريبية للتأهيل والتوجيه .

يقوم مدير المشروع باختيار هؤلاء الخبراء والتعاقد معهم لتنفيذ مهام محـــدد فى آجـال محددة ، على أن يتوفر لكل منهم " موقع عمل خاص مناسب مجهز تمامـــا فضلا عن سكرتاريه فنيه واداريه من أعلى مستوى .

(لن يقل المرتب عن : ٦٠٠ ـ ١٢٠٠ جنيها شهريا) .

٣ـ سكرتاريه فنيه واداريه متميزه

تتوفر فيها : ـ الاجاده التامه للغه الانجليزيه : صياغة / واختزالا / وطباعة علـــى الآلة الكاتبة .

ـ الاجادة التامه للغه العربيـــة : صياغة وكتابة على الآلة الكاتبة .

ـ اعداد الملفات وتنسيقها .

ـ مستوى متميز من الذكاء والكياسه واللباقه والمظهر الحسن .

ـ وتفضل الخبرة السابقه فى تطبيقات مماثلة .

(لن يقل المرتب عن : ٢٠٠ ـ ٤٠٠ جنيها شهريا) .

٤ـ مسئول اداری / مالی یدعمه فریق عمل قوامه (فردان)
یتولـــــی امساك الدفاتر ومتابعة الموازنات والصرف ٠
(متفرغ ـ قد یحمل علی مساهمة الحکومه المصریه) ٠

* تحدید المسئولیات تحدیدا دقیقا ومنع التداخل والتدخلات الخارجیه ٠
* التمویـل المناسب ـ والتحرر من القیود الاجرائیـه للصرف ـ خاصة لاعمال التأثیـــ والصیانه ٠

ثانيا ـ موقع العمل والتجهيزات والمواصلات والاتصالات

١ـ موقع العمـل : ـ

١ـ حجرة استقبال بها سنترال للاتصال الداخلى ٠
٢ـ قاعة الاجتماعات العامه ٠
٣ـ حجرة مدير المشروع ٠
٤ـ " لسكرتارية مدير المشروع ٠
٥ـ حجرة للسكرتارية العامه للمشروع والمجموعه المركزيه للآلة للكاتبة ٠
٦ـ ٣ حجرات لرؤساء مجموعات العمل ٠
٧ـ ٥ حجرات لسائر أفراد الفريق ٠
٨ـ حجرة أجهزة التصوير والطباعه وتجليد التقارير ٠
٩ـ قاعة الحاسب الالكترونى ٠
١٠ـ قاعة النهايات الطرفيه للاسترجاع ومخاطبة الحاسب ٠
١١ـ قاعة المكتبة المرجعيه للمشروع والملفات الفنيه ٠
١٢ـ قاعة للسندوات والدورات التدريبيه ٠
١٣ـ حجرة المساعدات السمعيه والبصريه للتدريب ومكتبة الافلام ٠
١٤ـ حجرة الانشطة المعاونه : رسام + خطاط + ٠٠
١٥ـ بوفيه لاعداد المشروبات ٠
١٦ـ حجرة للسعاة وعمال النظافه ٠
١٧ـ دورتى مياه ٠

١٦ حجرة + ٥ قاعات + بوفيه + دورتى مياه

٢ـ التجهيزات والاتصالات

١ـ خطى اتصال تليفونى (على الاقل) " أحدهما مزود بالاتصال الآلى المباشر "
٢ـ خط تلكس وجهاز ارسال واستقبال يفضل نوع " TWX " (ان أمكن) ٠
٣ـ نظام للاتصال الداخلى : سنترال داخلى أو INTERCOM
٤ـ آلتى تصوير زيروكس (بالايجار) ٠
٥ـ آلات كاتبة كهربائيه : ٢ انجليزى + ٢ عربى أو (واحدة من كل + WORD PROCESSOR)
٦ـ آلة تجليد التقارير الصغيره ٠

٧ـ آلة اعداد ماستر والطباعه ٠

٨ـ أثاث عملى نظيف محتـــــرم ٠

٣ـ المواصـــلات

١ـ سيارة خاصة لمدير المشروع ٠

٢ـ سيارة ثانية لأغراض العمل (وتفضل STATION WAGON) ٠

٣ـ سيارة ميكروباس لنقل الافراد والمطبوعات (السنه الثانية) ٠

ARAB REPUBLIC OF EGYPT
ACADEMY OF SCIENTIFIC RESEARCH
AND TECHNOLOGY

101, Kasr El Eini St. Cairo

October 3, 1981

Dear Mr. Brown

With reference to your letters of January 20 and May 18, 1981, we are pleased to confirm our agreement to the following:

1) The selection of the Georgia Institute of Technology as the sole source contractor/consultant for the detailed development, testing, and operation of the national STI system during Phase II; and

2) The selection of Catholic University as the sole source contractor for the implementation of the manpower development plan within the national STI system.

It is our understanding, however, that a substantial part of the technical responsibilities in Phase II will be entrusted to Egyptian consultants.

We are putting the last touches to the work statement document for Phase II that shall define the various programs and activities encompassed in the implementation process, with a clear definition of the responsibilities of the respective parties.

We do, however, ask you to kindly initiate the selection and notification procedures for the two contractors with USAID Washington, so as to avoid a hiatus in the project's implementation.

Thanking you and the USAID Cairo's project staff for constructive and dedicated support throughout Phase I, we remain,

Yours [illegible]

Dr. I. [illegible]
President

Mr. D. Brown
USAID - CAIRO
EGYPT

c.c. Prof. V. Slamecka
Dr. B. Haddidy
Mr. J. Riley
Dr. A. Gad
Dr. M.A.K. Madkour

ARAB REPUBLIC OF EGYPT
CADEMY OF SCIENTIFIC RESEARCH
AND TECHNOLOGY
101, Kasr El Eini St. Cairo

October 3, 1981

Dear Mr. Brown,

The Executive Committee of the STI Project and I have reviewed the design documents submitted by Professor V. Slamecka. We are pleased with the scope and contents of these documents.

In order to give the national STI system's design a wider exposure as well as a broader assessment, I wish to suggest that we pursue the following line of action. I believe we shall benefit from the reviews, opinions and discussions of the design by a small number of experts coming from three different backgrounds. I would, therefore, like to request your office to consider inviting 3-5 such experts on a two-day roundtable discussion during which they would review the system design features from their areas of expertise. The following indicates the background and caliber of the experts I have in mind:

1) Information systems design: James Martin, IBM; S. Neelameghan, Bangalore; India; Peter W. Keen, MIT; Russell Ackoff, Univ. of Penn.

2) Information systems management/operations: Jose Quevedo, CONACYT, Mexico; Jacques Michel, MIST, Paris.

3) Information systems users: Isaac Auerbach, AUERBACH PUBLISHERS, Philadelphia; Karl Willenbrock, Southern Methodist Univ.; Lawrence Eicher, National Bureau of Standards.

In order not to loose the momentum that now exists in the STI Project, such a discussion should take place during the next two months. The ASRT shall be pleased to host the meeting and to nominate Egyptian participants.

Please be assured of my appreciation of your assistance in this important effort.

Yours sincerely,

Dr. M. Badran,
President.

Mr. D. Brown,
USAID -Cairo,
Egypt.

c.c. Mr. J. Riley,
Prof. V. Slamecka
Dr. A. Gad
Dr. M.A.K. Madkour

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

November 7, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF contract INT-792187 covers the period of October 1981.

A. STATUS OF CURRENT ACTIVITIES

1. Systems Analysis

Mr. Adams completed changes to the policy document draft at the end of October; editing of the draft is required before its publication. King Research, Inc., who delayed submission of their report in anticipation of raw data from the library survey in Egypt, was requested to complete their contractual commitment without this data. No comments have been received so far from Cairo project management on Mr. Sarasohn's draft report summarizing results of the requirements survey. My writing up of the results of the resources survey has been delayed, inasmuch as top priority was given during October to completing the design and implementation studies.

2. Database Search Services

Cairo was advised that contract funds for this experiment will be exhausted by November 15, and that the service will be suspended as of that date. Because of the shortage of funds, further testing of the computer-to-computer linkage between Cairo and Atlanta has been postponed until Phase II. A successful experiment was conducted in October in which a major database vendor stored the result of Cairo searches on its computer and Georgia Tech transferred the output file in digital form to its microcomputer.

Dr. El-Hadidy, the consultant evaluating the database search experiment, requested more time to complete his report (originally expected by the end of October).

3. System Design/Implementation

Relatively substantial revisions of the two document drafts were carried out in October. Final copies of the reports were published and will be distributed from Atlanta on November 10. A sufficient number of copies are being forwarded to Cairo in time for the JCC meeting.

B. ADMINISTRATIVE MATTERS

1. A request for supplemental printing funds has been forwarded to the National Science Foundation, to allow for the printing and distribution of sufficient copies of project reports in Egypt.

2. I intend to attend the JCC meeting in Cairo November 14, at no cost to the project.

Respectfully submitted,

Vladimir Slamecka
Project Director

c: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCS Reports Coordinator
US Consultants

GEORGIA INSTITUTE OF TECHNOLOGY
SCHOOL OF INFORMATION AND COMPUTER SCIENCE • ATLANTA, GEORGIA 30332 • (404) 894-3152

December 7, 1981

Mr. Eugene Pronko
Senior Program Manager
Division of International Programs
National Science Foundation
Washington, DC 20550

Dear Mr. Pronko:

This progress report on NSF Contract INT-7924187 covers the period of November 1981

STATUS OF CURRENT ACTIVITIES

1. Systems Analysis

Draft of the document on national information policy has been edited and is in the printshop. King Research, Inc. has completed a report on the cost analysis of various alternatives for supplementing STI holdings of Egypt; comments on the report by the undersigned were forwarded to KRI. In preparation for analyzing the results of the resources survey we have written a statistical routine for the Unix/MRS software on the TERAK computer; it computerizes the data aggregation process. The input into the TERAK of the data tabulated by Cairo University Center will begin in December; we expect the survey analysis to be completed in January.

2. Database Search Services

The experimental search service has been suspended, as reported in last month's progress report, in mid-November, due to shortage of funds. Cairo is attempting to obtain release of additional USAID funds so as to supplement the budget of this activity. The project consultant's report, intended to evaluate this experiment and essential to the preparation of the final report by the Georgia Tech Library, has not been received as of this date.

3. System Design/Implementation

Copies of the interim reports on the national STI system design and a plan for the initial implementation activities (Phase II) has been distributed at the JCC in Cairo. A meeting to evaluate the design is tentatively planned for January in Egypt.

B. OTHER TECHNICAL ACTIVITIES

The principal investigator continues to keep abreast of the technological developments affecting the design of information services in Egypt. In this context, a study has been performed of the latest services in the text communication area. In particular, alternatives to Telex and TWX, made possible by the combination of data communication methods and the electronic word processors, have been studied, notably as regards efforts of the CCITT toward the establishment of international standards for new services. Implementation of the CCITT recommendations, ratified in October 1980, is pursued particularly by the European telecommunications agencies.

Of special interest to Egypt will be the new Teletex service, which will begin to substitute for Telex in Europe in 1982. (In the US, the FCC last month refused to open an inquiry into a nationwide standard for protocols and display formats for Teletex.)

Teletex is basically a one-way (buffer to buffer) text communication service like Telex, but it has a number of different, important features. It can be supported by any telecommunication network: in the case of a public data network, the 2,400 bps user rate is used; in the case of the public telephone network, a 2400 bps modem is used. Thus any country, if it so decides, can immediately start with the implementation of the teletex services.

Secondly, Teletex provides a character set which is large enough to incorporate all languages of the world based on the Latin characters. Non-Latin characters, including Arabic, will be included in the future by extension techniques that have been already defined. Teletex is thus a true multilingual text communication system. The charater set for Teletex (of which the ASCII code is a subset) includes terminal device controls which permit formatting of the message at the sender's end. Transmission may take place immediately or at a fixed hour; at the receiving end, the message is stored in an electronic mailbox. Teletex procedures include an error correction mechanism which permits the use of circuits or networks that are of varying quality.

Teletex will transmit an A4 page of text in 10 seconds, compared to 6 minutes for Telex. It is anticipated that Teletex charges will be approximately two-thirds of the long distance telephone call --i.e., approximately $3.00 per minute. As the minimal charge for buffer-to-buffer Teletex services will be for ten seconds, Teletex promises to be a relatively economic and versatile method of one-way, noninteractive transmission of smaller bodies of textual material to digital form. Teletext does not appear particularly suitable for online, conversational database searches, unless the search process is modified. Feasibility studies of such modification are contemplated by the German PTT.

C. ADMINISTRATIVE MATTERS

1. Cairo has reported verbally that several meetings of the Executive Committee have taken place, with the objective of structuring the Phase II of Egyptian activities and nominating the Egyptina project director.

2. The undersigned attended the first day of the JCC in Cairo, on November 16, and met with Egyptian project personnal and with USAID staff.

Respectfully submitted,

Vladimir Slamecka
Project Director

c: Dr. Badran
Dr. Gad
Dr. Madkour
Ms. Weber
Mr. Davenport
Dr. Miller
OCA Reports Coordinator
US Consultants

CITATION PATTERNS OF SELECTED EGYPTIAN JOURNALS

GEORGIA INSTITUTE OF TECHNOLOGY
Atlanta, Georgia, USA

ACADEMY OF SCIENTIFIC RESEARCH AND TECHNOLOGY
Cairo, Egypt

CITATION PATTERNS OF SELECTED EGYPTIAN JOURNALS

Davis B. McCarn

May 1980

Academy for Scientific Research
and Technology
National Information and
Documentation Centre
Cairo, Arab Republic of Egypt

Georgia Institute of Technology
School of Information and
Computer Science
Atlanta, Georgia, USA

PREFACE

Project ISE ("Information Services of Egypt") is part of an Applied Science and Technology Program under a Project Grant Agreement between the U.S. Agency for International Development and the Egyptian Academy for Scientific Research and Technology. The objective of the five-year project is the design and selective implementation of nation-wide information services intended to support the socioeconomic development of the Arab Republic of Egypt. Phase I of Project ISE (November 1979-October 1981) consists of a system analysis and design study.

The project is a collaborative effort of Egyptian and U.S. organizations. The Egyptian Academy of Scientific Research and Technology, with its National Information and Documentation Centre, is the Egyptian executive agency for implementation of Project ISE. Egypt-based activities are guided by the project's Steering Committee comprised of senior Egyptian experts and headed by the President of the ASRT. Planning and project management assistance to the ASRT is provided by the U.S. National Science Foundation under a U.S. Agency for International Development Participating Agency Service Agreement. Technical assistance in Phase I is supplied by a team of senior U.S. consultants under Contract NSF INT-7924187 from the National Science Foundation to the Georgia Institute of Technology. Project funding is provided by the Government of Egypt and by the U.S. Agency for International Development.

The publication of this report does not imply official concurrence of the sponsoring agencies with the views and opinions expressed therein.

This study is motivated by the desire to demonstrate, in a quantitative manner, the need for up-to-date information services by the scientific community of Egypt. The joint Egyptian-U.S. project ISE (Information Services of Egypt)[1] has as its main objective the design of a national system of information resources and services in Egypt. In its context it is relevant to prove that there is indeed a need in a developing country such as Egypt for a major collection of scientific and technological information resources, and to demonstrate the value of concomitant information services to specific constituencies of users.

From a system designer's viewpoint it is important to observe that the need for a good library in science and technology and for good information services, does not necessarily depend solely on the perceived needs of the science and technology communities of a given country. Potential users may not appreciate the need for the availability of current information on science and technology; their lack of awareness does not mean, however, that such a need does not exist. In a recent study, Michael Gordon reviewed the manuscript rejection rates and reasons for rejection given by "two prestigious physical science journals" and found that developing country (LDC) authors "are shown to experience far higher rejection rates than authors in developed countries (57% vs. 17%) and to be faulted on specific points which tend to indicate that their major problems are those of maintaining current awareness. It is thus indicated that the problems LDC researchers experience in accessing scientific information are a major factor in inhibiting the quality and quantity of their own information output."[2] More specifically, Gordon found that the work of LDC authors lacked originality more often and was twice as likely to be faulted on inadequate references as the work of authors from the developed countries. Thus, it would seem, researchers in developing countries lack -- for whatever reason -- access to current information and this lack is reflected in the quality or significance of their work.

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[1] See Preface.

[2] Gordon, Michael D., "Deficiencies of Scientific Information Access and Output in Less Developed Countries," Journal of the American Society for Information Science, Vol. 30, November 1979.

Is this generalization true for Egypt? In an effort to assess the applicability of these conclusions for the ARE, the author has conducted an analysis of the citation patterns of references in the issues of journals published in 1979 by the Egyptian National Information and Documentation Centre (NIDOC). For each of the documents obtained by the author during his visit to NIDOC in January-February 1980, a citation frequency table was prepared showing for each year the frequency of citation references appearing in that year. Based on these frequency tables, the median age of citations was calculated. (The median age is the age in years that separates the citations in half -- i.e., half the references are to materials younger than the median, and half to materials older than the median.) Eugene Garfield refers to this median as the "half-life" of the citations for a given journal.[3] He has tabulated such half-lives for the journals covered by Science Citation Index, in the final volume of the annual Index, Journal Citation Reports, which provides a ready basis of comparison with the results for NIDOC journals. Table 1 shows the results of this analysis for the NIDOC journals.

Table 1. Median Age of References in Selected NIDOC Journals

Egyptian Journal of	Issue	Year	Median Age of Reference (years)
Bilharziasis	1&2	1977	13.1
Botany	3	1977	10.0
Chemistry	3	1977	17.3
Food Science	1&2	1977	16.1
Horticulture	1	1979	13.7
Pharmaceutical Sciences	1	1977	13.0
Phytopathology	1&2	1978	14.6
Soil Science	2	1979	13.5

In order to assess these median ages for references in the Egyptian journals it is necessary to compare them with the age of citations in

[3]Eugene Garfield, "ISI's Journal Citation Index Data Base -- a Multi-Media Tool, Current Comments, April 19, 1972.

comparable journals from the developed nations. To provide a comparison the above-mentioned Journal Citation Reports was consulted to find journals in the same subject areas as those covered by the NIDOC journals. In some cases journals were listed with median reference ages of "greater than 10 years"; since the specific median age for these was not given, they were not used in the sample. Thus, the median ages given for the ISI journals is an underestimate. Table 2 shows the median ages for the selected journals; details of the analysis are given in the Appendix.

Table 2. Median Age of References in Selected Journals from Developed Countries

Journal Subject Area	No. of Journals	Median Age of References (years)
Bilharziasis	3	8.2
Botany	2	7.6
Chemistry	2	8.8
Food Sciences	2	6.7
Horticulture	3	5.2
Pharmaceutical Sciences	5	5.8
Phytopathology	3	8.9
Soil Science	3	8.7

In order to quantify the difference between these values and those for the NIDOC journals it is desirable to have some measure of the difference between the ages of references in the two different journal groups. In general, the age of the citations in a journal or group of journals follows an inverse exponential distribution: the fraction of the references, F(t), to the journals within the past t years is

$$F(t) = 1-\exp(-at)$$

where a is a fitted constant. Now, the most reasonable such measure would appear to be the difference between the average or mean ages of the references for the two groups as a measure for the degree the less timely

group is behind the more timely one. This measure is in fact merely the difference between the median ages divided by natural logarithm of 2 (.69315). Doing these calculations results in the estimates in Table 3.

Table 3. Lag of Egyptian Science References Behind Developed Country References

Subject Area	Lag (Years)
Bilharziasis	7.1
Botany	3.5
Chemistry	12.3
Food Sciences	16.1
Horticulture	12.0
Pharmaceuticals	10.4
Phytopathology	8.2
Soil Science	7.1

A review of references in the Journal of the Egyptian Medical Association, with a median reference age of 11.2 years, and of articles published by Egyptian scientists in U.S. journals indicated the same patterns of age of references.

It is important to note that these are very rough measures, and that caution must be used in their interpretation. The conclusion nevertheless seems to hold that articles produced by Egyptian researchers in Egyptian publications share the characteristics identified by Gordon and reflect a serious lack of awareness of recent developments in science and technology. Except in the case of Botany the estimated lag is large enough, and it should cause real concern to Egypt's science policy makers and administrators.

Whereas the lag phenomenon should not be automatically equated with a measure of science quality, it does indicate a strong possibility that one of Egypt's most vital resources -- its scientific manpower -- functions suboptimally. And while one cannot argue that the availability of quality

user-oriented science information services in Egypt will alone make the difference, it is clear that without the existence and use of such a service, this characteristic of Egyptian science cannot change. This fact places the issue of cost/benefit of the national science enterprise into a new light relative to the cost of the design and implementation of science information systems.

APPENDIX

DETAILS OF REFERENCE AGE ANALYSIS

BILHARZIASIS

Egyptian Journal

	Number of Citations	Cumulated Citations	Annual Percentage	Cumulated Percentage
1979	0	0	0%	0%
78	3	3	2	2
77	1	4	1	3
76	6	10	4	7
75	1	11	1	8
74	5	16	4	12
73	5	21	4	16
72	2	23	1	17
71	4	27	3	20
70	5	32	4	24
69	9	41	7	31
68	5	46	4	35
67	10	56	7	42
66	11	67	8	50
65	9	76	7	57
60-64	19	95	14	71
55-59	8	103	6	77
50-54	16	119	12	89
Before 1950	17	136	12	101

Median: $\frac{136}{2} = 68$ (Located in 1965)

BILHARZIASIS

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Journal of Helminthology	379	1497	8.9	1.58
Tropenmedizin und parasitologie	305	1649	2.5	7.21
Annals of Tropical Medicine and Parasitology	934	886	9.8	2.78

BOTANY

Egyptian Journal

	Number of Citations	Cumulated Citations	Percentage of Citations	Cumulated Percentage
1979	0	0	0%	0%
78	0	0	0	0
77	3	3	2	2
76	4	7	3	5
75	3	10	2	7
74	11	21	8	15
73	12	33	9	24
72	13	46	9	33
71	12	58	9	42
70	11	69	9	51
69	7	76	5	56
68	5	81	4	60
67	4	85	3	63
66	10	95	7	70
65	5	100	4	74
60-64	13	113	9	83
55-59	16	129	12	95
50-54	1	130	1	96
Before 1950	8	138	6	102

Median (Half-Life) of Citations: $\frac{138}{2} = 69$; located in 1970

BOTANY

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
American Journal of Botany	3678	276	>10.0	0.89
Annals of Botany	2093	469	8.8	2.48
Botanical Review	695	1063	>10.0	0.14
Journal of Experimental Botany	2048	482	6.4	1.66

CHEMISTRY

Egyptian Journal

	Number of Citations	Cumulated Citations	Annual Percentage	Cumulated Percentage
1979	0	0	0%	0%
78	0	0	0	0
77	0	0	0	0
76	4	4	3	3
75	4	8	3	6
74	1	9	1	7
73	7	16	5	12
72	3	19	2	14
71	4	23	3	17
70	6	29	4	21
69	3	32	2	23
68	4	36	3	26
67	2	38	1	27
66	4	42	3	30
65	9	51	7	37
60-64	23	74	17	54
55-59	28	102	21	75
50-54	6	108	4	79
Before 1950	26	134	19	98

Median: $\frac{134}{2} = 67$ (Occurs in 1960-64)

CHEMISTRY

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Journal of the American Chemical Society	105213	1	9.1	1.57
Zeitschrift für Chemie	1344	691	5.5	2.52
Chemical Reviews	4649	217	9.3	0.68
Journal of the Chemical Society	16205	45	>10.0	(Not applicable)
Journal of Biological Chemistry	102670	2	8.4	1.49

FOOD SCIENCE

Egyptian Journal

	Number of Citations	Cumulated Citations	Percentage of Citations	Cumulated Percentage
1979	0	0	0%	0%
78	0	0	0	0
77	7	7	5	5
76	2	9	2	7
75	2	11	2	9
74	2	13	2	11
73	3	16	2	13
72	9	25	7	20
71	2	27	2	22
70	6	33	4	26
69	2	35	2	28
68	0	35	0	28
67	9	44	7	35
66	7	51	5	40
65	11	62	8	48
60-64	21	83	16	64
55-59	23	106	17	81
50-54	11	117	8	89
Before 1950	16	133	12	101

No Date = 1 citation

Median (Half-Life) of Citations: $\frac{134}{2} = 67$; located in 1960-64

FOOD SCIENCE

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
CRC Critical Reviews in Food Science and Nutrition		2660	(Not listed since less than 100 citations made in 1978)	
Food Technology		727	>10.0	1.44
Journal of Food Science		305	5.1	3.20
Journal of the Science of Food and Agriculture		504	7.7	1.70

[1]Number of journal publication years from the current year going back whose articles have accounted for 50% of the total citations received in a given year.

[2]When a 50% point is not reached in 10 years, that is when the number for the earliest year (1969) is under 50, a half-life of >10.00 is given.

HORTICULTURE

Egyptian Journal

	Number of Citations	Cumulated Citations	Annual Percentage	Cumulated Percentage
1979	0	0	0%	0%
78	1	1	1	1
77	4	5	2	3
76	5	10	3	6
75	6	16	3	9
74	4	20	2	11
73	8	28	4	15
72	10	38	5	20
71	12	50	6	26
70	8	58	4	30
69	9	67	5	35
68	8	75	4	39
67	13	88	7	46
66	6	94	3	49
65	7	101	4	53
60-64	36	137	18	71
55-59	26	163	13	84
50-54	19	182	10	94
Before 1950	16	198	8	102

Median: $\frac{198}{2} = 99$ (Located in 1965)

HORTICULTURE

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Hortscience	757	1007	4.3	3.43
Journal of the American Society of Horticulture	1093	796	5.0	4.02
Journal of Horticultural Science	350	1562	7.7	1.42

PHARMACEUTICAL SCIENCE

Egyptian Journal

	Number of Citations	Cumulated Citations	Percentage of Citations	Cumulated Percentage
1979	0	0	0%	0%
78	0	0	0	0
77	4	4	2	2
76	4	8	2	4
75	10	18	4	8
74	7	25	3	11
73	13	38	5	16
72	7	45	3	19
71	13	58	5	24
70	11	69	5	29
69	22	91	9	38
68	17	108	7	45
67	10	118	4	49
66	13	131	5	54
65	9	140	4	58
60-64	50	190	21	79
55-59	23	213	10	89
50-54	12	225	5	94
Before 1950	11	236	5	99

Median (Half-Life) of Citations: $\frac{236}{2} = 118$; located in 1967

PHARMACEUTICAL SCIENCE

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Journal of Pharmaceutical Sciences	6724	125	6.3	1.85
Journal de Pharmacologie	398	1466	5.4	0.75
International Pharmacopsychiatry	233	1845	4.9	0.85
International Journal of Pharmaceutics	11	3207	-Not Listed-	
Annual Review of Pharmacology and Toxicology	1468	638	4.9	1.90
Journal of Clinical Pharmacology	779	985	4.1	1.28

PHYTOPATHOLOGY

Egyptian Journal - Vol. 10, No. 1, 1978

	Number of Citations	Cumulated Citations	Percentage of Citations	Cumulated Percentage	
1979	0	0	0%	0%	
78	0	0	0	0	
77	3	3	2	2	
76	3	6	2	4	
75	7	13	4	8	
74	14	27	9	17	
73	6	33	4	21	
72	6	39	4	25	
71	12	51	7	32	
70	8	59	5	37	
69	8	67	5	42	
68	2	69	1	43	
67	6	75	4	47	
66	8	83	5	52	-- Median
65	3	86	2	54	
60-64	23	109	14	68	
55-59	16	125	10	78	
50-54	6	131	4	82	
Before 1950	33	164	20	102	

Egyptian Journal - Vol. 10, No. 2, 1978

1979	0	0	0%	0%	
78	0	0	0	0	
77	0	0	0	0	
76	2	2	2	2	
75	5	7	4	6	
74	3	10	3	9	
73	1	11	1	10	
72	5	16	4	14	
71	3	19	3	17	
70	5	24	4	21	
69	5	29	4	25	
68	6	35	5	30	
67	1	36	1	31	
66	10	46	8	39	
65	3	49	3	42	
60-64	19	68	16	58	-- Median
55-59	19	87	16	74	
50-54	7	94	6	80	
Before 1950	23	117	19	99	

PHYTOPATHOLOGY

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Annual Review of Phytopathology	693	1066	6.9	(Not Appl.)
Phytopathologische Zeitschrift	650	1115	7.2	2.76
Phytopathology	5059	198	9.4	1.34

SOIL SCIENCE

Egyptian Journal

	Number of Citations	Cumulated Citations	Annual Percentage	Cumulated Percentage
1979	0	0	0%	0%
78	2	2	2	2
77	3	5	2	4
76	3	8	2	6
75	6	14	5	11
74	1	15	1	12
73	3	18	2	14
72	8	26	6	20
71	2	28	2	22
70	4	32	3	25
69	7	39	6	31
68	9	48	7	38
67	7	55	6	44
66	5	60	4	48
65	5	65	4	52
60-64	24	89	19	71
55-59	15	104	12	83
50-54	12	116	10	93
Before 1950	10	126	8	101

Median: $\frac{126}{2} = 63$ (occurs in 1965)

SOIL SCIENCE

Selected Western Journals
1978 Annual Science Citation Index

Journal	No. of Citations	Rank by No. of Citations	Cumulative Half-Life	Cumulative Percentage in 1978
Journal of Soil Science	794	967	8.2	1.63
Plant and Soil	1414	660	7.8	1.62
Soil Science	2489	397	>10.0 1/	0.48
Soil Science Society of America Journal	3288	311	9.2	1.21

1/ When a 50% point is not reached in 10 years, that is when the number for the earliest year recorded (1969) is under 50, a half-life of >10.00 is given.

SOIL SCIENCE

Citation Analysis of: Soil Science, Vol. 128, No. 6: December 1979

	Number of Citations	Cumulated Citations	Annual Percentage	Cumulated Percentage
1979	7	7	4%	4%
78	3	10	2	6
77	16	26	10	16
76	12	38	8	24
75	15	53	10	34
74	17	70	11	45
73	7	77	4	49
72	8	85	5	54
71	7	92	4	58
70	6	98	4	62
69	13	111	8	70
68	7	118	4	74
67	5	123	3	77
66	3	126	2	79
65	2	128	1	80
60-64	12	140	8	88
55-59	11	151	7	95
50-54	3	154	2	97
Before 1950	3	157	2	99

Median: $\frac{157}{2} = 78.5$ (Occurs in 1972)

The Journal of the Egyptian Medical Association
Volume 61, Number 1-2, 1978

	Number of Citations	Cumulated Citations	Percentage of Citations	Cumulated Percentage
1978	2	2	1%	1%
1977	14	16	4	5
1976	11	27	3	8
1975	20	47	6	14
1974	17	64	5	19
1973	15	79	5	24
1972	10	89	3	27
1971	15	104	5	32
1970	13	117	4	36
1969	18	135	6	42
1968	20	155	6	48
1967	16	171	5	53
1966	13	184	4	57
1965	10	194	3	60
1960-64	46	240	15	75
1955-59	23	263	7	82
1950-54	10	273	3	85
Before 1950	44	317	14	99

Median: $\frac{317}{2} = 158.5$ (in year 1967)

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CURRENT STATUS OF THE NATIONAL INFORMATION AND DOCUMENTATION CENTRE OF EGYPT

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November 1980

Academy of Scientific Research
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National Information and
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PREFACE

Project ISE ("Information Services of Egypt") is part of an Applied Science and Technology Program under a Project Grant Agreement between the U.S. Agency for International Development and the Egyptian Academy for Scientific Research and Technology. The objective of the five-year project is the design and selective implementation of nationwide information services intended to support the socioeconomic development of the Arab Republic of Egypt. Phase I of Project ISE (November 1979-October 1981) consists of a system analysis and design study.

The project is a collaborative effort of Egyptian and U.S. organizations. The Egyptian Academy of Scientific Research and Technology, with its National Information and Documentation Centre, is the Egyptian executive agency for implementation of Project ISE. Egypt-based activities are guided by the project's Steering Committee comprised of senior Egyptian experts and headed by the President of the ASRT. Planning and project management assistance to the ASRT is provided by the U.S. National Science Foundation under a U.S. Agency for International Development Participating Agency Service Agreement. Technical assistance in Phase I is supplied by a team of senior U.S. consultants under Contract NSF INT-7924187 from the National Science Foundation to the Georgia Institute of Technology. Project funding is provided by the Government of Egypt and by the U.S. Agency for International Development.

The publication of this report does not imply official concurrence of the sponsoring agencies with the views and opinions expressed therein.

CONTENTS

I. INTRODUCTION

The objective of this study is quite limited: to assess the current status of the Egyptian National Information and Documentation Centre (NIDOC). The purpose of such an assessment is to provide a basis from which to consider the future functions and organization of this agency within an expanded system of national information services in Egypt.

Consequently, this study does not have as its objective to offer an account of NIDOC's history; such accounts have been provided elsewhere.[1,2] Nor is the study intended to be a cost/benefit analysis, since cost effectiveness will be one of the key parameters considered in the design phase of Project ISE. It is also not the purpose of the study to analyze the facilities of NIDOC, whether they be the utilization of space or the application of information technology; a new building is already planned to accommodate both current and expanded activities of the organization, and the issue of applications of information technology will be addressed during the next phase of Project ISE.

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[1] El-Hadidy, Ali, "Development of an Egyptian National Science and Technology System." Proceedings of U.S.-Egyptian Symposium/Workshop on Planning an Egyptian National Scientific and Technical Information System, Cairo, Egypt, April 1976.

[2] Badr, Ahmad, "Libraries, Librarianship and Information Services in Egypt." Proceedings of U.S.-Egyptian Symposium/Workshop on Planning an Egyptian National Scientific and Technical Information System, Cairo, Egypt, April 1976

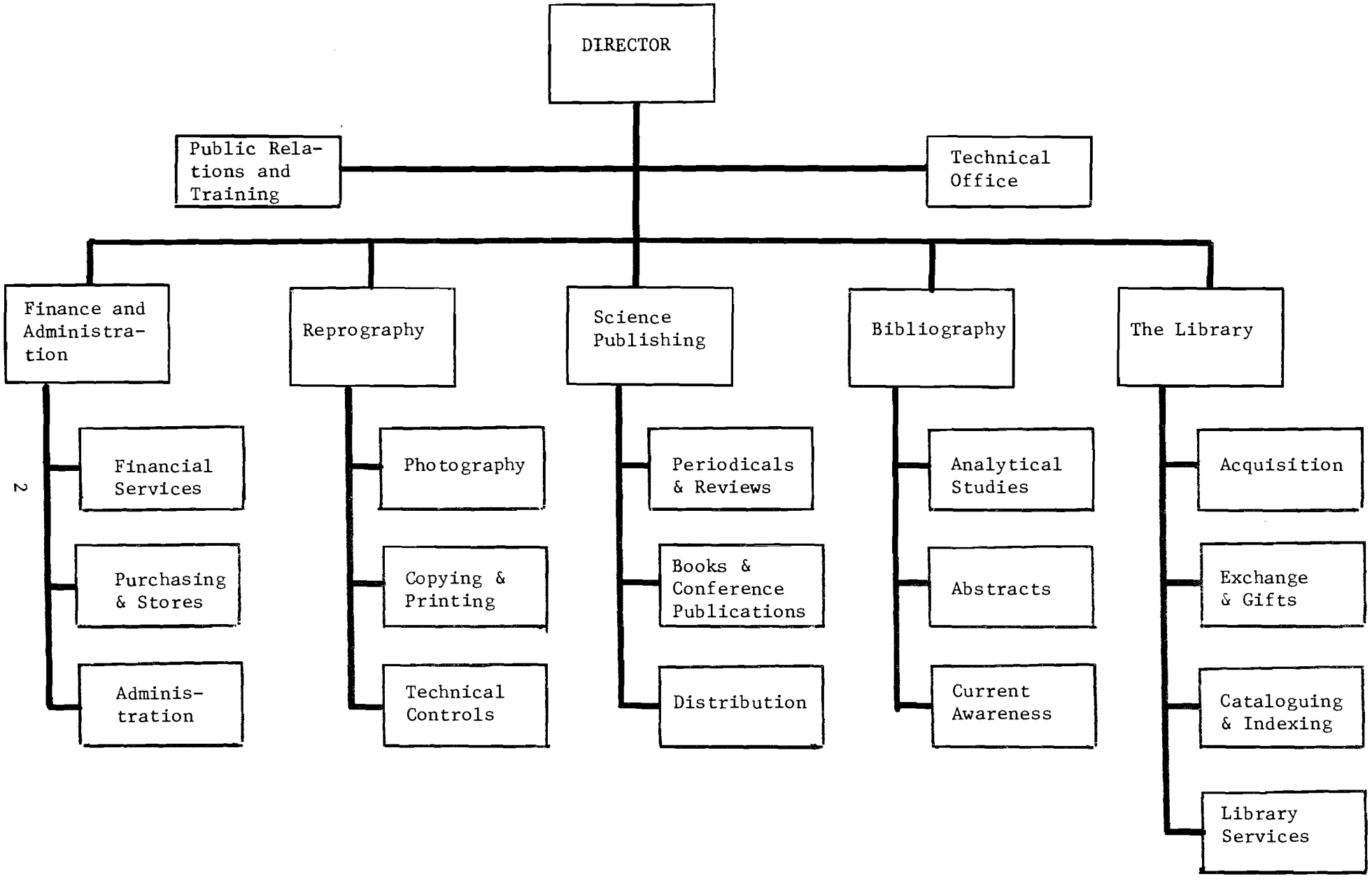

Figure 1. NIDOC Organization (1980).

II. NIDOC ACTIVITIES

Early concern with scientific and technical information activities in Egypt has been sporadic and uncoordinated.[3] In 1954, the National Research Centre, still in its early stages, established a department for scientific and technical information and documentation, which operated nationally and internationally. The Presidential Decree #498 which redefined, in 1968, the function of the Ministry of Scientific Research in the framework of the Egyptian development plan, established the National Information and Documentation Centre (NIDOC). NIDOC thereby became an organ of the Egyptian Academy of Scientific Research and Technology, the policy-making organization for the country's science and technology. It was assigned responsibility for the following set of activities.[4]

1) Collecting scientific and technical documents and disseminating their contents promptly to scientific and industrial institutions.

2) Collecting scientific Arabic materials and disseminating them in the Arab Republic of Egypt

3) Preparing bibliographic lists of, and abstracting scientific and technical research publications

4) Publishing in collaboration with scientific societies high-quality scientific periodicals in the various fields of science and exchanging them among such societies

5) Supporting the function of scientific editing

6) Participating in the revival of ancient Arabic scientific writings and in Arabization of scientific terms

7) Developing a research program in documentation and information

8) Conducting regular programs to train technicians in the field of information and documentation.

Figure 1 shows the present-day organization chart of NIDOC. In addition to the Finance and Administration Department, NIDOC has five technical departments: 1) Library, 2) Bibliography, 3) Public Relations and Training, 4) Reprography, and 5) Science Publishing. The nature and extent of the activities of these departments are summarized below.

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[3] Egyptian Academy of Scientific Research and Technology. The National Paper of the Arab Republic of Egypt. Prepared for the U.N. Conference on Science and Technology for Development, Vienna, 1979. P. 14.

[4] Egypt. Presidential Decree No. 498 (1968).

1. The Library Department

According to its 1968 mandate, the Library is in charge of

- o subscription to periodicals and acquisition of scientific books, with the objective of building a central library of science and technology,
- o acquisition of abstract bulletins and reference materials, and making making these available to researchers,
- o issuance of a union list of scientific periodicals in Egypt, and
- o acquisition of worlds patents.

Basically, the Library Department procures and processes scientific and technical publications, and provides assistance to users of the library. It acquires about 600 books per year. The total number of books held is about 50,000. The Library currently subscribes to about 725 periodicals; an additional 1,000 periodical titles are acquired at NIDOC through exchange agreements with or gifts from universities, scientific foundations and institutes. Another 1,000 subscriptions, held at Cairo University Library, are currently also managed by NIDOC. Anglo-American cataloging rules are followed for descriptive cataloging, and the Library of Congress Subject Headings are used for subject cataloguing. Statistics on acquisition and cataloguing are given in Appendix A.

Serials. While the total collection of serials at NIDOC is extensive, it suffers from serious gaps. These gaps are the result of two different causes. First, the worst gaps have occurred because of the difficulties of paying for subscriptions which require hard currency; approximately 80% of the gaps in NIDOC holdings are said to be a result of this cause. The second cause of gaps is non-delivery of specified issues of a serial. Since mail is seriously delayed in delivery to NIDOC, rational check-in procedures are impracticable; NIDOC usually receives subscription materials so late that claiming is impossible. About 20% of the gaps are a result of non-delivery.

In addition to the problem of gaps in holdings, NIDOC also suffers from rather random serial selection. While a collection analysis will be performed independently of this study, it does seem that serials acquisition guidelines and policy are imprecise. Most of the serial runs examined did not include any materials beyond 1978. A careful review of the selected subscriptions and the gaps is very desirable.

Indexes and abstracts. The indexes and abstracting services available in the library are, in most cases, not current. Index Medicus was only available through 1978. Science Citation Index has not been received since 1966. In this case also, a careful effort is required to identify and obtain the finding tools in Egypt.

Monographs. The situation with regard to monographic materials is even more serious. The major source of book purchases is the annual Cairo Book Fair; it is at this Fair that 50% of NIDOC's foreign books are

purchased (with Egyptian pounds). The Fair does not, however, provide an adequate opportunity to purchase current books from industrialized countries: the 1980 Fair seemed to the authors of this report to be a large remaindering sale, providing many foreign publishers with an outlet for their unsold copies of older materials. Since book purchases by NIDOC are per force limited to the acquisition of books available at the Fair (because of hard-currency limitations), it would be highly desirable to change the situation, to identify monographs NIDOC should have in the fields of its scope and coverage, and to purchase them from wherever they are available.

Collection Adequacy Test. During the authors' visit NIDOC was conducting a survey of the degree to which its collection met the needs of its clientele. While the survey had not been completed a review of the results for three days provided some indication of the experience of its users. Table 1 shows the results of the survey for these three days.

Table 1. NIDOC Collection Adequacy (Sample)

	Periodicals	Monographs
Total Requested	1899	271
Total Found	1143 (60%)	162 (60%)
Total Not Found	756 (40%)	109 (40%)

Several comments are relevant to these results. First, the usage at NIDOC seems consistent with experience elsewhere in that 87.5% of requests were for serials materials; science and technology serials are more important as reference materials than monographs. Second, the periodical use figures are somewhat deceptive in that they include uses of indexes, particularly Chemical Abstracts, the most used material in the library. Moreover, since this particular serial is always found, the find rate for periodicals is significantly overstated and in reality is probably lower than 60% (by comparison, the finding rate in large U.S. libraries is on the order of 75% to 85%). NIDOC's difference in the area of monographs is less pronounced when compared to U.S. libraries.

Library Services. Appendix A shows that the Library provided, in 1979, services to over 27,000 patrons. The concept of service, however, is very limited compared to U.S. and other libraries. In any effective library, one expects that the librarian will help in the location of needed materials, answer reference questions, and, if the material needed is not available in that library, assist in obtaining it from some other source. This concept of service underlies present-day networks for resource sharing and interlibrary loan. In Egypt, very little interlibrary lending is practiced, and there is no standard interlibrary loan form; thus, the concept of mutually collaborating specialized libraries has not evolved.

2. Bibliography Department

According to the 1968 mandate, the Bibliography Department is in charge of

- publishing tables of contents of periodicals available in the Library,
- publishing and translating into English and French abstracts of research papers from scientific periodicals issued in Egypt and neighboring countries, and
- fostering the use of automation in bibliographic services.

The Department's main activity has been the publication, since 1973, of printed Arab Science Abstracts, a less-than-current biannual publication containing abstracts of scientific and technical articles from periodicals published in the Arab states; it appears that the publication will cease in 1980. The abstracts were prepared in Arabic, English, and French.

A current awareness service has been initiated for several dozen scientists working in pharmaceutical fields and in cancer; retrospective searches on cancer, using the Lending Division, British Library, are also available. In addition, special bibliographies on a variety of subjects are prepared upon request. Between 1955 and 1968, the Department issued a "Bulletin," now defunct.

For a nation of Egypt's size, and given the relatively advanced level of the country's science and higher education establishments, the range, depth and caliber of these information services are very inadequate. The Department has a competent staff of well trained professionals who have, in addition to expertise in information work, strong backgrounds in the disciplines in which they provide services. In the absence of any promotion or marketing effort, however, there is a very low demand for the bibliographic services of NIDOC.

An example of opportunities that may not be taken full advantage of is the recent acquisition of microform viewing equipment. This equipment has not been used. An aggressive effort could be mounted to take advantage of this facility and the associated microfiche copies of the NTIS reports file. The Department could seek permission to make copies of the NTIS microfiche reports, and obtain a microfiche duplicator for that purpose (NTIS indicates that permission for such duplication activities is not exceptional). These new services could be advertised in and out of the Library so that users will be aware that they exist. If experience with the NTIS service were successful, it would be possible to consider the acquisition of selected journal materials on microfiche, to fill the gaps in the Library collection.

3. Science Publishing Department

The Presidential decree that established NIDOC placed this department in charge of

- issuing, in cooperation with Egypt's scientific societies, scientific periodicals,
- distributing the periodicals in Eygpt, and exchanging them with foreign scientific institutions, and
- establishing a printshop to support scientific publishing.

The Department now produces the following periodicals:

Desert Institute Bulletin
Egyptian Journal of Agronomy
Egyptian Journal of Aminal Production
Egyptian Journal of Bilharziasis
Egyptian Journal of Biomedical Engineering
Egyptian Journal of Botany
Egyptian Journal of Chemistry
Egyptian Journal of Food Science
Egyptian Journal of Geology
Egyptian Journal of Horticulture
Egyptian Journal of Microbiology
Egyptian Journal of Pharmaceutical Sciences
Egyptian Journal of Physics
Egyptian Journal of Physiological Sciences
Egyptian Journal of Phytopathology
Egyptian Journal of Soil Science
Egyptian Journal of Veterinary Sciences
Proceedings of the Mathematical and Physical Society

This active publishing function produces the most important scientific journals of Egypt.

NIDOC's function in the science publishing process is relatively unique: it facilitates a qualitative intervention in this process by the Academy of Scientific Research and Technology. Through NIDOC, the ASRT assists a number of scientific society publishers both methodologically and financially. The survival of vernacular science journals in Egypt, as in many other smaller countries, faces numerous obstacles: the preference of scientists to publish in international journals, the vagaries of the refereeing process (with regard to both its rigor and its timeliness), the unrealistic delays in printing and distribution schedules, and of course inadequate incomes to cover operating costs. NIDOC has at best only partial control of some of these factors; thus while it strives to assist in accelerating the refereeing process, the Egyptian Government Printing Office sometimes takes from 1 to 1½ years to print an issue of a journal after the copy has been delivered. The published research is thus

dated,[5] which further reduces the utility of these journals as media of prompt dissemination of knowledge, and further discourages prospective authors.

4. Reprography Department

This department's function was defined in 1968 as being in charge of the photocopying of scientific documents, and the provision of microfilm or photocopies of such documents when requested by researchers. Accordingly, the Reprography Department is responsible for scientific photography and the reproduction of materials, including photocopies, slides, and microforms. Offset printing is also available, as is scientific photography. A list of the equipment available in the Department is given in Appendix B.

The Reprography Department has a very low demand for its services. This low demand is apparently the result of several years of insufficient supplies and inadequate equipment. While the inadequacies have mostly been remedied, the users have not returned to use the services of the Department. Either an aggressive campaign to increase usage should be undertaken or the staffing of the Department should be reduced. In the reproduction area, the Rank-Xerox Copyflow has not operated for many years. Action should be taken to obtain the necessary maintenance support to repair the machine. In addition, a collator and new binding equipment would greatly improve the capacity of the reproduction and printing unit.

5. Public Relations and Training Department

The Department provides information about the services and functions of NIDOC and prepares brochures about its services. Additionally, news items are followed up, visitors received, and social and cultural activities of the Centre arranged. The training unit of this department, whose mandate was contained in the 1968 founding charter of NIDOC, is supposed to arrange training programs for NIDOC staff and for personnel from other information and documentation organizations. A summary of the rather sparse training activities over the past three years is given in Appendix C.

One may note that the two functions -- public relations and training -- are quite disparate, having little in common; yet both are indispensable. The notion of public relations would seem to stand considerable expansion, so as to encompass a dynamic "marketing" of NIDOC services.

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[5] McCarn, Davis B. Reference Age Analysis of Selected Egyptian Journals. Atlanta, Georgia, Georgia Institute of Technology (School of Information and Computer Science), July 1980. (Project ISE Technical Report)

III. DISCUSSION

There is no doubt of the utility of and need for scientific information services in Egypt, In a study of citation patterns of references in 1979 issues of the journals published by NIDOC, McCarn provides rough measures of the degree to which Egyptian science may lag behind frontier research in developed countries, and concludes that "articles produced by Egyptian researchers . . . reflect a serious lack of awareness of recent developments in science and technology."[6] Such conclusions are not uncommon for science in developing countries. Indeed, considerations of effectiveness and productivity of Egyptian science and industry have been uppermost in that country's establishment of a central agency for the inventorying, processing and communication of scientific and technical information. Since the establishment of NIDOC in 1968 and of its precursor in 1954, a question of increasing importance has been that of the feasibility of and strategy for improving the effectiveness of NIDOC. Appendix D describes the history and status of both the internal and the external efforts in this direction.

Our study of NIDOC's organization and activities leads us to suggest that, given the many changes that have taken place since NIDOC's establishment, all major aspects of the present status of the agency require attention: its objectives, the scope of its activities, its staff, and its facilities. The following remarks expand on the first three areas.

1. NIDOC Objectives

NIDOC's 1968 charter is a remarkably comprehensive document identifying a host of functions that have later become the staple of functional desiderata associated (e.g., by Unesco) with central information and documentation bodies at the national level. The major types of technical responsibility usually attributed to such bodies are the comprehensive inventorying (acquisition and organization) of printed documents of various types; the preparation and publishing of so-called secondary publications (abstracts and indices); and the provision of a varying range of client-oriented information services. Their other responsibilities are intrinsic to the information enterprise: formulation of policy, coordination of practices, development of manpower, planning of development-oriented research, and the like. NIDOC's 1968 charter contains elements of all of these responsibilities except policy-making.

The intervening dozen years that followed the assignment of functions to NIDOC have, however, improved the general understanding of the circumstances and conditions under which information can more effectively perform its varying roles. This understanding has several dimensions, all of which bear on the set of functions ascribed to NIDOC.

- Dominant among these newer dimensions is the precept that the most urgent need is for information services to support the broad process of socioeconomic development of a people and a country,

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[6] McCarn, Ibid.

rather than solely the enterprise of basic and applied research in academia and industry. The ramifications of this viewpoint are vast, and in developing countries in particular it shifts the emphasis from science-oriented informatin handling to the management of "technological" information -- the broad, volatile, poorly-organized, and hard-to-find resource for problem-solving and decision-making in all purposive professions of society. Concomitantly, the composition of the clientele of information services for socioeconomic development changes drastically.[7] As this new dimension and its ramifications are deployed in Egypt, they will impact the function of NIDOC.

- o A second major new dimension is a preference for addressing the national information enterprise, particularly in developing countries, at a more encompassing level, both functionally and structurally. Functionally, this view attempts to take into account such underlying factors as the people's propensity to seek and ability to use information; and it shifts attention from technical information processing to its actual application, postulating that the social value of knowledge is not in its existence but in its use. Structurally, this more comprehensive view invites more complex designs of information systems at the national and supranational levels. On the one hand these systems couple more effectively the information resource with its users; on the other hand, they encompass a broader and more powerful range of information processing capabilities. Because of their physical, geographic extension and interweaving, these systems are often called "networks." Although the charter of NIDOC vested in the agency some systems coordinating and planning functions, the latter fall considerably short of the needed responsibility of some Egyptian organization to begin considering a national information system as a comprehensive entity that collaboratively manages and shares the resource called information.

2. NIDOC Activities

The current complement of programs and activities of NIDOC lies entirely within its charter. By the same token, it falls short of the potential range and intesity of programs and activities that the charter provides for and invites. This is due to a number of factors, some of which lie outside NIDOC management's control. The following are candidates for attention in the possible updating of NIDOC's activities.

- o NIDOC has been less than successful as an agent of change and synthesis in the information industry environment of Egypt. There is no denying the difficulty of such an ambition, and of

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[7] Saracevic, Tefko. "Perception of the Needs for Scientific and Technical Information in Less Developed Countries." In: V. Slamecka, ed. Scientific and Technical Information Services for Socioeconomic Development. Washington, DC, International Science and Technology Institute, Inc., April 1979.

the forces of tradition that inhibit collaborative efforts among the country's authors, publishers, librarians and information processing specialists, as well as collaboration between the public and the private sector elements. These obstacles notwithstanding, some leading component of the information scene in Egypt must take it upon itself to formulate, lobby in professional and political circles, and gradually implement a growing set of cooperative principles and protocols that underlie the concept and entity of "national," cost-effective information systems and services.

- The virtual absence of a program of modern information services requires urgent action. The concept of "modern information services" encompasses an effort to continually assess the nature and receptivity of information markets; a program of entrepreneurial production and diffusion of information products into these markets; provision of effective and well-publicized mechanisms for coupling random information needs with data resources (via referral to expertise, database search, and document delivery services); provision of "information analysis" service which assists the user to understand, interpret, and apply purposive knowledge; and a dynamic, broadly based campaign to alert problem solvers and decision makers to the value of information resources and to the existence of information services. Not all of these activities are likely to be the sole responsibility of one organization; however, their near-absence in NIDOC must be remedied if the agency is to remain a viable factor in the Egyptian information industry.

- Largely external circumstances have led, over a period of years, to the less-than-satisfactory situation that characterizes NIDOC's literature collection and library service. The two science collections of the Academy, one within the ASRT proper and the other in NIDOC, are under separate management which may have a historical cause but does complicate the acquisition, service, as well as personnel policies. The combining of these units is one issue; another is the most suitable administrative home for the combined library: NIDOC, the Academy, or even a third party. The desirability of these alternatives and their impact upon other functions of NIDOC should be carefully considered in the very near future. The third aspect of the NIDOC Library is the unevenness of its collection, in terms of both comprehensiveness and consistency of coverage; the formulation of and adherence to a sounder acquisition policy are essential.

- With respect to the science communication process NIDOC, as a catalyst in publishing of scientific journals of Egypt, has played an admirable role in an unusual position. For many valid reasons, Egypt desires to output her science results partly through vernacular media. Given the difficulties of maintaining quality scientific journals publishing in developing nations, the facilitating function currently performed by NIDOC

is very desirable. Two questions are appropriate, however; is NIDOC the ideal or best agent for such a function; and what improvements in this function can be suggested? The likely answer to the first question is that the Academy is probably the most appropriate agent, and its delegation of this function to NIDOC is logical in the absence of a scientific publication unit in the Academy. As to the second question, it would appear that at least two steps may be considered: tying the publishing/editorial services with other (future) information services of NIDOC, particularly some form of incentives to carry out bibliographic searches for authors of scientific articles; and examining every possible way of accelerating the editorial and printing schedules, including the use of commercial printing houses.

- Appendix C shows the extent of training activities conducted, either for NIDOC staff or by NIDOC staff for others, during 1977-79. The weak trends seem to a) favor foreign language training for NIDOC staff, and b) show a decline of NIDOC-taught courses for external clientele. Most apparent is the absence of in-house training activities, however; one would suggest, for example, that professional NIDOC staff members who attended quality-level training courses or programs in Egypt or abroad, should as a matter of principle be expected to train members of their departmental staffs in the same subject or skill. A more formal, planning-based approach to inhouse and extramural training is desirable as NIDOC assumes broader roles on the Egyptian national scene.

The above suggestions, if considered and at least partly implemented, will affect the future organization of NIDOC, and the type of facilities the agency will require. A study of these effects is the subject of the next project phase, and will be reported on in the future.

3. NIDOC Staff

The staff level of NIDOC fluctuates; from a count of 157 two years ago,[8] present staff is down by 25% (Table 2). Persistent, vexing difficulties of staff acquisition and stability are alluded to in Appendix D. Given the range of functions assigned to NIDOC, this is not an excessive staff; given the actual extent of current activities, however, NIDOC is not drastically understaffed. One does note a somewhat uneven distribution of personnel in the various departments, some (e.g., cataloguing, reprography) being relatively well staffed for their existing workloads. The ratio of professional to clerical personnel is quite high (approximately 50%) although comparisons with other similar agencies are probably distorted by NIDOC's science publishing function. Table 3 shows the distribution of staff qualifications in 1978.

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[8] Unesco. Reunion d'experts sur de developpement des systems d'information scientifique et technologie dans les etats Arabes. Paris, Unesco, November 1978. Annexes, p. 1.

Table 2. NIDOC Staff Distribution (1980)

Department*	Number of Persons		
	Professional	Clerical	Total
Public Relations/Training	2	3	5
Technical Office	3	7	10
Finance/Administration	5	21	26
Reprography	2	13	15
Publishing	8	9	17
Bibliography	5	4	9
Library	13	22	35
TOTALS	38	79	117

*See NIDOC organization chart (Figure 1).

Table 3. NIDOC Staff Professional Backgrounds (1978)*

Specialization	Number
Science	26
Agriculture	14
Medicine	2
Engineering	2
Pharmacy	1
Librarianship	19
Applied Arts	7
Commerce	10
Law	3

*Unesco. Op. cit.

If NIDOC moves forward to assume some of the previously under-emphasized functions mentioned above, its staff will require considerable expansion along the lines of expertise not yet on board. Specifically, professional and clerical personnel in areas associated with mechanized information processing, both systems analysts and operating staff, will be in demand.

In order to develop an adequate personnel basis for both existing and new functions in management and operations, the Egyptian Government needs to resolve the fundamental problem of remuneration for the information professions. The present salary policies seem to drive competent individuals out of Government information establishments. (In the United States, information workers and librarians in Government receive higher salaries than those in university and, often, private sector organizations; thus, the Government attracts and retains the best information scientists and librarians. In Egypt the situation is reversed.) Graduate librarians in public institutions in Egypt earn L.E. 30 per month; a librarian at the American University in Cairo earns L.E. 100 per month. In comparison with librarian salaries, a microfilm camera operator earns L.E. 150 per month. Unlike the university professor, the information professional has no easy way to supplement his or her earnings except by going on a leave of absence to work outside Egypt. If a national network of science and technology information is to be built in Egypt this inequity must be rectified, so as to attract and retain high-caliber personnel.

4. Summary

Over the years, NIDOC in particular and the Egyptian information sector in general have struggled through the country's and the region's political fluctuations and an inclement economic situation. The will and wisdom for guiding progress have been in ample supply. The human and material resources needed for such an advance were woefully inadequate, however, as a result of which factor many well conceived plans remained largely ambitions confined to the printed pages of internal memoranda and consultants' reports (see Appendix D).

Our point of departure is to view NIDOC not in isolation but as a major component of a comprehensive national approach to the management and use of information resources in support of Egypt's social and economic development. Stated differently, it is an instrumentality of the process of socioeconomic development which must be accounted for in the planning and implementation of that process. The upshot of this approach and of this analysis leads to an argument for a strengthened legislative, statutory and budgetary basis for NIDOC, so as to break away from its level of bare functional subsistence to a plateau at which both the agency and its dedicated staff can realize their mission and potential.

APPENDIX A

NIDOC LIBRARY ACTIVITIES

Table 4. NIDOC Library Acquisitions, 1977-1979

Year	Books purchased locally		Books purchased abroad		Periodicals		Books as Gifts
	Vols.	Cost(LE)	Vols.	Cost(LE)	Titles	Cost(US$)*	Volumes
1977	359	8,493			643	27,710	75
1978	645	11,371	152	3,562	588	51,189	49
1979	532	11,000			725	60,140	20

*Periodical subscriptions paid in different hard currencies.

Table 5. NIDOC Library Classification Workload, 1977-1979

Year	No. of Books	No. of Theses
1977	391	
1978	922	60
1979	428	

Table 6. NIDOC Library: Technical Processing Times

Technical Process	Average Time (Mins.)
Classification	10
Cutter's No.	5
Cataloguing	30
Typing of card	5

Table 7. NIDOC Library User Services, 1977-1979

	1977	1978	1979
NRC Clientele	15,679	11,133	11,572
Other Clientele	14,420	14,040	15,480
Books loaned	670	741	861
Photocopying Service*			
Number of Orders		1,224	2,686
Approx. no. of photocopies		40,000	100,000

*Photocopying Service started July 1978

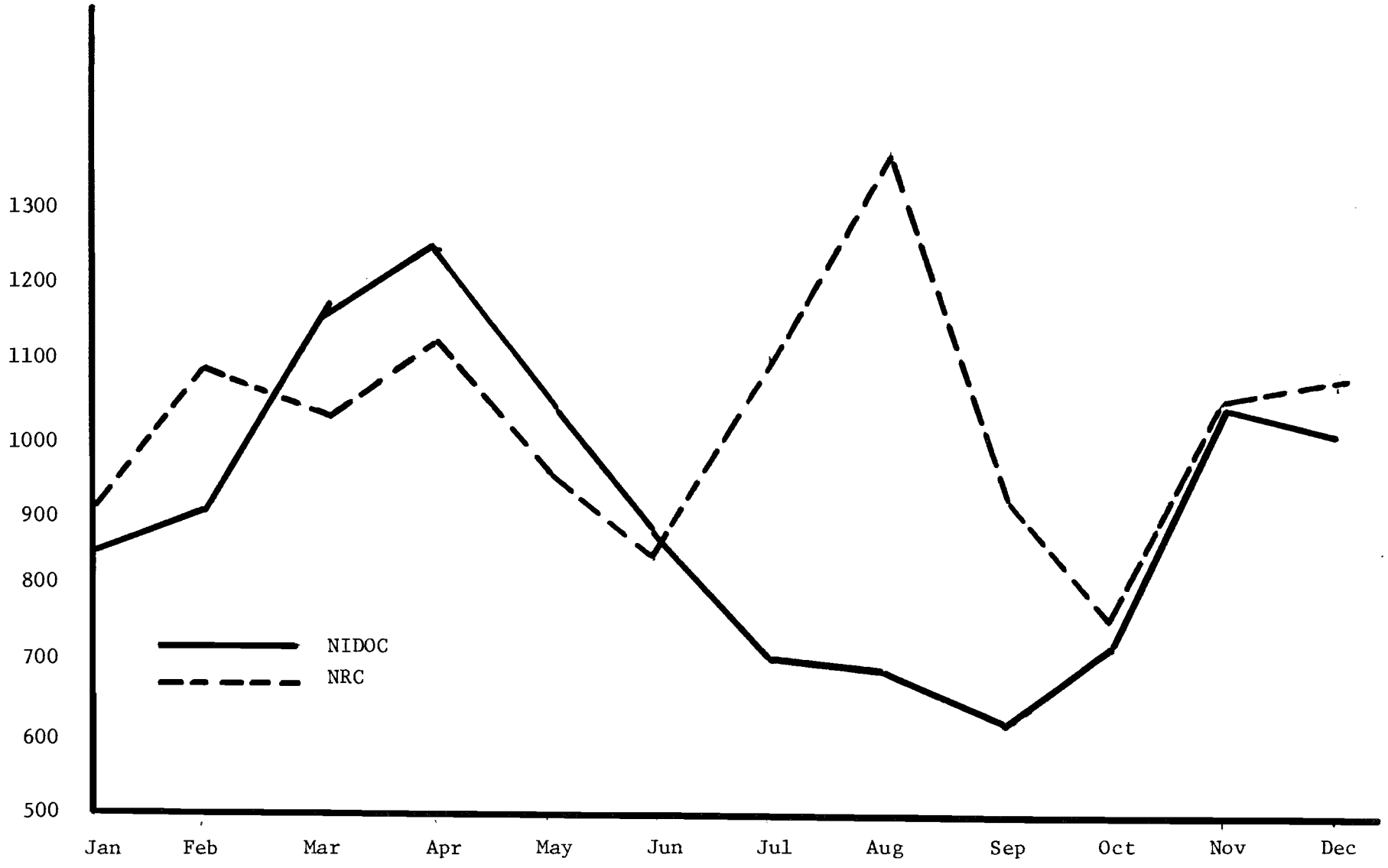

Figure 2. NIDOC Library Attendance, 1975

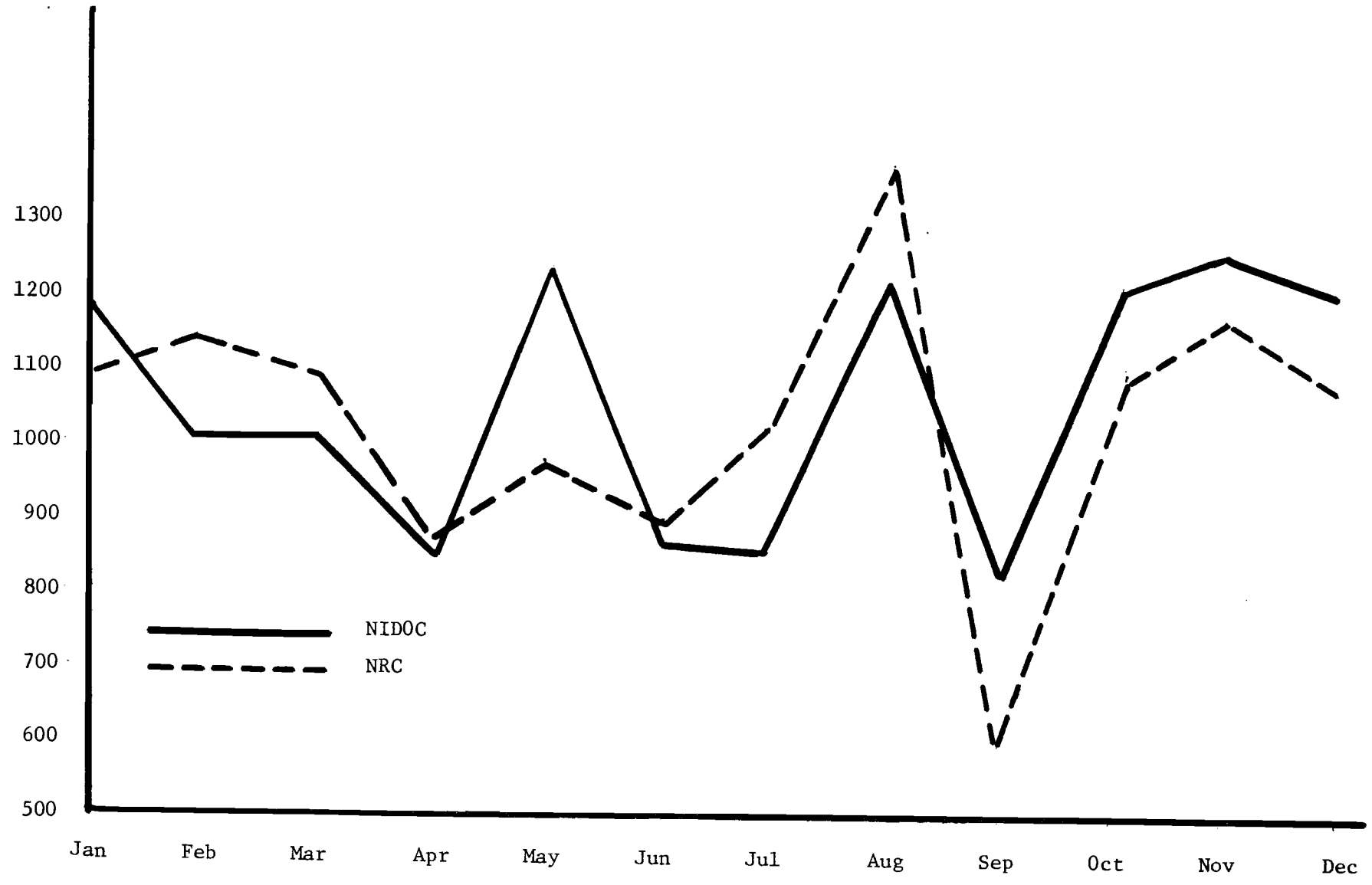

Figure 3. NIDOC Library Attendance, 1976.

APPENDIX B

NIDOC REPROGRAPHY DEPARTMENT

Table 8. Available Reprographic Equipment*

Units	Description
1	Kodak 35 mm Microfilming Camera (MRD-2)
1	Portable Kodak 35 mm Microfilming Camera
1	Yena 35 mm Camera
1	Bell & Howell 16 mm Camera
1	Processing Machine (Kodak)
1	Black & White Duplicating Machine
1	Graflex 9x12 cm Film Duplicator
2	Rolliflex Camera
1	Voglander 35 mm Camera
3	Microscope Filming Camera
3	Durst Enlargers (705)
1	Agfa Enlarger (6x9 cm)
1	Yena Automatic Enlarger (35 mm)
1	Omega Enlarger (9x12 cm)
1	Durst Enlarger (13x18 cm)
1	Contact Printer (18x24 cm)
1	Kodagraph Enlarger (35 cm)
1	Print Washer
1	Dryer
1	Hot Plate
1	Copyflo Machine
3	Multilith Printing Presses
1	Zitaprint Press
1	U-Bix Duplicator
1	Xerox Camera

*Exclusive of microfilm/microfiche equipment in Bibliography Department.

Table 9. Reprographic Activities, Feb.-Dec. 1979

Activity	Number of Units
(35 mm) Microfilm Frames	3000
Prints (different sizes)	8000
Positive Microfilm Frames	1000

APPENDIX C

NIDOC PUBLIC RELATIONS AND TRAINING DEPARTMENT

Table 10. NIDOC Staff Training, 1977-1979

NIDOC Department	1977			1978			1979		
	No.	Duration	Field	No.	Duration	Field	No.	Duration	Field
Library	7	3 months	English course B.C.	4	3 months	Library Practice	1	6 weels	English Course B.C.
	1	4 months	Russian Translation Moscow	3	2 months	Industrial Documentation IDCAS	5	3 weeks	Industrial IDCAS
				5	3 months	English Course NRC	1	1 month	Information System Management
				3	1 month	Computer in Linear Programming	5	1 month	Library Practice Course B.C.
							1	2 months	English Course American U.
							1	2 weeks	CNRS France
	8			15			14		

Table 10 (continued)

NIDOC Department	1977			1978			1979		
	No.	Duration	Field	No.	Duration	Field	No.	Duration	Field
Science Publishing	5	3 months	English Course B.C.	1	1 month	Library Practice Course B.C.	2	3 months	English Course NRC
							2	3 months	Fortran Language
							2	2 months	English Course American U.
Reprography				1	6 months	Operating & Maintenance of Equipment	1	2 months	English Course American U.
Technical Bureau				1	1 month	Archives	1	5 weeks	Archives
				2	3 months	English Course NRC	1	3 weeks	Industrial Documentation IDC
	5			5			9		

Table 10 (continued)

NIDOC Department	1977			1978			1979		
	No.	Duration	Field	No.	Duration	Field	No.	Duration	Field
Public Relations and Training							1	3 months	Secretary American U.
Bibliography	3	3 months	English Course B.C.	3	1 month	Library Practice Course	1	6 weeks	English Course B.C.
				1	2 months	Biblio-graphy Retrieval ALESCO	3	2 months	English course American U.
				1	6 weeks	French Language			Information Services
Finance and Administration				1	2 months	Accounting	1	6 weeks	Store-keeping
				1	3 months	Personnel Administra-tion	1	3 months	English Course NRC
	3			7			7		

Table 11. Training Programs for Externals, 1977-1979

Organization	1977			1978			1979		
	No.	Duration	Field	No.	Duration	Field	No.	Duration	Field
1. Suez Petroleum Co.	1	6 months	Library Technical Processes						
2. Al-Nasr company for Coke & Chemicals							1	2 weeks	Library Technical Processes
3. Misr Spining and Weaving Company				1	1 week	Library Technical Processes			
4. Fisheries Research Station Al-Kanater	1	6 months	Library Technical Procsses						
5. Atomic Energy Establishment	1	1 year	Library Technical Processes						
	1	1 year	Reprography						
6. Department of Library & Arch. Sc. Fac. Arts - Cairo University	10	40 hours	Information Services	6	40 hours	Information Services	8	80 hours	Information Services
	14			7			9		

Table 11 (continued)

Organization	1977			1978			1979		
	No.	Duration	Field	No.	Duration	Field	No.	Duration	Field
7. Faculty of Engineering Menoufiya Univ.				1	1 week	Library Technical Processes			
8. Faculty of Education Assiut University				1	1 month	Library Technical Processes			
9. Faculty of Science Assiut University				1	2 weeks	Library Technical Processes			
10. Ministry of Finance				3	6 weeks	Reprography			
11. Al-Riyadh Univ. Saudi Arabia	1	4 months	Reprography	1	3 months	Reprography			
	1			7					
GRAND TOTAL	15			14			9		

Table 12. NIDOC Public Relations Activities, 1977-1979

Activities	1977		1978		1979	
	No. of Persons	Agency	No. of Persons	Agency	No. of Persons	Agency
Reports and Statistical Information			1	Academy of Science & Technology		General Organization for State Information
					1	CAPMAS
						Director, NIDOC
Inquiries			2	Unesco	1	Unesco
					1	World of Learning
Visitors, Delegations	3	FAO	23	IDCAS	9	ALESCO
	1	Unesco	3	Khartum University, Soudan	10	Trainees for Administrative Training Centre
Experts	1	Unesco	3	AID	3	AID
	9		29		22	

APPENDIX D

SUMMARY OF PRIOR RECOMMENDATIONS

PRIOR NIDOC SURVEYS AND RECOMMENDATIONS*

A. Introduction

Since its establishment in response to a UN conference recommendation, the National Information and Documentation Centre (NIDOC) has undergone several stages of development. A number of recommendations, special studies and resolutions aimed at enhancing the Centre's national and regional role have been proposed and, in some cases, enacted during the last decade. For convenience, we may distinguish between internal and external studies and recommendations. Internal efforts include those of the the NIDOC administrators, as well as studies by various committees reviewing the Centre's modus operandi, flow of work, and other aspects of operations of NIDOC departments. External studies have been performed by visiting consultants and international experts.

B. Internal Studies

1. Administrative Studies

The recommendations developed internally have centered around three projects: a) the new NIDOC building, b) the procurement of a printing press, and c) the procurement of a computer.

a) NIDOC Building. The idea of building a facility for NIDOC dates from 1962, when an area of land totalling 6125 square meters and situated in front of the National Research Centre was designated for the purpose. The project was subsequently included in all the plans presented by the Centre after that date, and later amended in the 1973-82 ten-year plan; for various reasons, however, the project was not implemented. In 1976, the Secretary-General of the Atomic Energy Establishment, the Director of the Scientific Instruments Centre and the Director of NIDOC met, as a committee, and proposed that NIDOC be built on part of the land belonging to the AEC, close to the National Research Centre and other scientific organizations; that an engineering and architectural concern be engaged; and that cost estimates for land and building be developed. NIDOC specified the need for a five-story building with a surface area of 4000 square meters.

At a later date, however, an area of land at Madinet Nasr was allocated to the project, and several meetings have been held since March 1978 between officials of NIDOC, the Academy, and design engineers from the "Arab Office" which will execute the project. The general design document was discussed with Mr. F. Poole, an American consultant, in June 1978.

b) Phototypesetting Machine. A "Monophoto" photosetting machine was purchased from the United Kingdom. However, it was never set up, and was later allocated to the Central Organization for University and School Books and Educational Aids.

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*This summary was prepared by members of the NIDOC staff.

c) Computer. The request to purchase a computer was reintroduced for the five-year plan commencing in 1976. A committee of the Academy, which studied the data processing needs of the Academy and affiliated organizations, recommended in 1974 that requests for the required configuration be submitted to companies specializing in the field. The offers were studied and it was decided that the rental of an EDP service would be more economical until the operating team was formed and trained. The computer was to serve NIDOC as well as the National Research Centre and various other research institutes and laboratories.

In 1978, another committee was formed to study the present and future computing needs of the Academy. Its conclusions were reaffirmed by EDP EDP of the National Research Centre, and presented in May 1978 for study by IBM.

2. Internal Committee Studies

In February 1975, a committee of some of NIDOC's department heads was set up to study impediments to the flow of work and to propose solutions. Discussed below are the difficulties noted in the study, proposals made for dealing with them, and steps taken to improve conditions.

a) Lack of Space

Proposals: Arrange an area to accommodate the photosetting machine expected November 1975; remove back issues of periodicals to the National Library's old premises; use any available area in the Academy as storage space (the space previously occupied by the Science Museum was proposed); and provide new premises for the Centre, since the present space is insufficient.

Steps taken: As a result of these recommendations, optimum use is now being made of the present space. Excess periodicals were sorted and presented to regional universities to make space for more recent acquisitions, and publications in overstocked storehouses were distributed

b) Insufficiency of Funds

Proposal: NIDOC's requests for yearly budgets should be met to enable implementation of projects.

Steps taken: Financial allocations have increased during the last few years.

c) Severe Lack of Modern Equipment

Proposal: provision of new equipment (especially for the Reprographic Department -- e.g., microfiche, offset printers, photocopiers, mail stamp machines, furniture).

Steps taken: The Centre acquired new equipment for the Reprographic Department, a number of photocopiers, typewriters and furniture. Six microfiche machines were presented to the Centre by a USAID project.

d) Manpower

Proposal: Increase NIDOC's staff by 25 university graduates, 32 high school graduates, and 15 non-staff employees.

Steps taken: The required number of high school graduates was added to the staff. A number of university graduates were appointed, but because of resignations, loans and leaves without pay, the quota was not met.

e) Training

Proposal: Give priority to enrolling staff members in training courses either locally or abroad; and make arrangements for a program of post-graduate studies in information science, to be offered by NIDOC in cooperation with various experts and consultants.

Steps taken: A number of staff members were enrolled in specialized training courses eet up by national and international organizations in Cairo. In cooperation with the British Council, fifteen staff members were given a course in the English language. In Decmeber 1979, a training program in the U.S. was approved.

f) Lack of Incentive Pay

Proposals: Award bonuses to employees whose productivity is above normal; include NIDOC among agencies receiving bonus pay awarded by the National Research Centre, since the majority of NIDOC's services are rendered to NRC projects.

Steps taken: NIDOC's budget included yearly allocations for bonus pay to staff members in the years 1976-79 (in addition to other bonuses).

g) Financial and Administrative Affairs

Proposals: Establish an independent accounting unit for NIDOC, as well as a separate post office box whose number would be printed on all NIDOC stationary.

Steps taken: The accounting unit was established to serve NIDOC and the Scientific Instruments Centre.

3. Official Committees

On August 28, 1972, the Minister of State for Scientific Research appointed a Committee for Documentation, Information and Scientific Publishing, with the aim of eventually establishing a centre for documentation and information. In 1975, the ASRT Council established a Committee for Information and Scientific Publishing; it merged the above committees for the purpose of studying the best methods of information transfer, optimal utilization of modern technology in information science, and development of scientific publishing. This committee was reformed on April 3, 1978 with the same aims.

The studies prepared by these committees covered documentation, information work, and scientific publishing. Several recommendations were proposed, and some were implemented.

C. Recommendations by External Consultants

1. Mr. Vasilii Laiko (July-December 1968)

In its proposals to UNDP for the year 1967/68, NIDOC requested a consultant to study "The Preparation and Mechanization of a Union Catalogue for Books and Periodicals in Science and Technology." The request was approved and Mr. Vasilii Laiko was commissioned to undertake that study during July-December 1968.

Proposals:* It was recommended that mechanization of information retrieval be carried out at a middle level, based on the use of a digital computer. The estimated cost of realizing the system proposed would be approximately LE46,000. The implementation period would be about two years. Should the proposal be approved, the system could be implemented in two stages: a) creation of the union catalogue, and b) creation of a punched card retrieval file.

Steps taken: A complete survey was made of all scientific books and periodicals stocked in scientific libraries, resulting in the "Directory of Scientific and Technical Libraries in the UAR". In 1972 a survey was carried out by NIDOC of all scientific books and periodicals stocked in science libraries in Alexandria, to be published as a supplement to the guide to scientific periodicals in libraries affiliated with the Academy, as a step towards the preparation of a union catalogue. The idea was presented in 1978 to the Academy's Committee for Information and Scientific Publishing of studying the possibility of a national survey of all scientific books and periodicals. The Committee recommended the formation of a working group to study the feasibility of a union catalogue for scientific periodicals on a national level. The study would identify the libraries to be covered, estimate the quantity and quality of available periodicals and develop time schedules, manpower, and budget estimates.

2. Mr. Thomas Brimelow (May 2-23, 1973)

NIDOC, always mindful of the importance of manpower training in the field of scientific and technical information work, proposed a nine-month study program in information science to be offered through the Institute of Statistical Studies and Research. Mr. T. Brimelow arrived in May 1973 to study the project and prepare a curriculum. His report stressed the importance of such a program, confirmed that it could be carried out at the Institute for Statistical Studies and Research, and recommended October 1975 as the starting date.

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*Laiko, V. A Mechanized Information Retrieval System for the Documentation Centre in Cairo. Paris, Unesco Report 1227/BMS-RD/DBA).

In response to these recommendations NIDOC requested, in 1974, a number of fellowships to be included in Unesco's 1975/76 programme, and it contacted Unesco, the Institute for Statistical Studies and Research, and the Ministry of Planning. In 1977, the project was again discussed with Mr. Brimelow, who urged a speedy implementation of the proposal.

Although the aims and objectives set forth in the consultant's report were reemphasized in the 1977 discussions, it was felt that current needs would best be served by a short intensive course of 8 weeks duration, since the overriding aim was to teach students to make the fullest use of the information and other resources which were then available. A proposal was presented to Unesco for possible assistance, but Unesco replied that only a limited number of fellowships could be offered for the 1979/80 programme and suggested that further contributions be discussed with the UNDP. NIDOC then recommended that the subject be included in the USAID program of assistance.

3. Mr. Seppo Vorinen (January 1977)

Unesco commissioned one of its experts, Mr. Seppo Vorinen, to assist NIDOC in "Introducing a Machine-Readable Catalogue."

In his report, Mr. Vorinen made the following recommendations: the National Information and Documentation Centre should undertake a project for mechanization of the NIDOC catalogues; the aims of the first stage of this project should be (a) to convert the catalogue data of the Science Library of NIDOC into machine-readable form and establish a bibliographic database for NIDOC and (b) to produce different kinds of catalogues from this database and (c) to offer bibliographic data in machine-readable form to the National Library for national union catalogues; a special working group should be formed and should cooperate closely with the National Centre for Bibliographical Services of the National Library; the cataloging system should be compatible with MARC-format and with the International Standard Bibliographic Description for Monographic Publications (ISBD-M); selected books and journals in the field of library automation should be made available to the working group.

Following the report Unesco requested that it be informed of the measures NIDOC intended to take to implement the recommendations, and it offered to contribute its services in carrying them out.

4. Mr. A. F. Romerio (April 3-30, 1977)

NIDOC proposals to UNDP for 1975/76 included a request for a consultant in information systems to provide aid in developing a plan for establishing a national information system in the field of science and technology, including medicine and agriculture. The plan was to be based on the development and strengthening of the different networks such as specialized libraries, university libraries, and documentation and information centres. It called for a review of the existing infrastructures and information handling procedures, and for the identification of information needs.

In 1976 NIDOC repeated its request, and included the task of establishing a publications exchange unit. Unesco appointed Mr. A.F. Romerio, who visited the Centre and several libraries in April 1977. His report* stressed two main goals for this study: the design of a National Information Centre which could routinely serve the Middle East Region; and the modification of the flow of work in the Centre's library, especially the loan and exchange systems.

Recommendations: adapt the present NIDOC administrative structure to the new needs and, in particular, create an Information Storage and Retrieval Department; within the framework of the IRS Department, create a Document Analysis Section in charge of indexing/abstracting procedures and provide the necessary staff training; set up a NIDOC scientific and technical thesaurus using existing standardized thesauri and following Unesco specifications; create a Technical Operations Section in the ISR Department and train the necessary staff; adapt a new lending system at the NIDOC library and training the library staff in the use of the MARC-type cataloguing system; set up, with international or bilateral assistance, a microform library; renew or re-adapt the existing reprography and printing equipment; adopt the international ASV-CODAR system for handling Arabic languages in scientific and technical fields; create, with existing staff, an exchange of publication section in the Publications Department; demonstrate at NIDOC an interactive video display terminal and ask for a Frascati-Cairo 4-wire telephone line for data transmission; if test operation gives positive results, study a permanent connection to ESRIN in 1978 and an upgrading to Level 1 in 1979; study the feasibility of bringing up the NIDOC node to Level 2 at the end of 1980.

The execution of the above proposals requires the active contribution of international organizations like Unesco in the form of financial and technical aid as well as fellowships. Some of these proposals have been included in the AID programme.

5. U.S. Group of Experts

Within the framework of the agreement reached by the US-Egyptian working group in November 1974, the US National Science Foundation sent two experts, Mr. Burchinal and Mr. Eichler, to study possible cooperation in the field of scientific information systems. Since then steps have been taken for the execution of the cooperation project.

D. Other Visits by International Experts

1. Within the framework of the agreement between NIDOC and the General Institute for Information and Documentation (ZIID) of the German Democratic Republic, Mr. Siegfried Langhans visited the Centre during the period from September 13-26, 1971 to acquaint himself with the work carried out.

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*Romerio, A.F. A Teledocumentation System for the National Information and Documentation Centre of Egypt. Paris, Unesco, April 1977. (Preliminary Report)

2. Mr. Vomer Kennath, Commercial Representative of the GDR, also visited the Centre for two weeks to study the possibility of introducing mechanization.

3. Mrs. Celia Zaher, then Head of Unesco's Division for the Promotion of Information Services, visited NIDOC on February 18, 1972 to study Unesco's contribution to the setting up of training programs in information science. Mrs. Zaher agreed that an expert should be invited for this purpose, and she promised Unesco cooperation.

4. In accordance with the agreement on scientific and technical cooperation with the People's Republic of Hungary, the Director of the Hungarian National Documentation Centre (OMKD) visited NIDOC for two weeks in March 1973 to study means of cooperation between the two agencies.

5. In accordance with the agreement on scientific and technological cooperation between the National Information and Documentation Centre (NIDOC) and the All-Union Institute for Scientific and Technical Information (VINITI) of the Soviet Academy of Sciences, a delegation headed by Mr. Chakhmakhchev, visited NIDOC during the period from March 21 to April 2, 1974 to study means of coperation in the field of staff training.

THE EGYPTIAN NATIONAL SYSTEM FOR SCIENTIFIC AND TECHNICAL INFORMATION: ALTERNATIVES FOR LIBRARY COLLECTION DEVELOPMENT

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PREFACE

The design and implementation of an Egyptian system of scientific and technical information services, intended to support the country's socioeconomic development, is part of an Applied Science and Technology Program under a Project Grant Agreement between the Egyptian Academy for Scientific Research and Technology and the U.S. Agency for International Development. Phase I of the project (November 1979-January 1982) consists of a system analysis and design study.

The project is a collaborative effort of Egyptian and U.S. organizations. The Egyptian Academy of Scientific Research and Technology, with its National Information and Documentation Centre, is the Egyptian executive agency. Egypt-based activities are guided by an Executive Committee comprised of senior Egyptian experts and headed by the President of the ASRT. Technical assistance in Phase I is supplied by a team of U.S. consultants under a National Science Foundation contract (INT-7924187) to the Georgia Institute of Technology. Planning and project management assistance is provided by the U.S. National Science Foundation under a U.S. Agency for International Development Participating Agency Service Agreement.

The publication of this report does not imply official concurrence of the sponsoring agencies with the views and opinions expressed therein.

ACKNOWLEDGEMENTS

We would like to acknowledge the active participation of the Egyptian team members throughout the course of this project, both in connection with the site visits conducted by Mr. Palmour and in the conduct and analysis of the Collection Assessment Survey: Dr. Hishmat M.A. Kasem (Cairo University), Mr. Satwat Sherif (NIDOC), and Dr. Mohamed H. Zehery (National Scientific and Technical Information Centre, Kuwait) were all actively involved. We would also like to acknowledge the support of Dr. M.A.K. Madkour, National Project Manager, who was kind enough to forward to us Dr. Zehery's very helpful comments and criticisms of the survey.

We would also like to acknowledge here the guidance and understanding of Professor Vladimir Slamecka who served not only as the overall project director but also as a link between us and the team members in Cairo.

Many King Research staff members participated in this part of the project. Mr. Vernon E. Palmour conducted lengthy site visits in Egypt and assisted in the development of the research methods used in the survey. Ms. Mary Yates, our corporate librarian, directed the massive task of identifying and developing the various lists of recommended books, serials, and indexes used as the basis of the Collection Assessment Survey. Dr. Robert Wiederkehr coordinated the analysis of the results and was assisted by Mr. Scot Palmour; Ms. Yates participated also on this task by analyzing the availability and costs of available scientific and technical information resources. I would also like to acknowledge the massive typing task performed by Ms. Jane Hurst in the typing of all the lists of recommended materials.

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SECTION 1
INTRODUCTION

This report discusses the design, administration, and analysis of the Collection Assessment Survey, designed by King Research as part of its subcontract with Georgia Institute of Technology[1] under a Project Grant Agreement between the Egyptian Academy for Scientific Research and Technology and the U.S. Agency for International Development. King Research also participated in instrument and sample design for the Survey of Information Resources and Survey of Information Requirements, reported elsewhere.[2,3]

The focus of this report is on scientific and technical books, abstracting and indexing services, and journals (also referred to as "serials" throughout this report). Here we attempt to illuminate the symbiotic relationship between library collection development and library network development through a discussion of the costs of purchasing basic scientific and technical information resources for a set of alternative library system configurations.

As reported in the above-cited document by Slamecka, information resources are only one component in the development of a national system for socioeconomic development. Other components include technology, governance, funding, and personnel. But the basic resources of books, journals, and indexes form a common denominator for the evaluation of any information system: their lack of availability when needed quickly leads to the failure of any system. Their availability when needed, on the other hand, leads to further use of and satisfaction with the system.

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[1] National Science Foundation contract INT-7924187.

[2] Slamecka, Vladimir (1981) The Egyptian National System for Scientific and Technical Information: Design Study. Atlanta, Georgia: Georgia Institute of Technology; Cairo, Egypt: National Information and Documentation Centre, Academy of Scientific Research and Technology.

[3] Sarasohn, Homer (1981) Information Needs and Uses in Egypt. Cairo, Egypt: Academy for Scientific Research and Technology.

SECTION 2

THE COLLECTION ASSESSMENT SURVEY

2.1 Background and Purpose

The primary purpose of the Collection Assessment Survey was to identify and evaluate existing major Egyptian library collections as potential resources in a national information network. Recognizing the lack of a good quantitative approach for assessing library collections, it was decided that the use of evaluated lists of recommended book and journal titles was the preferred method. Visits were made to 15 major libraries in Egypt to discuss this approach. All agreed that it was a suitable means for assessing Egyptian library collections.

The method selected would provide selected Egyptian libraries a mechanism by which (1) they could compare their holdings against lists of books and serials in key scientific and technical fields, and (2) indicate which titles on these lists were relevant to the needs of their collections and users.

Lists of selected or recommended titles were prepared based on the best available lists of evaluative information. Journal titles were selected and arranged based on rankings of titles by demand obtained from the British Library Lending Division (BLLD). Book titles and abstracting and indexing titles were identified through review of existing "core" lists, standard reference works, and catalogs of existing quality library collections. This process resulted in development of the following lists:

1. King Research (1980a). AGRICULTURE: A PRELIMINARY CORE LIST OF JOURNALS AND BOOKS. Rockville, Md., King Research, Inc.
2. King Research (1980b). ENGINEERING: A PRELIMINARY CORE LIST OF JOURNALS AND BOOKS. Rockville, Md., King Research, Inc.
3. King Research (1980c). PUBLIC HEALTH: A PRELIMINARY CORE LIST OF JOURNALS AND BOOKS. Rockville, Md., King Research, Inc.

4. King Research (1980d). A SELECTED LIST OF AGRICULTURAL JOURNALS PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

5. King Research (1980e). A SELECTED LIST OF AGRICULTURAL REFERENCE BOOKS, ABSTRACTS, AND INDEXES PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

6. King Research (1980f). A SELECTED LIST OF ENGINEERING REFERENCE BOOKS, ABSTRACTS, AND INDEXES PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

7. King Research (1980g). A SELECTED LIST OF MEDICAL JOURNALS PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

8. King Research (1980h). A SELECTED LIST OF MEDICAL AND PUBLIC HEALTH REFERENCE BOOKS, ABSTRACTS, AND INDEXES PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

9. King Research (1980i). A SELECTED LIST OF SCIENCE AND TECHNOLOGY JOURNALS PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

10. King Research (1980j). A SELECTED LIST OF SCIENCE AND TECHNOLOGY REFERENCE BOOKS, ABSTRACTS, AND INDEXES PREPARED FOR THE ARAB REPUBLIC OF EGYPT. Rockville, Md., King Research, Inc.

Whereas the Survey of Information Resources was conducted nationally to obtain a numerical description of collections, personnel, technology, and other resources, the Collection Assessment Survey was designed to reveal specific subject strengths and weaknesses as well as to provide input regarding which titles were actually needed by Egyptian libraries.

The number of titles on the selected lists were as follows; the largest list was the "Science and Technology & Engineering" serials list, with 1,710 titles:

Table 2.1 Total Number of Titles in Selected Bibliographies

Materials	Major Field				
	Medicine	Agriculture	S&T	Engineering	Total
Books	1,237	377	854	589	3,057
A&I	76	19	118	28	241
Serials	640	155	1,710		2,505

Based on a sample of titles extracted from each of these lists, we calculated a mean purchase or subscription price in dollars, for later analysis. The computed prices are shown in Table 2.2

Table 2.2 Mean Price in Dollars for Books, Abstracts & Indexes, and Serials, 1980

Materials	Major Field			
	Medicine	Agriculture	S&T	Engineering
Books	$ 32.49	$ 19.75	$ 30.00	$ 36.35
Abstracts & Indexes				
Subscription	168.47	269.21	307.57	208.44
Backfile (one year)				
Hard copy	30.66	64.07	128.03	92.39
Microform	27.90	27.00	100.25	120.50
Serials				
Subscription	64.72	51.91	$ 131.55	
Backfile (one year)				
Hard copy	51.50	52.56	63.31	
Microform	23.19	19.65	39.17	

These mean prices were drawn from the sources described in Table 2.3.

Table 2.3 Sources of Unit Cost Data

Material		Source
Books		• (U.S.) Books in Print, 1980-81 • British Books in Print 1980
A&I	Subscription (papercopy)	• F.W. Faxon 1980 Librarian's Guide • Ebsco Subscription Services
	Backfile (papercopy)	• Alfred Jaeger's Periodicals American and Foreign 1980 • Kraus Periodicals General Catalogue 78-79 (American and Foreign)
	Backfile (microform)	• Microforms Annual 1980/81 (Microforms International Marketing Corporation) • Serials in Microform 1979-1980 (University Microfilms International)
Serials		
	Subscription (papercopy)	• F.W. Faxon's 1980 Librarian's Guide • Ebsco Subscription Services
	Backfile (papercopy)	• Alfred Jaeger's Periodicals American and Foreign 1980 • Kraus Periodicals General Catalogue 78-79 (American and Foreign)
	Backfile (microform)	• Microforms Annual 1980/81 (Microforms International Marketing Corporation) • Serials in Microform 1979-80 (University Microfilms International) • Ebsco Subscription Services

2.2 How the Survey Was Conducted

Egyptian project team members were supplied with the lists along with (1) instructions on how to use the lists, (2) instructions on how to tabulate the data, and (3) guidelines for the Egyptian survey team to use in selecting the libraries.

The last instruction was the most critical. King Research recommended (a) that libraries fill out the lists which were most relevant to them, and (b) that libraries which might be linked in a national network be included. The decision on which libraries to include in the survey was made by Egyptian team members based on their knowledge of Egyptian libraries. The actual work of supplying the requested information (e.g., indicating which book, index, or serial titles were held and which years of a serials backfile were held) was done jointly by members of the Egyptian survey team and staff members of the visited libraries. Table 2.4 displays the names of the Egyptian libraries surveyed as well as the identity of the list(s) used at each library. Altogether, 22 libraries were included in the survey, with a heavy emphasis on academic libraries.

Table 2.4 Respondents to Collection Assessment Survey

Library	Medical		Agriculture		S&T		Engineering
	Journals	Books	Journals	Books	Journals	Books	Books
1. Faculty of Science, Assyut University	-	-	-	-	X	X	-
2. Faculty of Engineering, Assyut University	-	-	-	-	X	-	X
3. Faculty of Agriculture, Assyut University	-	-	X	X	-	-	-
4. Faculty of Medicine, Assyut University	X	X	-	-	-	-	-
5. NIDOC, Cairo	X	X	X	X	X	X	X
6. Faculty of Science Library, Cairo University	-	-	-	-	X	X	-
7. Faculty of Engineering, Alexandria University	-	-	-	-	X	X	X
8. Faculty of Agriculture, Alexandria University	-	-	X	X	-	-	-
9. Faculty of Medicine, Alexandria University	X	X	-	-	-	-	-
10. Research and Higher Studies Centre, Alexandria Univ.	-	-	-	-	X	X	-
11. Medical Research Institute Library, Alexandria	X	X	-	-	-	-	-
12. Faculty of Engineering, Monofeya University	-	-	-	-	X	-	X
13. Faculty of Agriculture, Monofeya University	-	-	X	X	-	-	-
14. KIMA Fertilizers Company, ASWAN	-	-	-	-	X	X	-
15. Faculty of Medicine, Mansoura University	X	X	-	-	-	-	-

Table 2.4 Respondents to Collection Assessment Survey (continued)

Library	Medical		Agriculture		S&T		Engineering
	Journals	Books	Journals	Books	Journals	Books	Books
16. Faculty of Agriculture, Mansoura University	-	-	X	X	-	-	-
17. Faculty of Medicine, AIN Sham's University	X	X	-	-	-	-	-
18. Faculty of Agriculture, AIN Sham's University	-	-	X	X	-	-	-
19. Faculty of Medicine, Tanta University	X	X	-	-	-	-	-
20. Faculty of Agriculture, Tanta University	-	-	X	X	-	-	-
21. Agricultural Research Center, Ministry of Agriculture	-	-	X	X	-	-	-
22. Faculty of Agriculture, Mushtohor University	-	-	X	X	-	-	-

SECTION 3

ANALYSIS OF ALTERNATIVE SYSTEM CONFIGURATIONS

3.1 Introduction

The purpose of this section is to interpret the results of the Collection Assessment Survey on the costs which would be incurred for purchasing books, abstracting and indexing services, and journals (in either paper or microform versions). First we describe five alternative library system configurations in terms of purchasing all the titles on the selected lists used in the survey. Then we describe the costs of purchasing titles based on supplementing libraries according to data they supplied in the Collection Assessment Survey.

3.2 Alternative 1: Purchase All Titles

For illustrative purposes, we costed out five system configurations:

1. Single Comprehensive Collection
2. One Comprehensive Collection plus Three Specialized Collections
3. Six Specialized Collections
4. One Comprehensive Collection plus Six Specialized Collections
5. Five Comprehensive Collections

A "comprehensive" collection is assumed to be one in which all titles on all the lists (see Table 2.1) are purchased. A "specialized" collection is assumed to be one in which all books, abstracting and indexing services, and serials in one of the three major fields (see Table 2.1) are purchased.

Table 3.1 compares the collection development purchase cost of the five alternative system configurations under the assumption that all the titles on the selected lists are purchased. These costs are expressed in 1980 U.S. dollars, and do not include the effects of inflation, discounting, shipping, handling and surcharges. The component costs leading to Table 3.1 are displayed in Table 3.2.

Table 3.1 Collection Development Purchase Costs[1] for Alternative Systems (Purchase All Titles on Selected Lists)

Assumptions Concerning Backfile Purchasing Policy and Backfile Size (in years)		Alternative System Configurations				
		1 Single Comprehensive Collection	2 One Comprehensive + Three Specialized	3 Six Specialized	4 One Comprehensive + Six Specialized	5 Five Comprehensive Collection
Policy	Years					
Microform[2]	0	$ 1,767,000	$ 3,534,000	$ 3,534,000	$ 5,301,000	$ 8,835,000
	5	2,451,000	4,902,000	4,902,000	7,354,000	12,256,000
	10	3,135,000	6,269,000	6,269,000	9,403,000	15,673,000
Papercopy[3]	0	1,767,000	3,534,000	3,534,000	3,501,000	8,839,000
	5	2,620,000	5,240,000	5,240,000	7,860,000	13,100,000
	10	3,473,000	6,946,000	6,946,000	10,419,000	17,365,000

[1]Costs of books, abstracts and indexes, and serials in 1980 dollars. Assumes five-year subscriptions, 1981-1985, for abstracts and indexes and serials.
[2]Purchase 50% of backfiles of serials and A&I services in microform and balance in papercopy.
[3]Purchase all backfiles of serials and A&I services in papercopy.

3.2.1 Book Costs

The costs for books are the one time costs of purchasing one title of each book appearing on the selected lists. These costs were estimated to be the numbers of book titles purchased (taken from Table 2.1) times the average costs per title (taken from Table 2.2).

3.2.2 Abstracting and Indexing (A&I) Costs

The A&I costs consist of two components: the subscription cost and the backfile cost. The subscription costs were estimated for a five year period (1981-1985) assuming that the titles would be purchased in papercopy. This cost is the product of three quantities:

1. the number of titles (taken from Table 2.1)
2. the average cost per title per year (taken from Table 2.2)
3. the number of years of the subscription, viz, five.

The backfile costs were estimated for backfiles of three different sizes: no backfile, a 5-year backfile, and a 10-year backfile, and two different backfile purchasing policies:

1. The Papercopy Purchasing Policy
2. The Microform Purchasing Policy.

The Papercopy Purchasing Policy involves purchasing the entire backfile in papercopy only. The Microform Purchasing Policy involves purchasing as many titles as possible in microform and purchasing the balance in papercopy. It is assumed that 50 percent of the backfile copies are available in microform and the rest are not. Therefore, for the Microform Purchasing Policy half of the titles are purchased in microform and half are purchased in papercopy. For the Papercopy Purchasing Policy, the cost is the product of three terms:

1. the number of titles purchased (taken from Table 2.1)
2. the average papercopy purchase price per title per year (Table 2.2)
3. the size of the backfile (0, 5 or 10 years).

For the Microform Purchasing Policy, the papercopy purchase cost is half that of the Papercopy Purchasing Policy (because half of the titles are purchased in papercopy), and the microform purchase cost is the product of three terms:

1. the number of titles purchased in microform (equal to half the value appearing in Table 2.1)
2. the average microform purchase price per title per year (taken from Table 2.2)
3. the size of the backfile (0, 5, 10 years).

The total cost for the Microform Purchasing Policy, of course, is the sum of the papercopy purchase cost and the microform purchase cost.

3.2.3 Serials Costs

In parallel to the A&I costs, serials costs is the sum of the subscription costs and backfile costs. The method for estimating these costs is the same as that used for estimating the A&I costs.

3.2.4 Discussion of Table 3.1 Results

Of the alternative system configurations considered, the single comprehensive system (alternative 1) is the least expensive, regardless of the backfile purchasing policy selected. Alternatives 2 and 3 are twice as costly as this alternative, alternative 4 thrice as costly, and alternative 5 four times as costly. These results are a consequence of the fact that (by assumption) the cost of three specialized systems are the same as the cost of one comprehensive system.

If a backfile of 5 or 10 years is acquired, then adopting the Microform Purchasing Policy is less expensive than adopting the Papercopy Purchasing Policy. For example, if a 10 year backfile is acquired for the single comprehensive system (alternative 1) then from Table 5 it can be seen that the Microform Purchasing Policy (cost $3,135,000) is $238,000 less expensive (by about 10 percent) than the Papercopy Purchasing Policy (cost $3,473,000).

3.2.5 Discussion of Table 3.2 Results

Table 3.2 displays the component costs used to prepare Table 3.1. These costs are listed by type of materials (Books, Abstracts & Indexes, Serials) by major fields (Medicine, Agriculture, Science and Technology) by Backfile Purchasing Policy (microform and papercopy), and by backfile size (0, 5, and 10 years). Since the comprehensive collection is the union of the collection in medicine, agriculture, and science and technology (which includes Engineering), the cost of the comprehensive collection, which is presented in the rightmost column, is the sum of the costs of the three specialized collections in medicine, agriculture, and science and technology. The total costs shown at the bottom of Table 3.2 are the costs of purchasing books, abstracts and indexes, and serials for backfiles of three sizes: 0, 5 and 10 years).

The figures for the total costs for the comprehensive collection in Table 3.2 are the main input used to develop Table 3.1. These figures may be interpreted in two ways: either the cost of a single comprehensive collection, or the cost of three specialized collections. Because of this interpretation, the following alternatives all have the same purchase costs:

- two comprehensive collections
- one comprehensive plus three specialized
- six specialized.

The last alternatives appear in Table 3.1 as alternatives 2 and 3.

3.3 Alternative 2: Purchase Only Relevant Titles Which Are Not Held

Table 3.3 presents results of the Collection Assessment Survey concerning the reported number of relevant titles not held at NIDOC (selected to illustrate the comprehensive collection) and at six specialized libraries. The six libraries were selected from the set of existing ones on the basis of their holdings of serials and abstracts and indexes. Generally, the libraries with the most serial holdings were selected for inclusion in the overall system configuration. Where counts were close, the number of abstracts were doubled

Table 3.2 Collection Development Purchase Costs by Materials and Major Fields
(Purchase All Titles on Selected Lists)

Materials		Medicine		Agriculture		Science & Technology		Comprehensive	
		Microform[1]	Papercopy	Microform[1]	Papercopy	Microform[1]	Papercopy	Microform[1]	Papercopy
Books		$ 40,190[2]	$ 40,190	$ 7,445[2]	$ 7,445	$ 47,100[2]	$ 47,100	$ 94,736[2]	$ 94,736
Abstracts & Indexes									
Subscription	5 years	64,017	64,017	25,575	25,575	210,648	210,648	300,240	300,240
Backfile	0 years	-	-	-	-	-	-	-	-
	5 years	11,246	11,650	4,321	6,086	81,836	88,472	94,403	106,208
	10 years	22,492	23,300	8,642	12,173	163,674	176,944	194,808	212,417
Serials									
Subscription	5 years	207,104	207,104	40,230	40,230	1,124,752	1,124,752	1,372,086	1,372,086
Backfile	0 years	-	-	-	-	-	-	-	-
	5 years	119,480	164,800	28,108	40,734	438,453	541,300	586,041	746,834
	10 years	238,960	329,600	56,213	81,468	876,906	1,082,601	1,172,082	1,493,668
Total									
Backfile	0 years	311,311	311,311	73,250	73,250	1,383,190	1,383,190	1,767,062	1,767,062
	5 years	442,037	487,761	105,679	120,071	1,903,480	2,012,963	2,450,506	2,620,104
	10 years	572,763	664,211	138,105	166,892	2,423,770	2,642,736	3,133,950	3,473,146

[1]Microform purchase policy is to purchase 50% of backfiles in microform and all other materials in papercopy.

[2]Papercopy cost under microform purchase policy.

Table 3.3 Number of Relevant Titles Not Held at Central and Specialized Libraries

Library	Medicine	Agriculture	Science & Technology
National Information and Documentation Centre (NIDOC)			
Books	1,117	336	1,288
A&I	69	5	94
Serials	564	124	1,445
Faculty of Medicine, Alexandria University			
Books	871		
A&I	35*		
Serials	397		
Faculty of Agriculture, Tanta University			
Books		301	
A&I		14	
Serials		110	
Faculty of Science, Cairo University			
Books			865*
A&I			46*
Serials			552
Faculty of Medicine, Mansoura University			
Books	851*		
A&I	35*		
Serials	302*		
Faculty of Agriculture Assyut University			
Books		252	
A&I		10	
Serials		110	
Faculty of Engineering, Monofeya University			
Books			981*
A&I			92*
Serials			217

*Estimated value based on incomplete response.

and added to the number of serials, and this total was used as a basis for inclusion. (This approach is consistent with the unit cost of materials displayed in Table 2.2 which shows that A&I costs are usually more than double the serials costs.)

3.3.1 Costs for Alternative Systems - Purchase Relevant Titles Not Held

Table 3.4 compares the collection development purchase cost of four alternative system configurations under the assumption that only those titles are purchased that are judged to be relevant and are not held at the library or information center. The costs presented in Table 3.4 were computed by the same basic procedure that was used to produce Table 3.1 and is based on the unit costs of Table 2.2 and on the numbers of titles of Table 3.3. Recall that Table 3.1 is based on a different assumption, viz. that all the titles on the selected lists (Table 2.1) are purchased.

In contrast to Table 3.1, where alternatives 2 and 3 have equal costs, Table 3.4 shows that alternative 3 (six specialized) is less expensive than alternative 2 (one comprehensive plus three specialized). The reason for this difference is traceable to Table 3.3; the central comprehensive centre (NIDOC) has judged more titles not held to be relevant in each major field than the specialized libraries in that field. Consequently, the collection development purchase cost for the comprehensive collection is considerably more expensive than the sum of the costs of the individual collections, one in each of the three major fields. A corollary of this result is that alternative 2 is more costly than alternative 3, as indicated in Table 3.4.

3.3.2 Discussion of Table 3.5 and 3.6 Results

Tables 3.5 and 3.6 display the component costs used to create Table 3.4. Costs are given for the comprehensive collection, assumed here for purposes of illustration to be NIDOC, as well as the six selected specialized libraries (Tanta, Cairo, Alexandria, Mansoura, Assyut, and Monofeya). In parallel to Table 3.2 these costs are broken down by type of materials, by Backfile Purchasing Policy (microform or papercopy) and by backfile

Table 3.4 Collection Development Purchase Costs[1] for Alternative Systems (Purchase Only Relevant Titles Not Held)

Assumptions Concerning Backfile Purchasing Policy and Backfile Size (in years)		Alternative System Configurations			
		1 Single Comprehensive Collection	2 One Comprehensive + Three Specialized	3 Six Specialized	4 One Comprehensive + Six Specialized
Policy	Years				
Microform[2]	0	$ 1,451,000	$ 2,151,000	$ 1,205,000	$ 2,656,000
	5	2,013,000	2,984,000	1,669,000	3,682,000
	10	2,575,000	3,816,000	2,134,000	4,709,000
Papercopy[3]	0	1,451,000	2,151,000	1,205,000	2,656,000
	5	2,160,000	3,204,000	1,669,000	3,951,000
	10	2,869,000	4,258,000	2,134,000	5,246,000

[1]Costs for books, abstracts and indexes, and serials in 1980 dollars.

[2]Purchase 50% of backfiles in microform and balance in papercopy.

[3]Purchase all backfiles in papercopy.

Table 3.5 Collection Development Purchase Costs by Materials and Major Fields
(Purchase Only Relevant Titles Not Held)

Materials		Agriculture (Faculty of Agriculture Tanta University)		Medicine (Faculty of Medicine Alexandria University)		Science & Technology (Faculty of Science Cairo University)		Comprehensive (Example: NIDOC)	
		Microform*	Papercopy	Microform*	Papercopy	Microform*	Papercopy	Microform*	Papercopy
Books		$ 5,956	$ 5,956	$ 28,293	$ 28,293	$ 28,674	$ 28,674	$ 85,451	$ 85,451
Abstracts & Indexes									
Subscription	5 years	18,849	18,849	29,448	29,448	66,354	66,354	200,352	200,352
Backfile	0 years								
	5 years	3,185	4,485	5,173	5,359	25,778	27,869	63,989	69,071
	10 years	6,370	8,970	10,346	10,718	51,556	55,738	127,978	138,142
Serials									
Subscription	5 years	28,563	28,563	128,404	128,404	365,544	365,544	1,164,851	1,164,851
Backfile	0 years								
	5 years	19,957	28,921	74,078	102,176	142,497	175,923	498,122	639,881
	10 years	39,914	57,842	148,156	204,352	284,994	351,846	996,244	1,279,762
Total									
Backfile	0 years	53,368	53,368	186,145	186,145	460,572	460,572	1,450,654	1,450,654
	5 years	76,510	86,774	265,396	293,680	628,847	664,364	2,012,765	2,159,606
	10 years	99,652	120,180	344,647	401,215	797,122	868,156	2,574,876	2,868,558

*Microform purchase policy is to purchase 50% of backfiles in microform and all other materials in papercopy.

Table 3.6 Collection Development Purchase Costs by Materials and Major Fields for Three More Specialized Libraries
(Purchase Only Relevant Titles Not Held)

Materials		Medicine (Faculty of Medicine Mansoura University)		Agriculture (Faculty of Agriculture Assyut University)		Science & Technology (Faculty of Engineering Monofeya University)	
		Microform*	Papercopy	Microform*	Papercopy	Microform*	Papercopy
Books		$ 27,731	$ 27,731	$ 4,988	$ 4,988	$ 32,497	$ 32,497
Abstracts & Indexes							
Subscription	5 years	29,448	29,448	13,555	13,555	132,708	132,708
Backfile	0 years						
	5 years	5,173	5,359	2,290	3,225	58,103	62,815
	10 years	10,346	10,718	4,580	6,450	116,207	125,630
Serials							
Subscription	5 years	97,339	97,339	28,563	28,563	146,218	146,218
Backfile	0 years						
	5 years	56,156	77,456	19,957	28,921	56,999	70,369
	10 years	112,312	154,912	39,914	57,842	113,998	140,738
Total							
Backfile	0 years	154,518	154,518	47,106	47,106	311,423	311,423
	5 years	215,847	237,333	69,353	79,252	426,525	444,607
	10 years	277,175	320,148	91,600	111,398	541,627	577,791

*Microform purchase policy is to purchase 50% of backfiles in microform and all other materials in papercopy.

size (0, 5, and 10 years). In contrast to Table 3.2 the costs of the single comprehensive collection is much more expensive than the cost of three specialized collections. The reason for this is the larger numbers of titles not held at the comprehensive centre that were judged to be relevant (see Table 3.3).

3.4 Comments and Conclusions

We see from the above that the costs of collection development are sensitive to a variety of factors, including

- the field of science or technology involved
- the number (and identity) of library collections involved
- whether or not all titles or only relevant titles not held are considered
- whether a papercopy-only or joint papercopy-microform policy is considered
- the length of time over which a serials backfile is purchased.

Naturally, these factors provide only a "bare bones" outline of the factors which Egypt should consider. And, these factors do not all appear to have the same magnitude of impact on a plan to develop Egyptian libraries.

Of primary concern is the field of science and technology involved. We have purposely concentrated on three broad areas here which encompass a very broad range, under the assumption that socioeconomic development proceeds from progress in all fields. In actuality, Egypt's priorities may be such that, for example, priorities for agriculture and public health may need to involve short-term, applied-science goals. If this is the case, then the selection of fields in which libraries would receive first funding priority is an important social and political question.

Selecting fields for funding priorities has a direct impact on the number and types of libraries involved. An additional consideration is whether or not existing library collections should be relied upon in the development of a national system. Our assumption is that existing libraries should be relied upon; this is borne out by the difference in costs between the "purchase all titles" and "purchase only relevant not held" titles, especially when the costs of backfiles (in papercopy or microform copy) are considered. In terms of collection purchase costs per se it appears to make a great deal of sense, then, to build upon existing collections, assuming that the lack of interlibrary cooperation and possible under-staffing of reference services can be overcome in the future.

Another factor to consider is the role of microforms in library collection development in Egypt, and the length of time over which backfiles are to be purchased. According to our calculations, the purchase price difference between papercopy-only and papercopy-microform backfiles is not substantial. We believe that initial purchase cost should not be a consideration in deciding between the two for purchase of journal title subscriptions. Furthermore, we foresee the necessity for purchasing backfiles of A&I services eventually being overshadowed by the local or remote availability of computerized database searching. And, we have found that backfiles for all serial titles included in the Collection Assessment Survey are not available in microform.

Major factors which should be considered in developing a national STI system should be commonality, standardization, and ease of maintenance. In addition, we foresee the eventual development and/or identification of regional subject specialty collections in Egypt. If this is the case, we recommend a dependence upon papercopy supplemented by local availability of easily-maintained local paper-to-paper photocopying machines which can be used for reproduction and distribution of paper documents in local collections.

Concerning purchases of backfiles, it is a truism that resources allocated to purchasing backfiles of serial titles cannot be allocated to new titles not held. It is obvious, however, that increasing use of remotely-accessed online searching will result in generating demand for "older" materials. Also, while it is tempting to allocate all serials purchasing monies

to subscribing to new titles, it is also true currently that a major source used by scientists in identifying relevant journal titles is not the use of printed or computerized A&I services but the use of documents cited in relevant journal articles. Such a practice automatically results in identifying "older" journal articles. This practice is commonly followed in developed countries, and we have every reason to believe that it is utilized to even a greater degree in Egypt where the availability of sources of secondary bibliographic information is limited. Therefore, we recommend that, where possible, backfiles of ten years, at least for titles expected to be in high demand, be purchased. Very simply, if a question arises between purchasing backfiles for a high-demand title and purchasing a current subscription for a new or "marginal" title, we strongly recommend the former.

SECTION 4

DESCRIPTION OF JOURNAL TITLE SELECTION METHODS

4.1 Description of Alternative Methods

There are a variety of methods which might be used in Egypt for the actual selection of STI journal titles to be included in a national system. We have identified six basic methods. These methods, described below, differ in terms of the amount of prior information on user demand which can be obtained, and also in terms of their applicability to Egypt where a distinction must be made between development of a start-up collection and ongoing development in terms of actual demand.

BLLD Ranking

The British Library Lending Division (BLLD) is a major supplier of photocopies of journal articles both inside and outside western Europe. Because it can supply data on actual demand for individual journal titles it was used as a key input to the selection and ranking of journal titles in the individual lists used in the Collection Assessment Survey.

The major advantage for using the BLLD ranking to help in journal selection is that it allows the ranking of titles in terms of their actual demand. This is not the same as "value" since a single article in a single journal may be a key ingredient in a single, important project. But demand for individual titles from a broadly-used system such as BLLD does add prior knowledge about potential use which may not be available elsewhere. We thus view such listings as very useful since, for example, we know that actual demand may not necessarily correspond to what other sources, such as expert opinion or citation ranking, may recommend.

The major disadvantage of using a source such as BLLD for journal selection in Egypt is that the information needs within a developing country such as Egypt may not exactly parallel those reflected in the rankings produced from a system which primarily serves developed countries.

We are thus faced with a policy dilemma which cannot be solved through quantitative analysis. On the one hand, Egypt's goal is socio-economic development. If its goal is socioeconomic development, then an excellent case can be made to use a list such as the BLLD ranking, since it tells us what developed countries use.

On the other hand, Egypt is still in the process of socioeconomic development. Because of this, a case can be made that the information needs which are detected during the development process can be "outstripped" by the needs detected from a ranking provided by developed countries.

Journal Citation Rankings

The ranking of the number of times journals are cited by other journals is available from the Institute for Scientific Information (ISI). These citation counts measure the number of times journal article authors acknowledge other journal articles, and such rankings have been shown to correlate highly with qualitative assessments of the value or worth of scientific journals.

The advantages and disadvantages of citation rankings are very similar to those of the BLLD rankings, with the possible exception that citation rankings may not reflect so well actual use, as when journals are not used in the preparation of journal articles. The major question is still, however, which level of development Egypt desires to support. Citation rankings of all journals can be used to identify highly cited journals which are relevant to developed countries. In addition, both BLLD demand rankings and citation rankings can be used by making a priori judgements as to the subject relevance of journal titles to Egyptian libraries, and then running these titles against the rankings for the resulting titles. This introduces some subjectivity to the selection process; as we will see below, this subjectivity is often desirable.

"Relevance" Ranking by Egyptian Librarians

As we saw earlier, one of the goals of the Collection Assessment Surveys was to provide Egyptian librarians with the opportunity to identify titles which they perceived to be relevant to the needs of their current and potential users. The advantage of this approach is that it provides an opportunity for those close to users to assess those users' needs in terms of their collection requirements. It is thus assumed that this would translate into a "useful" collection.

The disadvantage of this approach is that this assumption is not always correct, irrespective of whether we are dealing with a developing or developed country. If a library is already understaffed or underutilized, there is always the possibility that even the librarians which run that library will not come into contact enough with their clientele so as to be aware of their needs.

Recommendations by Experts

One of the most straightforward methods for identifying relevant journal titles for library purchasing is to rely upon the judgement of experts, i.e., those who are familiar with journal subject content, quality, and user needs. This can be done either directly or indirectly. It can be done directly by having experts on a regular or consulting basis make judgements concerning which titles are relevant for individual libraries. It can be done indirectly (as was done in the Collection Assessment Survey's development of book lists) by consulting lists composed of titles which had already been recommended by experts.

A key factor in selecting this option is the availability of experts who can make such judgements. We think that such expertise is available in Egyptian and Arab librarianship, and we thus recommend that future collection development decisions take advantage of this expertise.

Duplication of Existing Quality Collections

This approach to journal title selection is perhaps the most straightforward. The library under consideration would identify a model library whose clientele closely parallels its own and then select similar titles based on anticipated use and budget availability. (This approach was one of the sources of input to the development of the book list in agriculture which was used in the Collection Assessment Survey.)

The advantage to this approach is that much of the lengthy decision-making concerning individual journal titles is avoided. The difficulty is that it is not always possible to accurately identify a library clientele closely paralleling that of the library whose collection is being developed.

In Egypt, the libraries included in the Collection Assessment Survey as well as the Survey of Information Resources differ substantially as to their collection scope and users. It may be possible in the future, however, to identify libraries in other Arab countries which might serve as good models for assisting in collection development.

Measurement of Actual Demand

This is the most desirable method for selecting journal titles. Using this method, the librarian waits until a significant amount of requests accumulate (e.g., interlibrary loan requests, document orders, search output, etc.) before actual purchases are made. One possible approach is to balance the cost of processing interlibrary loan requests against the cost of purchasing and processing document subscriptions to serial titles. Some libraries in the U.S., for example, automatically purchase a subscription to a journal title if five or more article requests from that journal are generated by users during a five month period.

The advantage of this approach is that subscription purchases reflect actual demand. However, there are several disadvantages which must be reckoned with. First, if a library starts from the situation of having a small or incomplete collection, and it is able to "generate" demand by providing printed

indexes and/or online searching, then delays are bound to occur in providing document delivery. Such delays, especially when they occur for popular or frequently requested items, may disappoint potential users and lower their confidence in the system. The second difficulty with such an approach has to do with setting an appropriate "trigger" number which is used for making the "buy" decision. If the number is set too low, too many infrequently-used titles will be purchased, resulting in a misallocation of scarce resources. If the number is set too high, then too few titles will be purchased, possibly leading to delays in delivery and resulting user disappointment and bad publicity.

4.2 Discussion of Alternative Methods

In reality, the major factor librarians must contend with in journal title selection is not the inability to rank titles in order of their relative desirability---we have seen above that there are a variety of methods available for doing this---but the fact that money for purchasing is usually limited. The major decision then becomes maximizing the available resources in order to minimize document delivery delay and satisfy a large percentage of demand.

While the Information Requirements Survey has given us an indication of the types of information used and needed by Egyptian professionals, it cannot by itself identify the priority areas for Egyptian socioeconomic development. The identification of such priorities is ultimately the responsibility of the Egyptian government, aided by the data gathered by this project. Egyptian government priorities have been incorporated into Sarasohn's description of user requirements. We feel that it is therefore appropriate that the Egyptian government itself should translate these priorities into the relative weight it wishes to place on different fields of scientific and technical information.

We have considered other methods for setting priorities for the allocation of funds, including the relative number of students in given scientific fields, the relative amount of funding allocated by the Egyptian government to

different fields of R&D, and so on. While such methods have the advantage of providing a numeric basis for allocating funds for information resources, they have a common drawback in that they are based on an assumption that the current size and structure of Egypt's R&D infrastructure has a one-to-one correspondence with future goals and objectives specified by the Egyptian government. Since the provision of information resources is itself a tool for socioeconomic development (through its support of R&D, teaching, study, etc.), we feel that tying the allocation of funds directly to the current situation has drawbacks, hence our recommendation that funding be tied to future goals and objectives for Egyptian socioeconomic development.

This is not to say that it is inappropriate to rely upon current resources and systems for providing access to scientific and technical information resources. Elsewhere we recommend that current library resources be taken into account in supplementing Egypt's information resources; this is entirely appropriate since the eventual goal of Egypt's libraries should be, we feel, to cooperatively supply information to all users, not just to those affiliated with these libraries' particular parent institutions.

We also note that another method used to identify priority areas for the investment of collection development funds, the ratio method, also has some problems in its direct applicability to developing countries such as Egypt. In this method, widely used in Western countries, the number of titles or volumes per population served (e.g., per student, per scientist, etc.) is calculated for a particular library and then compared with generally-accepted standards for similar types of libraries. This method has problems since it is inherently difficult to define a meaningful relationship between a particular ratio standard and the level or quality of library service which seems to be implied by the ratio. Even some U.S. libraries which have applied this method to allocating funds according to the size or budgets of individual college academic departments have encountered political problems since individual university departments may persuasively argue that their need for up-to-date "research front" information is greater, irrespective of whether their measure of titles-per-student compares favorably with other departments.

Our main point here is that it is impossible to divorce information resource allocation decisions from politics. Nor is it desirable, we feel, to do so, given that political decisionmaking may validly reflect national needs. The optimal approach to follow is one which combines both informed political judgements of need as well as statistical descriptions of the current situation.

Moreover, while there are many approaches available for selecting individual journal titles, usually a mix of them must be used, and the quantitative methods involved in ranking titles must be combined with subjective methods for identifying priorities for the initial allocation of resources. Let us consider the following problem, which is not unlike the one faced by Egyptian libraries:

> Given a budget of $1,000,000 (this number could be any figure reflecting available resources), find (a) the number of serial titles to purchase in each major field, and (b) which journal titles to purchase in each major field.

Following from the above discussion, a solution starts with a political decision: the allocation of funds among the major socioeconomic fields under consideration. Assume that a decision is made (for example, by an Egyptian national information policy board) to allocate funds according to the weights assigned by such a board to three key areas: Science and Technology[1], Medicine, and Agriculture. Assume that 100 points are hypothetically assigned by a governing body across these fields in the proportion of 60 points/30 points/10 points. Further assume that, considering the titles identified for the Collection Assessment Survey, the following decision is made:

> Purchase all abstracting and indexing services and book titles listed in each field; allocate in advance funds for 5 years of serial title subscriptions.

If this decision is made, and a 5-year backfile of titles under a mixed microform-and-papercopy policy is selected, then the following cost figures result.

[1] Including Engineering.
[2] i.e., 50% papercopy and 50% microform backfiles.

Table 4.1 Allocation of Materials Budget to Three Major Fields

Material	Medicine	Agriculture	Science & Technology	Total
Books	$ 40,000	$ 7,500	$ 48,000	$ 95,500
A&I	64,000	31,500	300,000	395,500
Serials	196,000 (384 or 60% of titles)	61,000 (139 or 90% of titles)	252,000 (276 or 16% of titles)	509,000 (799 or 32% of titles)
Total	$300,000	$100,000	$600,000	$1,000,000

The remaining uncertainty---selection of serials titles, would then be made based on one or more of the methods described in the previous section. A major concern, to repeat, is the relative emphasis to be placed on the different fields; changing the 60/30/10 point allocation to the three fields above would obviously result in a change in the funds available for purchasing selected titles.

We note here that a decision to purchase all A&I services is reasonable because it can give immediate bibliographic access until such a time when systems are in place for conducting or ordering online searches. Even when such systems are in place, there still may exist situations where it is justified to retain subscriptions to printed abstracting and indexing publications. Examples of such situations are: users have needs for bibliographic information which must be satisfied immediately because ordering a remotely-conducted search would take too long; simple searches (e.g., for specific documents or specific authors) are more quickly answered by going immediately to an A&I publication; search requests are too broad or poorly formulated and might therefore result in ineffective or premature use of online searching capabilities. We note here that even in the U.S., where online searching is widely available, the frequency with which printed indexes and online searching are used in combination is quite high, even when it can be demonstrated that the cost per document retrieved by online searching compares very favorably with the cost per document retrieved via the use of printed indexes. We found this in a recently-completed study of the Educational Resources Information Center (ERIC) system.[1] ERIC produces one of the United States' most widely used

[1] McDonald, D.D., et al., Cost and Usage Study of the Educational Resources Information Center (ERIC) System. Rockville, Maryland: King Research, Inc., 1981 (ERIC ED 208902).

bibliographic databases, the ERIC database of education-related literature. It also publishes the contents of this database in printed form in the monthly Resources in Education (RIE) and Current Index to Journals in Education (CIJE). We found that in about one third of the information requests for ERIC bibliographic information a joint use of ERIC printed indexes and ERIC computer searching occurred.

This is not to say that these information requests could not have been satisfied by sole reliance on computer searching. It does suggest that when both are available their joint use is mutually reinforcing. This is the basis for our recommendation that, at least at the beginning of the supplementation of Egyptian STI resources, both printed and computerized A&I services be made available. The decision to continue subscriptions to printed A&I services would then be reviewed at a later date, say after three years, when more experience has been gained in satisfying needs for bibliographic information.

Perhaps one of the major issues to be considered in selecting titles is the actual structure of the information delivery system. We saw in a previous section how costs differed according to the number of libraries participating in the system; costs also differ according to the number of comprehensive versus subject specialty collections. Obviously, one of the major concerns is the number of physical sites at which the documents are stored. Furthermore, the ability of the cooperating libraries to participate in networking (e.g., through the delivery of requested materials to remote locations) must be taken into account, coupled with the availability of a locator system (i.e., a union list) to help locate documents in remote locations.

In Egypt, we are faced with a situation in which a high level of interlibrary cooperation has not been a tradition. This is a tradition which must be changed if Egypt's libraries are to maximize access to the information resources they have now and those resources which they will have in the future. The most basic element in resource-sharing among libraries is the concept of interlibrary loan and document delivery. Egyptian libraries must develop procedures whereby needed documents or document copies can be obtained from

remote locations. The most basic elements of such resource-sharing are the following:

- Agreement among participating libraries to share their materials, i.e., agreement to loan books to requesting libraries and agreements to supply copies of journal articles when requested.

- Adequate financial, technical, and human resources to support this exchange (e.g., payment for mailing or telex costs, staff resources to fill requests, photocopying machines to make requested copies, etc.). This would also involve the development and operation of accounting procedures so that the costs of the borrowing and delivery services can be correctly allocated and compensated for.

- Adequate locator systems for materials held at participating libraries. At the minimum this would involve the production and exchange of serials holdings lists. An ideal development eventually would be a unified, regularly-updated union catalog for participating libraries.

- Establishment of regular communications (e.g., via a newsletter) between participating library and information center staff to keep them up-to-date on standards and procedures.

- Identification of a single library or information center as the lead organization or management center to coordinate the development of standards (e.g., for standardized borrowing forms and procedures), staff training, and interaction with non-member libraries and information centers inside or outside Egypt. An example of this latter activity would be the ordering of documents from organizations such as BLLD, Institute for Scientific Information, or University Microfilms when they are not available from Egyptian or other Arab libraries. Another example of the

coordinating activities to be carried out by such a center (often the largest library in a group) would be the establishment of the sequence by which document requests would be transferred among member libraries. For example, the decision might be made early on to transfer unfilled requests immediately to the central library.

- Publicity to inform potential users that document delivery services are available.

It is reasonable to expect that in any interlibrary loan or document delivery network that there will be "net borrowers" and "net lenders". That is, the ratio of document requests made by a library to document requests received to be filled by a library will differ significantly from library to library. This disparity may lead to some consortium or network members perceiving that they are giving more than they are receiving. This may occur if care is not taken from the beginning to adequately and equitably compensate members for the time and resources devoted to requesting and filling document requests. While there are a variety of methods available for calculating compensation amounts, the main variable used in such calculations is the actual or projected number of interlibrary transactions among participating libraries. While it is impossible to estimate at the present time what this transaction volume would be among Egyptian network members, we do urge that adequate statistics be collected and maintained by each participating library so that negotiations can be based on realistic estimates of actual or projected interlibrary transaction volume. Such statistics will also serve as the basis for future decisions on which serial titles to purchase or cancel. At the minimum, these statistics should include:

- Number and type of document requests generated by each cooperating library in the network.

- Subject field of the document request.

- Title and date of document requested.

- Type of requestor (e.g., student, employee of library's parent organization, employee of other organization).

- Whether or not document request was satisfied, and if satisfied, identity of the supplier and whether or not an original or photocopy was supplied.

- Time required to fill request.

Such statistics should be collected and aggregated on a monthly and annual basis and reported for each library in the network as well as for the system as a whole. As the system progresses, an attempt should be made to identify reasons why individual document requests were not filled to determine if the fault lies with individual collections (e.g., document not held or document not on shelf) or with the system itself (e.g., problems with mailing, breakdowns in photocopying machines, inaccurate or out-of-date location information, etc.). After an initial trial period of one to three years, the system's performance should be reviewed and questions such as the following should be addressed:

- Should additional libraries or collections be added to the network; for example, to help fill document requests in subject fields with particularly low fill rates?

- Is the volume of requests generated from requestors located outside network libraries' parent organizations great enough to justify altering or developing special financial arrangements with such organizations, e.g., through the development of deposit accounts which can be drawn upon as document requests are initiated?

- Do requirements exist for speeding up the time it takes to satisfy document requests, e.g., through the setting up of facsimile transmission services within participating libraries?

We have assumed implicitly throughout this discussion that requests for documents, and the documents themselves, will be transmitted and delivered via existing telephone, mail, and telex systems. We are not convinced, based on our data collection activities as well as our conversations with Egyptian

officials and information professionals, that dedicated transmission and delivery systems would be justified at the outset. By "dedicated" we mean the implementation of delivery services or telephone/cable/microwave devoted solely to document requests and document transactions among participating libraries. This situation may change if the number of transactions increases to the point where such systems would be cost-effective.

One final point that we wish to make here is that document delivery, collection development, and bibliographic services must be developed together, since a failure of any one of the three will result in a failure of the entire system. It is for this reason that authority must be vested in a single organization with overall responsibility for planning and development. This will necessitate a closer cooperation among Egyptian libraries than appears to have been the case in the past. Nevertheless, the system will not succeed unless a spirit of cooperation exists to overcome local or regional differences and vested interests.

The question must be asked here whether Egypt's objective should be to develop or supplement a single comprehensive collection versus a series of smaller specialized collections. We have already described the purchase cost implications of various options. With respect to obtaining needed copies of documents, it may one day be technologically feasible for a single document collection, perhaps stored electronically, to satisfy all serial article copy requests, irrespective of where requests originate. If this is the case, then why should Egypt consider options whereby several collections would participate in a library network, possibly resulting in a duplication of holdings?

We think this question should be answered by examining four issues:

1. The question of governance.
2. The role of title duplication.
3. The needs of local users.
4. The relevance of subject specialization.

With respect to governance, no matter how many libraries or information centers cooperate in the network, a single facility should be designated as having the responsibility for coordinating network services. While such a

facility would not manage the services provided by other libraries, it would be responsible, for example, for developing standardized procedures for requesting documents, and for analyzing and reporting statistics on network activities. Thus, while all libraries would participate in providing services, only one should be identified as having lead responsibility for coordinating the development of services.

The next issue concerns the duplication of titles (chiefly serial titles) among cooperating libraries. While it may be desirable eventually for cooperating libraries to engage in cooperative collection development activities, such as the agreement upon subject specialization areas, it should not be desirable to reduce title overlap completely. If two medical school libraries participate in resource sharing activities, it would be unrealistic for them to eventually develop two unique, non-overlapping collections. First, local users will need access to serial titles on a walk-in basis. Second, as will be discussed later, the importance of browsing for local users should not be underestimated. Thus, even in a multi-library network with highly-developed document delivery services, the complete elimination of serial title overlap will be neither feasible nor desirable. The same would be true for a network encompassing a comprehensive central collection affiliated with specialized subject collections. The comprehensive collection may very well duplicate titles held by the special collections. However, an example of a decision eventually made on a system-wide basis might be that the comprehensive collection would duplicate high-demand titles held by specialized collections; low-demand titles outside the subject scope of the specialized collection would be held only by the relevant specialized collection or only by the comprehensive collection. In summary, it would be unrealistic to anticipate that library networking will eliminate the need for duplicate titles among member libraries. In fact, cooperating libraries may find, after examination of document request statistics, that it is actually cheaper to increase the number of duplicate titles within the system. (This often occurs in U.S. library networks.)

The long-range goal of participating libraries should be to provide information to all users, regardless of whether they are employed by the participating library's parent organization. As in other countries, Egypt may find substantial economic, political, and technical barriers to accomplishing this goal. Nevertheless, providing library services to all users, particularly those

involved in research, teaching or other professional activities, requires that service outlets be located in close geographic proximity to the users. This need would tend to argue against the desirability of a single comprehensive center acting on its own as a supplier of documents in response to all locally-generated requests.

The final issue is that of subject specialization. Given the number of specialized (i.e., medical, agricultural, engineering, etc.) libraries which already exist in Egypt, the issue of whether or not specialized libraries would participate in network activities is almost academic. The real question is the degree to which specialization will continue to be relevant given the inability of any one library to acquire and store all relevant materials in any given field. Given limited funds for collection development, a choice may have to be made between purchasing materials for a comprehensive (i.e., multi-subject) collection versus a specialized collection. This is essentially a restatement of the problem about comprehensive versus specialized collections which initiated this discussion. While it is difficult to discuss this issue without reference to real factors such as cost and geographic location, we feel it is essential that the willingness of any one library to participate in cooperative activities be considered when allocating funds for collection development. In other words, libraries which do not agree to participate in interlibrary activities such as document delivery, union catalog development, or cooperative decisionmaking on acquisitions, should receive a low priority for collection augmentation. The rationale for this criterion is very simple. Libraries which agree to participate in resource sharing are in effect multiplying the opportunities they have to serve users. Money spent on libraries which agree to loan books or supply copies to other libraries thus benefits local users as well as other users. Therefore, the degree of a library's specialization in relation to its becoming a member of a library network whose resources are to be upgraded is less important than its willingness to provide services to users, either locally or at a distance.

Let us now summarize the discussion of the issues regarding the relative roles which a comprehensive central collection and specialized subject collections would play in an Egyptian library network. Regarding governance, it is recommended that a single organization be charged with the responsibility

of coordinating the planning, development, and implementation of network activities. This organization's staff should be housed at or near the collection which is identified as the central library and should report organizationally to a board composed of the directors of cooperating network libraries, not to the director of the central library. It should be made clear very early on that this organization's purview will be cooperative network activities, not the direct management of individual libraries' locally-provided services. Ideally, network members should contribute at least part of this central organization's budget, in proportion to their own operating budgets.

Regarding title duplication, we again point out that the duplication of high demand book and serial titles is justified for network members, since this duplication can result in a reduction in the time and cost for providing some services. Cooperating members should, however, attempt to reduce duplication for low-demand titles, which may be better "retired" to the central collection but still accessible via a union catalog and interlibrary loan.

Regarding local users, we recommend that network libraries work to reduce any restrictions on who is eligible to use the services of network members. A reduction of these restrictions will inevitably lead to demands being placed on network members by users not employed by network members' parent organizations. Again, statistics should be kept on the organizational affiliation of network library users. This will enable the Egyptian government to calculate appropriate financial compensation for the network in relation to its service to "outside" users.

Finally, regarding the issue of subject specialization, we do not think that it is desirable to aim in the long run to develop a single comprehensive collection on all subjects which would eventually overshadow the need for local specialized collections, e.g., for medical or engineering collections attached to university faculties.

In conclusion, we do not feel that a single, comprehensive collection, which would service all demands which cannot be satisfied by local, specialized collections, is a desirable long-range solution for providing access to

scientific and technical information throughout Egypt. Instead, the long-range emphasis should be on upgrading local specialized collections (e.g., in health, agriculture, engineering, or science and technology) so that they can provide service based on core collections of high-demand titles in their collections. In practical terms, this means that a user who requests and receives a computerized bibliographic search at, say, the Faculty of Agriculture library at Assyut, should have some assurance that he or she can obtain immediate physical access to often-requested serial titles at Assyut.

The role of a central, comprehensive collection should be (1) to house network staff, (2) to develop collections in subject areas not covered adequately by other network members, (3) to maintain current subscriptions to infrequently-requested serial titles, (4) to serve as a storage or "retirement" facility for older materials, (5) to serve as a service point to interact with Arab and other libraries and information services outside Egypt, and (6) to provide other network-level services which can be cost-effectively centralized. These would include the ordering and processing of materials purchased outside Egypt, the collection and analysis of cost and usage statistics, and the conduct of bibliographic database searches if such searches cannot be conducted locally.

SECTION 5
QUESTIONS FOR THE FUTURE

In the previous sections we outlined data and issues which are relevant to the costing of collection development, to selecting journal titles for library collections, and to library network development. We hope that we have made clear the importance of combining the quantitative data presented herein with the experience and insight of our Egyptian colleagues. Several issues remain outstanding, however, which we believe should receive further attention.

First, we have made a basic assumption throughout the study that initial collection development should concentrate upon scientific and technical information resources as embodied in books, journals, and abstracting and indexing services. It is the nature of these resources that they emphasize research and development, including basic research, as distinct from practical decisionmaking information of immediate use to managers, executives, bureaucrats, and others not directly involved in research and development. This reflects an overall judgement that scientific and technical information resources are critical to long-range socioeconomic development, and that traditional resources such as books, journals, and indexes are effective methods for communicating such information. Further, we have also interpreted the data with an assumption that participation by existing Egyptian libraries and information centers will occur in a national scientific and technical information system. In other words, we have based our discussion on the assumption of the relevance and applicability of traditional information resources and traditional information delivery mechanisms.

Such an assumption must be adopted with regard to the provision of information resources to users outside the traditional sphere of R&D. Delivery of "management" information, for example, may require development of a more highly decentralized and labor-intensive delivery service, possibly emphasizing outreach (e.g., publishing, seminars, consulting) over the traditional organization and delivery of STI, even when supplemented by modern electronic technology. Egypt is already well aware of this distinction in the provision

of management and industrial information, as evidenced by a program sponsored by the Engineering and Industrial Design Development Center (EIDDC) of the Egyptian Ministry of Industry and Mineral Wealth. This program, designed to increase Egyptian industrial productivity, envisions the employment of both industrial technology professionals as well as information professionals. The program's goal is to upgrade Egyptian industry through the adoption of modern industrial technology. The methods adopted in this technology transfer program involve an outreach program in which program employees work with Egyptian managers to determine their needs, identify appropriate technology, set up demonstration programs, etc. This approach to the diffusion of information is not unlike that employed by the United States' venerable agricultural extension agent program. The key ingredient is that individuals are employed to go beyond simply retrieving information to actually promoting its use among users whose needs are thoroughly understood. Often this understanding of user needs occurs because the "linking" agent, as he is sometimes called, is drawn from the same professional or industrial community as the potential information users. Therefore, it would be appropriate that those responsible for upgrading Egyptian libraries identify the existence of other technology transfer projects such as the one described above. The possible alliance of these two information transfer systems would be mutually reinforcing.

Second, we have proposed a heavy emphasis on papercopy, supplemented by photocopying technology and online literature searching. Current experimentation with digital transmission of full text via satellite may point to eventual supplementation, if not replacement, of local library collections. By "local library collections" we mean a set of books, journals, and indexes which can be browsed and copied by walk-in patrons.

In the ARTEMIS report, for example, Arthur D. Little, Inc., described a document delivery service which prints out pages of STI documents at the user's terminal (ARTEMIS: A System for Document Digitalisation and Teletransmission; Report to Directorate General XIII of the Commission of the European Communities, April 1980). This study reported that, as the costs of digitalisation and telecommunications continue to fall, full text document storage, retrieval, and transmission will become more and more attractive. A similar system, ADONIS, is also under study in the United States. A logical question

is then, why should Egypt rely on decentralized access via locally available papercopy documents when transmission via teletex or facsimile is currently under examination by Western governments and publishers? The answer is that Egypt by itself cannot afford to participate in a major way in the up-front development costs of such systems; it may also decide that it cannot afford to wait for the unknown future time when the legal, political, and economic uncertainties surrounding such systems are resolved. We have faith that such uncertainties will eventually be resolved, and that full-text storage, retrieval, and transmission of documents will be commonplace within the next ten to twenty years. However, Egypt must belance the certainty of currently-available technology and systems (papercopy, photocopying, and online bibliographic searching, for example) against the uncertainty of when more advanced technology will become available at affordable prices. A possible conservative approach would be for Egypt to rely on current technology while examining future technological options for full-text document transmission in cooperation with other Arab or "third-world" countries. We note, however, that even if Egypt decides at the present time to augment library collections and services through existing technology and through the formalization of library networking activities, library network members in the future would be logical candidates to serve as "service bureaux" for retrieving and distributing copies of documents transmitted via teletex or facsimile.

We do not anticipate, now or in the foreseeable future, doing away with the local library collection. This is true for both developed and developing countries. Local library collections will be preserved not only because of tradition but also because they perform a very valuable function: they place a collection of potentially relevant documents in close proximity to users so that they can be examined and/or browsed.

We must emphasize the importance of browsing and library collections to scientists' current awareness activities, especially for the many current journal titles whose subscription prices put them out of reach of the typical researcher in developing countries. While some current published and online services (e.g., contents listings, online bibliographic databases used for selective dissemination of information, etc.) replace some of the functions of browsing, they would generate demand for document titles which may not be held

locally. While an ultimate goal which Egypt should develop is effective interlibrary loan procedures, we recommend that interlibrary networking and document delivery not be viewed as a complete replacement for the local collection, especially for high demand titles.

A third important issue which will need to be addressed is copyright. This is because we anticipate the important role which photocopying must play in providing local access to documents. If a national system is established beginning with the establishment or strengthening of a single comprehensive resource center, and if heavy reliance at this center is placed upon photocopying for document delivery to both local and remote users, then we recommend that Egypt further investigate the copyright ramifications of such an approach.

We note that Egypt currently has no formal, legal copyright agreements with the U.S. other than the 1978 Phonogram agreement which is a convention governing the protection of producers of phonograms against unauthorized duplication. For example, according to the 1980 Annual Report of the U.S. Copyright Register published in 1981, Egypt was not party to the UCC, the Universal Copyright Convention, of which the U.S. is a member. Thus, the international legal ramifications of library photocopying of materials protected under international copyright agreements is not clear, unless copyright protection of foreign-published materials is directly addressed in current Egyptian law. In the long run, the development of electronic systems for aiding or providing document delivery services must face the realization that some publishers will demand royalties for the storage, retrieval, and copying of their documents. This is currently the case in the U.S. where many STI journal publishers belong to the Copyright Clearance Center, an organization which collects and distributes royalties from many U.S. industrial and other libraries. While this issue of copyright royalties is too complex to be treated adequately here, we do believe that it may be in Egypt's best long-run interest to consider the negotiation of copying licenses with publishers or their agents if it intends to develop a national library network in which photocopying plays a key role.

A fourth important issue is marketing and publicity for the expanded availability of scientific and technical literature. Local libraries should not simply strengthen their collections and continue with "business as usual".

Efforts should be mounted nationally through professional societies, faculties, and research programs to make potential users aware of available titles. This should not be attempted, however, until collections have actually been augmented and mechanisms (both technical and financial) are in place to handle a potential increase in demand.

Finally, a principle which should guide future library collection development in Egypt is that such development must take place under Egyptian guidance and control. This control must extend all the way from the selection of libraries to participate in and provide guidance to a national network, through the actual selection of journal titles for individual collections. Journal ranking lists and selected bibliographies developed outside Egypt should aid, but not supplant, decisions made by Egyptian experts.

THE EGYPTIAN NATIONAL SYSTEM FOR SCIENTIFIC AND TECHNICAL INFORMATION: DESIGN STUDY

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EXECUTIVE SUMMARY

The decade of 1980 challenges Egypt to build a healthy foundation for the long-term evolution of a new economic sector, the information sector. The past two decades have provided evidence that the production and use of knowledge are related to factors such as productivity and employment, and hence indirectly to the national standard of living. It is now accepted as axiomatic that intensive use of relevant and up-to-date data and information in problem solving and decision making is a *sine qua non* of accelerated human and national development. In industrialized as well as in developing countries, the intensified use of data and information is bringing about a rapid evolution and growth of national information industries. It is essential for Egypt to participate in and stay abreast of this global phenomenon.

This study proposes the establishment in Egypt of a public utility for the management and use of problem solving knowledge (termed "scientific and technical information," or STI). The key *raison d'etre* of this "national STI system" is to support Egypt's socioeconomic development. It has three primary objectives: 1) to raise the public awareness of STI as a problem solving resource, so as to increase its use in Egypt; 2) to organize public STI resources in Egypt, particularly those generated by Egypt; and 3) to provide for efficient access to, and delivery of, data and information located within the country and abroad.

The study makes explicit the relationship and functions of three autonomous groups comprising the national STI system: users, information services, and document repositories. Technically, the national STI system is an undirected ("ring") network: given suitable telecommunications it allows the eligible user to communicate directly with any of its information services and document repositories.

User Clientele

A distinct design characteristic of the proposed national STI system is its attempt to diffuse information-interacting activities into Egyptian problem solving communities, so as to force the integration of these activities with human problem solving and decision making processes.

The user communities to be given priority attention are, initially, those of Egyptian managers (policy, business and government decision makers), professional practitioners in the public and service sectors, and knowledge transfer agents (researchers and educators). A major effort is deemed essential to appraise these communities of the utility of data and information as a problem solving resource; toward this objective, the study identifies a series of strategies, the more critical ones of which relate to Egyptian education in problem solving. Concurrent with this longterm effort, intensive marketing of the newly developed information services, mediated through "information liaison" personnel in large enterprises and institutions, is advocated.

Information Services

The study recommends that Egypt establish a distributed, open-ended network of information services. Highest initial priority is attached to services supportive of problem solvers in the following sectors: agriculture, energy, human settlements, industry, medicine and health care, science and engineering, and transportation and communication. Each information service node is to be managed and operated by an autonomous organization belonging to the respective sector.

The main responsibilities of each information service node are: 1) the development of its user clientele and markets; 2) compilation of electronic databases of indigenous information of high utility to its user clientele; and 3) the location and provision, from foreign and domestic sources (databanks, libraries, human experts), of data and information requested by Egyptian problem solvers.

The study strongly recommends the wide use in the proposed national STI system of state-of-the-art technology: microcomputers, user-operable software, and telecommunications. A standard information processing facility is described and recommended for each of the information service nodes, having the capabilities of online creating and querying bilingual databases, camera-ready page composition of database contents, and electronic messaging. The facility is intended to operate in a programmer-free environment and be locally maintainable.

The earliest possible introduction to Egypt of an X.25 digital communication network is advocated, to allow online access from each information service node (and eventually from end user facilities) to the hundreds of databases now extant in industrialized countries. The importance of access to "source" databases by management users is emphasized. Meanwhile, the study recommends that the method temporarily used by Egypt to access public U.S. databases — transmitting queries via telex to a U.S.-based intermediary and having digital search output delivered by courier to Egypt — be introduced into all information service nodes.

Document Repositories

The study substantiates Egypt's need to acquire and maintain on its soil a non-trivial portion of the world's high quality scientific and technical literature (journals, reference works, and specialized documents such as patents and technical reports). This goal can be attained only if major Egyptian academic and special libraries subscribe to the principle of resource sharing. An embryonic consortium of such libraries is proposed under the auspices of the national STI system; initially its members only consent to provide, upon request and against remuneration, copies of documents from their holdings. A complementary program for supplementing the holdings of

this document repository network is outlined. The program provides a starting point of, as well as incentives for, a voluntary cooperative development and management of STI resources by Egyptian libraries, and it facilitates access by patrons of these libraries to the information services of the national STI system.

Governance

The various nodes of the Egyptian national STI system (user organizations, information services, document repositories) are autonomous organizations belonging to the government, the public or the private sector. The design of the national STI system is predicated on the willingness and ability of these autonomous institutions to collaborate. A method of participatory governance of the national system is proposed in the form of a public, non-governmental agency (Council on Information Services and Resources). The Presidential or Parliamentary mandate of the Council is to plan, coordinate, contract for, financially support, and monitor -- but not operate -- the activities of the national STI system. Included in the latter are systemwide functions such as the formulation of policy, design of common networking protocols and standards, manpower development, and certain national and international activities. The proposed governance provides for direct representation on the Council of the organizations comprising the national STI system.

Budget

The study examines and documents costs of the various functions of the national STI system, including some alternatives. In terms of 1981 dollars, the annual operating budget of the proposed system is approximately equivalent to US$1.3 million, or about 2.5 percent of the Egyptian R&D budget. This compares favorably with the 5 percent figure usually quoted as being the annual expenditure for established systems in developing countries. Four categories of funding sources are identified (income from services, partial operations support by parent organizations of the information system nodes, government subsidy, and grants and donations); and a tentative formula is suggested to generate the annual operating budget.

Related Reports

An accompanying document (Slamecka, V., THE NATIONAL STI SYSTEM OF EGYPT: IMPLEMENTATION, November 1981) describes a three-year program of activities, schedules, and costs necessary to implement the above design. A forthcoming document (Slamecka, V., THE NATIONAL STI SYSTEM OF EGYPT: MANPOWER DEVELOPMENT, 1982) analyzes Egypt's professional manpower needs in information work, and presents recommendations for, and an implementation plan of, a national effort in this area.

PREFACE

The design and implementation of an Egyptian system of scientific and technical information services, intended to support the country's socioeconomic development, is part of an Applied Science and Technology Program under a Project Grant Agreement between the Egyptian Academy for Scientific Research and Technology and the U.S. Agency for International Development. Phase I of the project (November 1979-December 1981) consists of a system analysis and design study.

The project is a collaborative effort of Egyptian and U.S. organizations. The Egyptian Academy of Scientific Research and Technology, with its National Information and Documentation Centre, is the Egyptian executive agency. Egypt-based activities are guided by an Executive Committee comprised of senior Egyptian experts and headed by the President of the ASRT. Technical assistance in Phase I is supplied by a team of U.S. consultants under a National Science Foundation contract (INT-7924187) to the Georgia Institute of Technology. Planning and project management assistance is provided by the U.S. National Science Foundation under a U.S. Agency for International Development Participating Agency Service Agreement.

The publication of this report does not imply official concurrence of the sponsoring agencies with the views and opinions expressed therein.

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It is a distinct pleasure to acknowledge, on behalf of those who participated in this study, our indebtedness to Prof. Dr. Ibrahim Badran, President of the Egyptian Academy of Scientific Research and Technology and former Rector of Cairo University, whose unswerving conviction — that the quality and rate of social and economic development of Egypt are inexorably predicated on improving the country's ability to access man's reservoirs of knowledge and expertise -- profoundly affected every person, Egyptian and American, associated with this project.

Prof. Dr. Hassan Ismail, the former President of the Academy, and Prof. Badran were instrumental in attracting to the project, as its Executive Committee, a group of Egyptian leaders whose stature and commitment have provided it with enviable guidance: Prof. Dr. Ali El-Salmy, member of President Sadat's Advisory Council; Prof. Dr. Aziz El-Kholy, Director of the National Center for Health Statistics; Prof. Dr. Ahmad Gad, Director of the National Information and Documentation Centre; General A.M. Hallouda, Director of the Central Agency for Public Mobilization and Statistics; Prof. Dr. Aziz Kamal, Dean of Engineering, Cairo University; and Dr. Mohamed A.K. Madkour, Director-General, Al-Ahram Microfilming and Organization Center. Prof. Dr. Ossama El-Kholy, advisor to Professor Badran, has provided the project with invaluable cultural and organizational insights.

Dr. Mohamed A.K. Madkour, the Egyptian Project Manager, has made major conceptual contributions to the design study. His technical prowess, able management, and indefatigable energies account for our ability to keep the project on schedule.

The project's technical and consulting staff consisted of some 20 Egyptian experts and U.S. consultants. I am deeply indebted to all of them for their expert and positive contributions to this study. At my institution, Miss Ann Lewis deserves credit for having shaped a manuscript into a finished product.

The U.S. contracting agencies have been extremely helpful throughout the duration of the project. Mr. James Riley and Ms. Janice Weber, of the U.S. Agency for International Development (Cairo), offered invaluable assistance on all-too-frequent and always urgent occassions. As the contract officer, Mr. Eugene Pronko, of the National Science Foundation (Washington, D.C.), has given the project a rare degree of professional and personal commitment, one that comes from having been associated with the project's conception in 1976, and having husbanded it since.

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CHAPTER I. INTRODUCTION

The case for the development of national systems of scientific and technical information (STI) has been traditionally based on the need of the scientific community to have access to the most recent global results of research. Communication of such information is vital to the progress of science, and it is an important element in the reward system of the science community. Yet while the pool of scientific knowledge is immense, and while virtually all societies and governments recognize a basic human right to access and obtain such knowledge, scientific communities in many nations experience considerable difficulties when trying to gain access to the STI communication channels: not being aware that information exists, not being able to find out where it exists, and not being able to pay the price for obtaining it are three of the most serious obstacles (Saracevic, 1979).

The cumulative effect of these difficulties on national science is nothing short of devastating. A study of the rates and reasons for the rejection of scientific manuscripts found that authors from developing countries experience far higher rejection rates than authors in developed countries (57% vs 17%), and that they are faulted on specific points indicating that their major problems are those of maintaining awareness of current research results. The study concluded that "the problems LDC researchers experience in accessing scientific information are a major factor in inhibiting the quality and quantity of their own information output." (Gordon, 1979; McCarn, 1981). The establishment of national STI systems is rationalized as the effective and economical strategy to remedy the communication problems of the scientific community.

The discovery of a relationship between research/development (i.e., knowledge generation) and industrial productivity, revealed by studies of agricultural and manufacturing industries (Mansfield, 1980) which established that the rate of productivity increase in these industries and their firms is directly related to the amount spent on research and development, indicated that information and knowledge may have a more general impact, one that affects the level and rate of economic growth. A substantial body of knowledge has been gathered in recent years in support of a correlation between knowledge activities and productivity in general. Industries with high productivity have been shown to have a high level of information expenditure per employee (Hayes, 1980). Other investigations have shown that unemployment of the information labor has consistently been lower than unemployment in either the manufacturing or agricultural sectors of the national economy; and that the high technology elements of the information sector (such as electronic components, computers and telecommunications equipment) have experienced appreciably less price rise than has the economy as a whole (Rubin, 1981). High information needs of research-intensive technologies have been demonstrated (Wolfe, 1974).

These and other studies offer convincing support for the intuitive feeling that "high technology fields depend heavily on information, better management depends on good communication and good internal information management systems, better educated and well-informed workers may well be more productive, better information may well result in increased sales and better relationship between product design and market needs," etc. (Hayes, 1980). Conversely, poor access to or unavailability of information has a detrimental effect on human problem solving and decision making. The fact that an empirical relationship exists between knowledge and productivity makes scientific and technical information a national resource of enormous value, since it is well-known that the rate of productivity growth affects the rate of economic growth (Council of Economic Advisors, 1979).

Another indicator of the importance of knowledge and information surfaced with the hypothesis that an increase in economic growth is strongly associated with an increase in the ratio of knowledge-producing labor to physical labor (Machlup, 1962). Machlup's observation that the efficient organization of production and government seems to require an increasing portion of labor going toward knowledge-related activities (in contrast to physical production activities) has since been amply borne out. The 1976 report on the "information economy" of the United States offered strong statistical backing for the hypothesis that the U.S. economy has shifted from a manufacturing base to an information base, in which 46 percent of the 1977 gross national product was attributable to the production and distribution of goods and services (Porat, 1977). Similar studies and comparable figures have been collected for other industrialized countries (OECD, 1980) as well as for some developing countries.

The widening recognition of the pervasive effects of knowledge and information is focusing national attention on the utility and value of information as a resource, particularly as a broad array of human activities has been redefined as symbol manipulating, information-dependent processes. Judicious applications of information technology have been shown to increase the cost effectiveness and productivity of these activities. The overall effect of this trend has been the emergence of information services as a sector of the national economy, and the concomitant perception of information as not only a resource which is indispensable for cost-effective problem solving in all walks of life, but also as an economic commodity.

The emerging relationship between information activities and economic development is complex and yet poorly understood; nevertheless, there is no evidence that it applies only to industrialized countries. To wit, 26.45 percent of professional labor of Egypt is said to have constituted that country's information sector in 1976 (El-Haddad, 1981). Similarly, the pattern of growth of the information labor force — largely due to the growth of public and private bureaucracies — is likely to be similar in developing countries (in the U.S., the bureaucracies account for 25 percent of the work force). Thus while the chief preoccupation of many developing countries is with food production and small industry manufacturing, they are in the process of developing a nontrivial information sector.

The rapid recognition of the importance and worth of knowledge and information is having a significant impact on the national planning of STI systems. Perhaps most importantly, these systems are beginning to be viewed as elements of the emerging national information sectors, and are being planned so as to conform to the characteristics of the latter. These characteristics are not yet well formed; however, some of those relevant to both developing and industrialized countries include the following: 1) the information sector consists of two major, overlapping categories: information generators and consumers; and information service industry; 2) the information sector traverses the public/private boundary; 3) the governance of the information sector parallels the respective governance modes of the private and public sectors; 4) the financing of the information service industry is pluralistic, with the public sector being the principal investor; 5) information technology is the major factor shaping the design of information products and services; and 6) the economics of the information sector exhibits characteristics of both regulated and free markets.

These characteristics have numerous implications for the design of national STI systems. The more important ones follow:

1) The foundations of the national information system must be based on the philosophical conviction that one of the basic societal goals is for knowledge to become a desideratum whose worth is recognized by each individual (El-Kholy, 1980). The benefits that the possession of knowledge makes possible do not occur as an automatic consequence of gaining access to knowledge; an esential condition for socioeconomic progress is for people to want knowledge and to want to cultivate it. A national STI system therefore should function in an atmosphere that induces people to want knowledge, that prompts them to actively seek it, and that encourages them to husband it as an indispensable personal and social resource (Slamecka, 1979b).

2) In principle, the national STI system must strive to service all individuals who perform socially useful problem solving functions in the domain of national development. In today's and particularly tomorrow's environment, optimum decision making assumes critical importance not only in science but in development, production, marketing, as well as in social and political management and administration.

3) The proper role of the government is to stimulate the development of the information sector, and to facilitate the provision of services through this sector. Earlier, governments considered it proper and logical to develop, operate and govern national information systems which, because they are deficit-prone, required government support and sponsorship. Today the preferred role of government is to stimulate the development of information services; it no longer needs to be the exclusive builder, operator, funder, and manager of these services, except in countries of a very low level of development.

4) The traditional definition of "scientific and technical information" as the research literature of science is too restricted; it must be rede-

fined to include other forms of knowledge. Two categories of knowledge are important to development: problem solving knowledge, and cultural knowledge. The proper concern of national STI systems is problem solving knowledge. There is much evidence that the knowledge needed most by problem solvers in developing countries is of the experiential variety ("know-how"), much of which is contained in proprietary repositories -- in the memory of human experts or the files of their organizations. The phrase "scientific and technical information" should be interpreted as being synonymous with "problem solving information." (It is so used in this report.)

5) The national STI system must make use of the most advanced information technology appropriate to its functions. Information technology fuels the information industry and it accelerates the process and rate of information innovation. The development of this technology has now reached another milestone: its use and application have become accessible to the non-expert. Low cost, cheap "machine intelligence" moves inexorably not only to the university and research laboratory but to the factory, the shop, the bank, the office, and even the home. Previously, information technology relegated its use to expert and affluent countries and institutions; the latest information technology is user-friendly, user-operable, more reliable, relatively low-cost, and transportable. By using this technology with judicious enthusiasm, national STI systems will contribute to the development of national information sectors.

* * *

These introductory remarks have sought to portray salient characteristics of the atmosphere within which Egypt proposes to develop the country's modern system of problem-solving information services.

CHAPTER II. OVERALL DESIGN OF THE NATIONAL STI SYSTEM OF EGYPT

To provide a common platform for the discussions that follow, it is useful to begin by delimiting the meaning of some basic and frequently used terms and phrases.

"Information resources" refers to the carriers of data, information, expertise, and knowledge. These carriers are of two types: records stored externally to the human mind on such media as paper, film, magnetic and electronic devices; and human memory. The term "information industry" refers to that component of society and the national economy which husbands the information resources: it generates information, processes it into consumable goods such as publications, and retails it via an array of diverse information services. The "information clientele" are problem solvers and decision-makers who are the consumers of the industry's products. The sum of the information industry and its clientele is the national "information sector." A key modus operandi of this sector is the construct "information systems." Whereas formal definitions of this construct are being attempted (e.g., IFIP, 1979), we may view it somewhat colloquially as organized sets of operations through which the components of the information industry attain their roles (Woolston, 1980).

The phrase "national information system" evokes numerous concepts, differentiated primarily with regard to the function the system entails; the content it husbands, operates on or vends; and the structure of organizations it comprises. One can thus speak of a national information system for certain literature, a national information system for support of law enforcement, a national information system that keeps an inventory of valuable commodities such as people or oil, and a national information system that maintains input and output schedules of the national economy. All of these and many others are proper examples of national information systems in existence today.

The phrase "national STI system" connotes, traditionally, a system of services for the scientific research and development community, based on the literature generated by that community. There exist numerous versions of such a system, based on functional and structural options and differences. Examples of these follow.

As regards functional alternatives, one may distinguish between information systems which facilitate the use of existing knowledge, versus those facilitating the generation of new knowledge. In the former category fall systems that store organized records (libraries, databanks, full text databases, computer-aided instruction systems), so-called "expert" systems that store problem solving expertise (describing real world problems and solutions), and "people" information systems. Information systems that facilitate the generation of new knowledge (new solutions) are exemplified by computational facilities (for weather forecasting, modeling, simulation, aggregate data

analysis, and similar), decision support systems, as well as "artificial intelligence" systems that have deductive capabilities.

Numerous alternatives also exist as regards structural considerations of information systems. The options facing the designer range from a single, central institution on the one hand to institutional networks of different arrangement and different modes of governance. The range of permutations is considerable.

1. Design Options and Rationale

Narrowing the choice of design options is accomplished by first specifying the rationale and objectives of the design effort. The design of the Egyptian national STI system described in this document has been guided by a number of generic desiderata which, in toto, form an underlying rationale for the proposed design. The more important of these desiderata are introduced below.

a) The national STI system exists to support the economic and social development of Egypt, and those problem solvers who contribute to such development. This statement has implications on the range of the clientele, the nature of information resources, the type of information services, and priority of access to the services. Relevant indicators and design guidelines have been produced by an analysis of Egyptian information requirements (Sarasohn, 1981).

b) The design should support the long-term evolution of the Egyptian national information sector. Given the reality and importance of the information sector as a socioeconomic paradigm of present and future Egypt, it is essential that national information services have the ability and property of enhancing its evolution. Consequently, the national STI system should possess an organization, functions, governance, and policies that are complementary to and supportive of the evolution of a national information sector.

c) The design of the national system of STI services should contribute significantly to the penetration of problem solving knowledge into all strata of Egyptian society. The benefits of knowledge use and the evolution of the information sector can be attained optimally only if information becomes a basic, everyday staple of the Egyptian problem-solver. Information therefore must not be viewed or treated as a rare, hardly attainable commodity but as a fundamental, common resource. Whenever feasible and economical the information activity should be performed as close as possible to the problem solving site.

d) The national system of STI services should aid the penetration of the newest information technologies into problem solving sectors of Egypt. Previously, the exploitation of information technology was conditional on the presence of highly skilled (and expensive) manpower -- manpower

which has been, and will continue to be, scarce in Egypt. The latest information technology, developed over the past three years, exhibits the property of being usable by a non-expert; coupled with the 28 percent annual decrease of the cost of this technology (or, inversely, the equal increase in computational power per unit of cost), impressive computational information processing facilities can be used effectively, on a dispersed basis, and in environments that do not possess advanced technical, programming and system management skills and training. For the first time, Egypt is truly able to take advantage of this technology on terms almost similar to those of countries that produce it. It is essential that the design of the national system of STI services capitalize on this development to the greatest possible extent.

e) The national STI system must judiciously mobilize and enhance already existing elements of the country's internal information industry -- information professionals, information services, and information resources. The prospect of capitalizing on these human, organizational, and financial resources depends, however, on the ability of the system to preserve the autonomy of the participating organizations. The implementation of the Egyptian system of STI services must thus embody strategies that stimulate and reward voluntary cooperation of existing organizations and agencies, without encroaching upon their organizational autonomy.

f) The first phase of the implementation effort must assure that, at the end of that phase, there exist in Egypt nontrivial operational information services, and that these services be viable and stable as regards continuity of their operation. The viability requirement implies stability of all essential features of the STI system then in existence, namely the demand for services, quality of services, system governance, and financial support. This desideratum affects such considerations as the size of the initial system, the comprehensiveness of initial services, and the system's governance.

2. Objectives and Functions

The overall goal of the proposed effort is to establish and maintain a national infrastructure for the husbanding and use by Egypt of scientific and technical information. The key elements of such an infrastructure are a system of nationwide services that effectively couple information-needing problem solvers with information resources, systematic provision and management of such resources, and a method of governance that assures continuity and stability of the system's operation.

The purpose of the national system of STI services is to bring knowledge to bear on human problem solving in the socioeconomic development of Egypt. This purpose will be accomplished by means of the following generic functions of the national system:

a) Intensive and pervasive "education" of problem solving communities regarding the utility of information, and dynamic marketing of information services of the national system.

b) Facilitation of access to existing recorded knowledge by problem solvers. The national STI system will provide these users with procedural and technical assistance for locating and obtaining data and information relevant to their problem solving activities, regardless of whether the data and information are located in Egypt or abroad.

c) The organization and management of Egypt-produced scientific and technical information. Better exploitation, in and out of Egypt, of the knowledge produced and recorded in Egypt requires that this resource be systematically husbanded, using modern database techniques, and intensively disseminated.

3. Structure

Discussions of national information infrastructures abound (Unesco, 1974; Ackoff, 1976; Urquahardt, 1976; Gray, 1978; Grolier, 1979). In general, the objective is to structure the interactions and relationships of various parties and stakeholders in the national information enterprise into a "system," and to provide a form of governance for the resulting structure.

The three principal constituencies, or subsystems, comprising the proposed Egyptian STI system are a) information users, b) document repositories, and c) information services. Their relationship is shown graphically in Figure 1.

The component members of the Egyptian national STI system are autonomous organizations in the public, government and private sector of Egypt. The design is predicated on the assumption that the organizations that are to comprise this system are prepared to adhere to certain common rules of conduct and procedure. Coherent evolution and performance are attained through a set of "social contracts" among the member organizations, a set of agreed-upon operating procedures and protocols, and a mechanism of governance and funding. Since membership and participation in the national system are voluntary, the form of its government must be participatory rather than authoritarian. The recommended form of governance, detailed in Chapter V, also encompasses such common functions as methodological assistance and manpower development.

The proposed macro-structure emphasizes a user and service orientation; it is open-ended as regards system size and complexity; its functions do not compete with other types of systems in the information sector (such as library and computer networks); and it is hospitable to future information requirements of the user community and, indeed, to the expansion of that community.

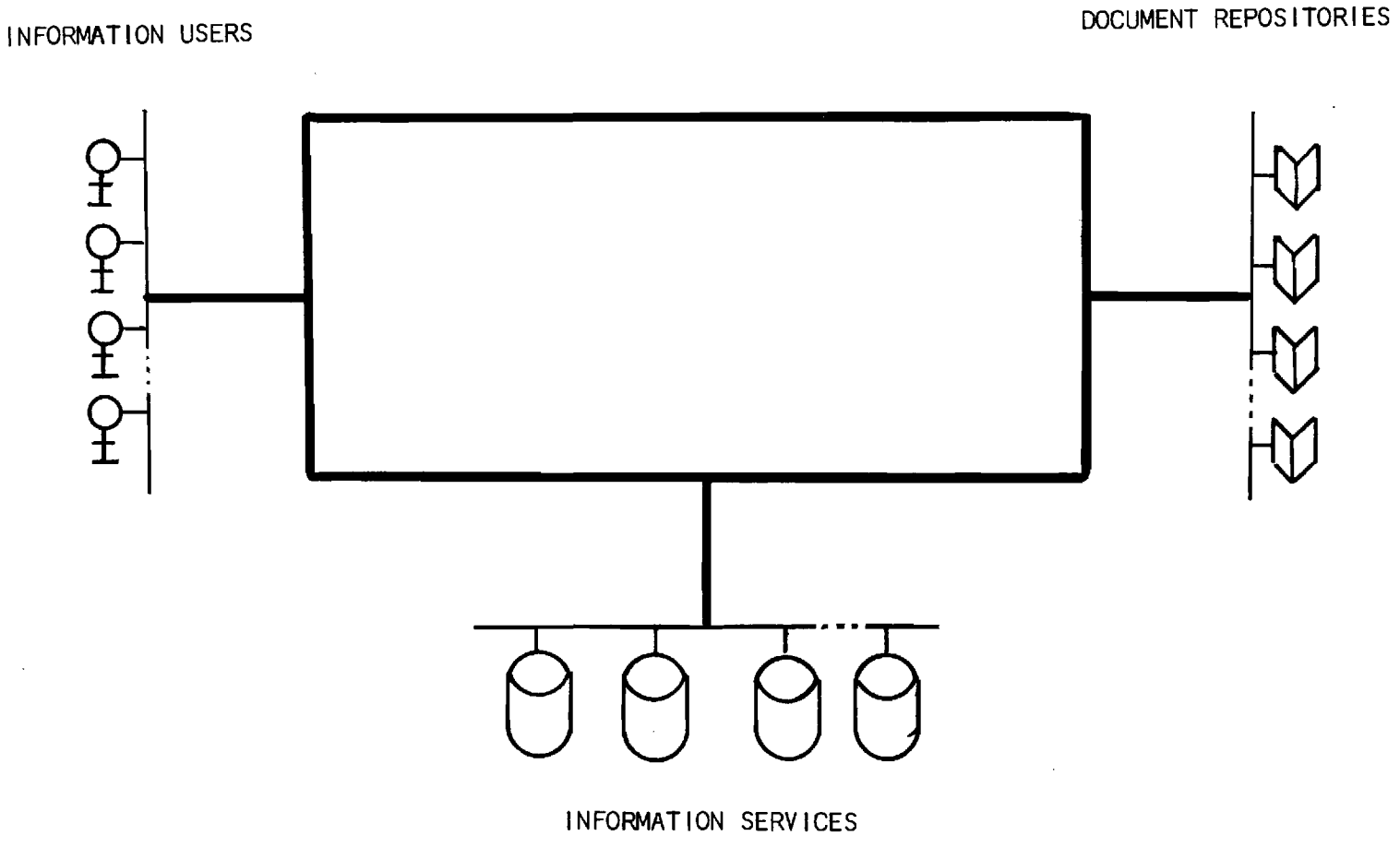


FIGURE 1. THE EGYPTIAN NATIONAL STI SYSTEM.

The three subsystems of the national STI system are further characterized below.

a) The Services Subsystem

The pivotal function of the national STI system is the linkage coupling members of the information user community with repositories of documents and expertise that comprise global information resources. The need for these information services is given by the vastness and complexity of these resources.

The subsystem of information services is comprised of an open number of autonomous organizations that may belong to the public, governmental or private sectors. The initial principal function and mandate of these organizations is the

i) development and maintenance of databases of scientific and technological information produced in Egypt and relevant to their clientele;

ii) searching of databases located in Egypt and abroad;

iii) mediation of requests for document delivery from Egyptian and foreign repositories;

iv) production and distribution of specific products emanating from the contents of such databases;

v) referral services for information requests and needs that cannot be met through one of the above services; and

vi) building up user clientele in the sphere of activity of each service.

More technical descriptions of these services are given in Chapter III.

These six functions are intended to be implemented at the outset; a future expansion of services is to be expected. The particularly useful and urgent future information service is "information analysis," the purpose of which is to assist the problem solver by synthesizing, evaluating and interpreting the data and information relevant to the problem (Carroll, 1980). This advanced form of information service is very desirable in Egypt, but it requires dual competence: in professional information work as well as in the subject of the problem domain. Provision of information analysis service in Egypt is contingent on first training such professional personnel.

In the future, selected information services are also likely to license foreign-produced databases, bring them to Egypt, and operate them locally. The economics of this service becomes favorable when the total cost of such an operation is less than the cost of using the databases remotely (abroad);

this is clearly a function of the number of searches carried out per year. As will be shown in Chapter III, none of the large foreign bibliographic databases (containing over a million records) have currently an Egyptian clientele large enough to justify the economics of operating them under license in Egypt.

As the first step toward developing a subsystem of information services, it is proposed to establish a small number (up to six) of fully operational model information services. A list of seven user constituencies recommended to be served by these services and based on priority areas of Egypt's socioeconomic development is given in Figure 2. It is recommended to proceed, at the earliest time possible, as follows: 1) screen a number of agencies or organizations active in each of the subject areas selected as candidates for the service (an extensive list of evaluation criteria has been developed); 2) contract with the chosen organizations or agencies to organize public information services for their respective constituencies of problem solvers; 3) assist the agencies or organizations methodologically, financially, and through personnel training to develop such a service.

The approximate scope of operations of each service site becomes apparent from Table 1 and Figure 3. Table 1 shows the minimal initial staffing recommended for each service site, and Figure 3 shows the requirements for physical space (about 450 square meters), and exemplifies the physical organization of activities. The personnel and space requirements are based on the following assumptions: each information service will build, during the first three years, several small databases relevant to its constituency; the demand for searching foreign-based databases will average, during the first three years, 500 requests annually per site; and each service will engage in intensive marketing efforts, and some publishing.

b) The User Subsystem

Human interaction with information has varied purposes. One way of categorizing it is to consider the behavioral goals of individuals interacting with information. Such goals may be said to be of three types: problem solving, learning, and entertainment. Each of these imposes different considerations on the individual's interaction with data and information. From the standpoint of the national STI system, problem solving is the critical function, because the quality of solutions to socioeconomic problems depends strongly on interaction with quality data and information. Problem solvers should be given highest priority by the Egyptian national STI services at this time.

The information user subsystem is then comprised of individual problem solvers who are current or potential users of information services and/or consumers of information. Whereas traditional STI systems tend to serve predominantly users who by profession are scientists or engineers, the intent of the Egyptian national STI system is to serve, directly or indirectly, the following categories of problem solvers: i) the manager (policy maker, business and government decision maker); ii) the professional practitioner (engineer, physician, planner, educator, farmer, etc.), and iii) the resear-

FIGURE 2. PRIORITY SECTORS

SECTORS	SUBJECTS
AGRICULTURE	COTTON WHEAT RICE SUGAR CANE FISHERIES LIVESTOCK LAND RECLAMATION IRRIGATION
ENERGY	PETROLEUM ELECTRICITY (NUCLEAR, THERMAL, HYDRO, SOLAR) GAS
HUMAN SETTLEMENTS	URBAN PLANNING HOUSING RECONSTRUCTION
INDUSTRY	TEXTILE INDUSTRY FOODS INDUSTRY ENGINEERING INDUSTRY CHEMICAL INDUSTRY METALLURGICAL INDUSTRY
MEDICINE AND HEALTH CARE	MEDICINE PHARMACOLOGY VETERINARY MEDICINE PUBLIC HEALTH
SCIENCE AND ENGINEERING	NATURAL SCIENCES ENGINEERING BEHAVIORAL SCIENCES, INCLUDING MANAGEMENT SOCIAL SCIENCES
TRANSPORTATION AND COMMUNICATIONS	TRANSPORTATION (RIVER, ROADS, RAILWAYS, AIR, MARITIME, SUEZ CANAL, PORTS) TELECOMMUNICATIONS

TABLE 1. INITIAL STAFF OF AN INFORMATION SERVICE

FUNCTION	FULL-TIME EMPLOYEES		
	PROFESSIONAL	SEMIPROFESSIONAL	CLERICAL
ADMINISTRATION			
DIRECTOR	1		
SECRETARY (WORD PROCESSING)		1	
TYPIST, TELEX OPERATOR			1
CLERICAL (MAIL ROOM, REPROGRAPHY			0.5
DATABASE DEVELOPMENT*			
PROOFREADING, VOCABULARY DEVELOPMENT	1		
DATA COLLECTION, ITEM DESCRIPTION	2	1	
DATA ENTRY**		1	
TYPING, CLERICAL			0.5
DATABASE SEARCHING***/DOCUMENT PROVISION			
SEARCH FORMULATION, EXECUTION	2		
MAINTENANCE OF COMPUTER FILES	1		
DOCUMENT DELIVERY SERVICE			0.5
LIBRARY			
REFERENCE COLLECTION, REFERRAL SERVICE	1		
TYPING, CLERICAL			1
PUBLISHING			
COPY WRITING, COMPOSITION	1		
MARKET DEVELOPMENT			
SERVICE REPRESENTATION, USER TRAINING	2		
TYPING, CLERICAL			0.5
COMPUTER ROOM			
SYSTEM EXPERT/INSTRUCTOR	1	1	

*DEPENDING ON DATABASE TYPE, ADDITIONAL EXTERNAL EFFORT MAY BE NEEDED FOR DATA COLLECTION.

**AVERAGE INPUT RATE = 50 KEYSTROKES/MIN (EXCLUDING CORRECTIONS).

***ASSUMES LESS THAN 5 REQUESTS/DAY FOR RETROSPECTIVE SEARCH OF DATABASES OUTSIDE EGYPT.

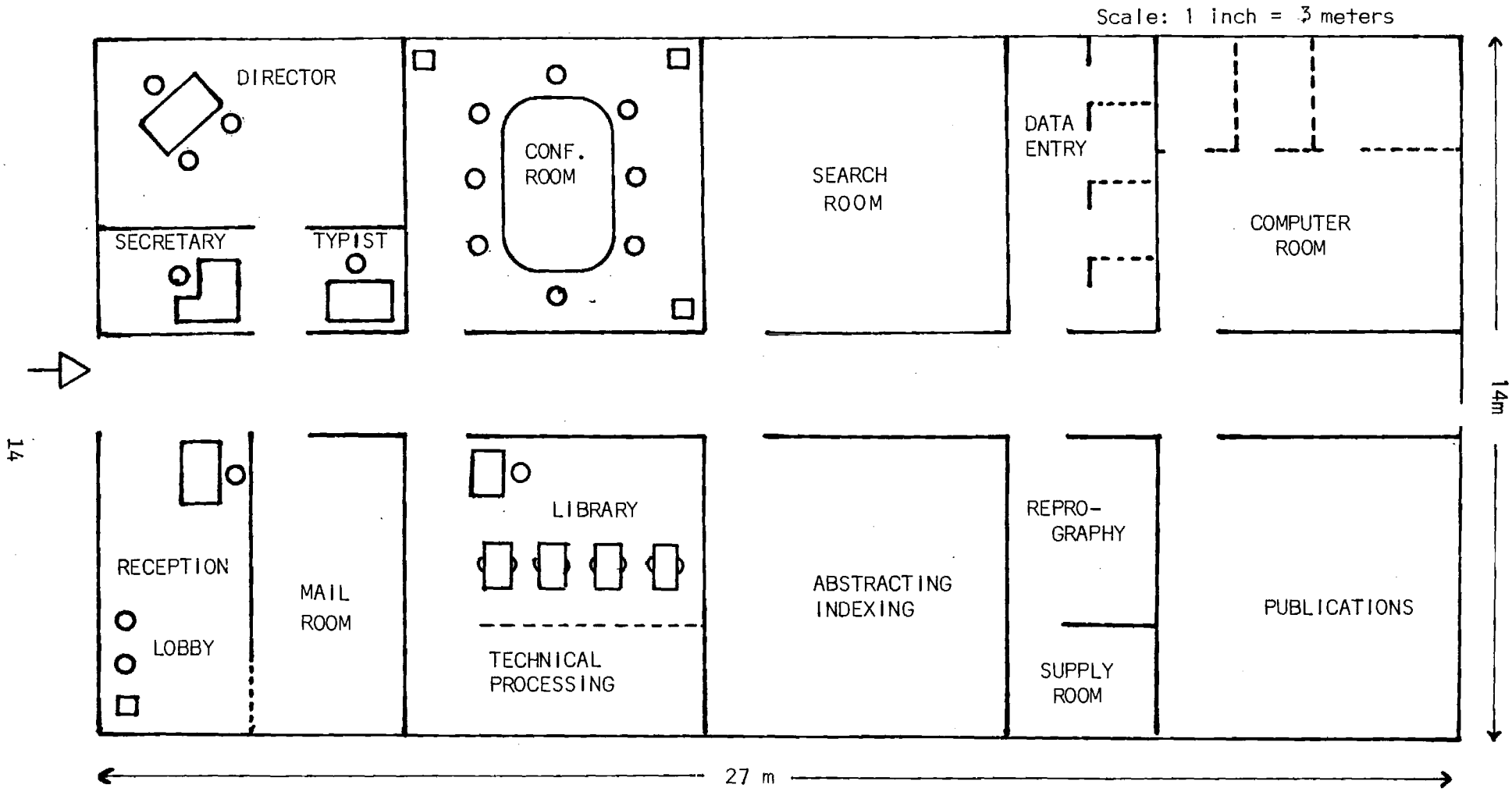


FIGURE 3. INFORMATION SERVICE: TYPICAL FLOOR PLAN

cher (natural and social scientists). The constituency of the user subsystem does not include at this time the general public. This omission is of course not intended to preclude access to information by the Egyptian public; rather it is a matter of setting initial priorities, as well as a reflection of the relative lack of readiness of the general public to make use of scientific and technological information.

Cumulatively, individual problem solvers comprise the user subsystem. While in principle the system allows them to interact freely and directly with all elements of the other two subsystems (information services and document repositories), in practice such interaction is likely to have two characteristics: the users will cluster according to problem solving subject areas; and each cluster will tend to relate more strongly to one information service and repository than to others. Conversely, each information service and repository may be said to have a "natural" clientele within the user subsystem. Appendices A-1 through A-7 tentatively identify the primary and secondary clienteles of each of the recommended initial information services.

Concretizing of a visible, institutionalized information user subsector is of crucial importance. Clearly, it is not always practical for information services to build up a clientele by contacting individually all problem solvers; nor is it likely that the majority of problem solvers will be in individual, direct contact with the information service. The strategy of the information services thus will be to assist in the establishment of "service representatives" (information officers, "gatekeepers" and similar functions) in large and medium size organizations and agencies, amounting to an extension of the information service into client organizations. These extensions are to be operated (funded and staffed) by personnel of the parent organizations, not by the information service.

Table 2 shows the categories of potentially the most effective "representatives" of information services in their respective local settings. The long-term goal is to gradually infuse certain information service functions into the user community itself, so as to allow the national information services to focus mostly on managing national information resources. Such a permeation of informational functions into the problem solving community is an essential as well as an effective strategy for raising the inclination of Egyptian problem solvers to use information.

c) The Document Repository Subsystem

Data and information that support problem solving activities in socioeconomic development cannot be fully enumerated. Usual categorizations (Saracevic, 1979) are in terms of

i) levels of information needed: policy and management information enabling decisions on choices (of alternate strategies, negotiation capabilities, etc.), scientific and technical information enabling technical decisions and training, and operational information enabling production and services;

TABLE 2. INFORMATION SERVICE AGENTS

PRIORITY CLIENTELE	SERVICE AGENTS
PLANNING, GOVERNMENT AGENCIES	INFORMATION UNIT
RESEARCH INSTITUTIONS	LIBRARY
PUBLIC CORPORATIONS	INFORMATION UNIT
• UNIVERSITIES	LIBRARY
SCIENTIFIC/PROFESSIONAL SOCIETIES	EDITORS

ii) necessary knowledge: "know-why" information (more scientifically oriented, generally readily found in the literature and easily transferrable), "know-how" information (more technically oriented, not so readily found in the literature, and hard to transfer), and "show how" information (operational, training, maintenance, etc. not found in the literature, in need of repackaging, and hardest to transfer); and

iii) sources of information: formal information sources (the open literature, report literature, abstracting and indexing services, databanks), informal information sources (personal contacts, consultants, meetings, invisible colleges), and specialized or negotiable information sources (operational information, surveys, statistics, data on industrial processes and products).

A still different categorization (Ackoff, 1976) distinguishes between three types of recorded transmittable "messages": i) primary: messages believed by their producers to convey information not previously communicated (for example, papers and patents reporting new findings); ii) secondary: messages about primary messages which affect awareness of their existence and availability (for example, bibliographies and indexes); and iii) tertiary: messages about the content of other messages (for example, abstracts, reviews, digests, state-of-the-art papers).

An essential function of the Egyptian national STI system is to deliver copies of the primary information sources (called here "documents" and incorporating journal papers, reports, patents, tapes, data, etc.) identified and requested by users of information services. The procurement, organization, reproduction, and delivery of these primary information sources is the function of the document repository subsystem. Although a large percentage of such documents is not available in Egypt and will have to be imported, a certain percentage of essential or frequently required information sources must be maintained within the country.

There are two strategies available to create this subsystem. One option is to assign the function to a single organization, and to build a central repository of primary STI sources; the other option is to construct a distributed subsystem comprised of a number of participating repository organizations operating in a collaborative mode (McDonald, 1981). Assuming that a certain minimal level of cooperation among selected Egyptian libraries is attainable, the latter strategy is highly preferable, primarily because of its resource-sharing effect. Information resource sharing is now seen as an absolute national necessity (Black, 1981).

The proposed document repository subsector of the national STI system of Egypt consists of a small number of selected Egyptian libraries whose collections contain a high proportion of primary STI sources, and which consent to make these collections available to the national system users. Natural candidates for membership in this subsystem are academic and special libraries, and special collections (such as patents). The number of such organizations in the system will be relatively small, and their selection is subject to their meeting the criterion of being able and willing to share their information resources with the user subsystem.

The document repository subsystem is also the ideal vehicle for systematically strengthening Egypt's STI resources, as described in more detail in Chapter IV.

The recommended strategy to develop this subsystem consists of the following steps: i) determine candidate libraries for membership in the subsystem; ii) contract with the selected libraries to become document repository nodes in the Egyptian national STI system; and iii) assist these libraries to implement document delivery services.

CHAPTER III. INFORMATION SERVICES OF THE NATIONAL STI SYSTEM

This chapter discusses functional specifications and cost estimates of initial services to be provided by the Egyptian national STI system. The following are definitions of several terms used frequently in this chapter.

Database: a file of data, in natural- and/or artificial- language, in digital form.

Source database: a database intended to present to the user the the ultimate information source; contains "primary" information (e.g., full text of documents, original survey data, etc.).

Reference database: a database intended to refer the user to ultimate information sources; contains secondary information (e.g., abstract/citations of documents, inventories of information sources, etc.)

Bibliographic database: a reference database containing surrogates of documents

Retrospective search: an on-demand, longitudinal database search.

Online search: a database search conducted in interactive, real-time mode.

Current awareness search: a recurrent database search covering recent additions to the database.

Search output: the product of running a search query against a database.

SDI (Selective Dissemination of Information): current awareness service, distributed to selected users.

Current contents: a service providing photocopies of contents pages of journals or other documents received (all or selected).

Bulletin: an internally produced publication containing output of database searches, news and other materials.

The specific information services to be provided by each service site are: database development; searching of local and foreign databases; document delivery; referral service; and publishing. Each of the five functions is discussed in more detail below. The chapter begins with a discussion of strategies for building up or strengthening the clientele of each information service, and it concludes with a section on the information technology to be provided for and used by each service site.

1. Clientele Development

The overwhelming importance of developing an Egyptian clientele for the proposed information services and of conditioning it to use problem-solving information more intensively has been highlighted by the analysis of Egyptian information needs and uses. One of the conclusions from this analysis states (Sarasohn, 1981):

> A majority (56%) of user requirements survey respondents acknowledge that information is essential or at least important in their work. A significant number said, however, that it was not important; almost half of the professors and teachers answered in this vein.
>
> The study of the Five-Year-Plan showed that many of the projects are dependent upon "new technology" and, hence, upon new information. But in discussing their needs with survey respondents, interviewers were frequently faced with a skepticism that information could be useful.
>
> These contradictions were pursued further for a rational explanation. The answer seems to be that a generation of managers, professionals, government administrators, teachers and others have grown up and are at work handicapped by the lack of adequate information resources. They have become accustomed to being frustrated. They no longer expect to have valid sources of information made available to them. As a result, many of them have ceased to seek or use new information. They succeed in their work to a level that may be limited by knowledge they have personally gained or by experience of their immediate coworkers.

The lack of propensity to seek out and/or use information is a phenomenon not unique to Egypt; its roots are both cultural and economic (Slamecka, 1979b). Problem solvers exhibit such a lack for various reasons: they may be unaware of their need for information; unaware of the existence of information; unable to find existing information; unaccustomed to ask for assistance; cautious about appearing inquisitive; disinterested in learning; not encouraged to exhibit innovativeness in problem solving; conditioned, through emphasis on rote memorizing during schooling, to believe that they should address only problems whose solutions they recall from memory; or simply because they are of passive personality.

To make a perceptible change in these predispositions of problem solvers requires a truly massive and long-term effort. In Egypt, this effort should have two primary and strong loci: the governance organization of the national STI system, and the information services of the national STI system.

a. Clientele Development through Information Services

Two major approaches are recommended for each information service to build up its clientele and to stimulate the use of its services.

First, and foremost, each information service should seek to establish its presence within major organizations of potential clients (such as large production plants, universities, professional societies, departments of government) in the form of "liaison officers." As the choice and appointment of such officers are the prerogative of the client organizations, it is mandatory that this effort be pursued via the management level, and that it be visibly supported by the agency coordinating the early development of the Egyptian STI system.

The objective of this effort is the gradual development, by each information service within its subject realm, of a network of information "extension agents." The functions of the latter are to provide direct linkage with in-house end users, by promoting available information services, attracting problem solvers to avail themselves of such services, and assisting in interpreting users' needs.

The development of this extension network will very likely rely on incentives such as free training of the liaison officers, reduced cost of service, free provision of tools such as thesauri, and possibly assistance in the procurement and installation of online terminals for direct access to the information service network and its databases. Each information service will wish to keep its community of liaison officers effective through periodic training sessions, frequent visits, meetings for exchanging experiences, and supply of working tools and public relations materials.

Second, each information service should pursue an intensive marketing effort in those segments of its potential markets which are unlikely to establish liaison offices (because of small size, geographic dispersion, etc.). Upon its establishment each information service should develop an in-depth regional or nationwide profile of its potential clientele, and compile a directory of potential user organizations. With optional assistance from the agency coordinating the development of the national STI system, each service will then develop appropriate public relations materials, design sales incentives, etc., so as to penetrate this market to an extent commensurate with its ability to serve it.

Two full-time "marketing specialists" are recommended for initial employment by each information service. The training of these specialists is to be provided centrally by the agency coordinating the development of the national STI system; the latter agency should also monitor, advise and assist the marketing staffs to carry out their functions. This assistance notwithstanding, the responsibility for the development of the user clientele rests with the information services, and their success shall determine, to a large extent, whether the key objective of the national STI system development — to bring information to bear on problem solving — will be attained.

b. Clientele Development through the National Governance Organization

Whereas the development of markets for information services is a function of the service organizations, the agency responsible for the governance of the national STI system should formulate and execute long-term approaches aimed at raising the proclivity of Egyptian problem-solvers to use information. The formulation or selection of these approaches is an Egyptian prerogative that cannot be prescribed by outsiders: the strategies must be suitable for or adaptable to the Egyptian cultural, social and political milieu. One may, however, provide a list of possible strategies and tools, so as to facilitate the Egyptian task of evaluating them for their appropriateness, potential, and applicability. Such a list includes the following:

i. Inducing change within the educational system of Egypt regarding education for problem solving.

ii. Using the venue of professional and trade associations to promote information use.

iii. Stimulating the development of "information engineering" consultants within large organizations and as private-sector entrepreneurs.

iv. Inducing extension service agents in the agricultural, industrial, and health sectors to utilize information services.

v. Working through chambers of commerce to promulgate the dissemination and use of information.

vi. Motivating club, hobby and paramilitary organizations to publicize the utility of information services.

vii. Increasing the effectiveness of product salesmen by information backup.

viii. Nurturing the development of "information gatekeepers" as intracompany communicators.

ix. Sponsoring advertising and public relations campaigns via mass communications media.

x. Instituting programs of rewards and awards for exemplary usage of information.

Some guidelines are available to aid the agency governing the national STI system to select and pursue means for inducing information awareness into the Egyptian environment (Wilson, 1980).

On a long-term basis, the central and essential thrust must take place in the educational system and institutions of Egypt. As the information service network reaches universities and technical schools, formal introduction of faculties and students to the use of these services should become part of the curricula of higher education, preferably in the form of classroom and laboratory instruction; ample models for such courses exist (Evans, 1977; Bourne, 1980).

Obviously, Egypt should be prepared to bear significant costs associated with the short- and long-term efforts to raise the propensity of Egyptian problem solvers for the use of information. This investment is absolutely mandatory, even though its effectiveness is not easily measurable. An impact of these efforts may be reflected in an increased usage of information services; the ultimate effect sought, however, is a higher quality of human problem solving.

2. Database Development

One of the important functions of each information service of the national STI system is to contribute to the collection, organization and systematization of data generated in Egypt and/or pertaining to Egypt. The objective of husbanding domestic information resources exceeds by far the objective of any single project, even that of the national system: the variety, volume and complexity of these resources, combined with the inherent impossibility of anticipating all uses and relationships of data, renders such an objective Sisyphean. It is essential therefore to delimit and give some direction to the efforts of the information service nodes in this area.

The principal state-of-the-art vehicle for organizing and systematizing collections of data are machine-readable "databases." The term refers to any collection of such data gathered and organized for a specified purpose, whether the data is represented in natural language (e.g., Arabic, English), an artificial language (numbers, graphics), or both. A definitive taxonomy of databases is wanting and may elude the discipline for some time (cf., Roland, 1982). A useful distinction has been made, however, between "reference" and "source" databases (Wanger, 1980).

Reference databases are those that refer to a primary source of complete information. They encompass two different types of data: "bibliographic," which contain abstracts and/or citations of the primary literature; and "referral," which contain descriptions of projects, institutions, activities, the expertise of individuals, and other non-print sources.

Source databases are those that themselves contain the primary or source information. They encompass a much more varied set of data: numeric, containing numeric values from original surveys and/or data that have been summarized or statistically manipulated; textual-numeric, containing records with fields of textual information, numeric information, or both; properties, containing dictionary or handbook-type chemical and physical data; and full-

text, containing records of the complete text of an item or some primary source.

In Egypt, as elsewhere, the database building activity should be guided principally by the defined needs of the user communities. The latter, because of differences in the nature and purposes of their work, may be expected to make use of both source and reference databases. It is therefore inappropriate to restrict, a priori, the database-building role of the national STI system. On the other hand, because of a number of considerations, it is desirable to recommend directions for its initial database-building activity. These considerations include the following:

i) An existing organization, the Central Agency for Public Mobilization and Statistics (CAPMAS) of the Ministry of Planning, is already mandated to develop and maintain certain national source (statistical) databases. CAPMAS is in the process of providing access to these files which will, presumably, become also available to the nodes of the national STI services. By the same token any plans of these services to embark on the development of demographic or other source databases must be coordinated with CAPMAS; the objective is to assist compatibly CAPMAS's responsibility rather than to duplicate or overlap with it.

ii) Another agency, the National Information and Documentation Centre (NIDOC) of the Academy of Scientific Research and Technology, has had a mandate to develop and maintain databases of the scientific and technical research literature produced in Egypt. As of this time work on such a database has not begun at NIDOC; a registry of agricultural publications issued in Egypt, being maintained at the Ministry of Agriculture as part of an international project, is the only continuing effort in this area. The development of a public database of Egypt-produced scientific and technical literature should thus have a high priority.

iii) The information technology being recommended for the initial operation of each information service node is sufficient to support small to medium-size databases. Since this technology is new in the environment of the national STI system, and since it is desirable that it be put to effective use as rapidly as possible, the information service nodes would be well-advised not to undertake initially database projects that require huge efforts in data gathering, verification, and compilation.

iv) The financial resources available for the three-year implementation phase of the national STI system are insufficient for undertaking the development of large databases. Such databases and information systems (for example, the contemplated investment information service) have to be built outside the current budget of the national STI system project, although the efforts should be coordinated.

In view of the above considerations, the prudent database building direction of the incipient national information service nodes is likely to focus on reference rather than source databases. Although the determination of the number of databases to be built, and of their scope and content, will have to be made by each information service, the following suggestions are offered.

a. Referral Databases

Table 13 (in Section 5 of this chapter) lists some of the referral databases that may be needed by the respective information services. The databases differ in size, in difficulty of data gathering and verification, and in the frequency of updating. No attempt is being made in this study, therefore, to design or discuss these databases in detail; each information service is expected, however, to evaluate the utility and urgency of these (and other) databases, and to assess the manpower effort and cost associated with data gathering, evaluation, compilation, entry and dissemination.

To the extent possible, the national STI system of Egypt intends to use a standard database technology, as described in Section 7 of this chapter, for the maintenance of the databases developed under its auspices.

b. Bibliographic Database

It is strongly advocated that the national STI system also undertake the compilation and maintenance of a bibliographic database consisting of surrogates of primary scientific and technical publications generated in Egypt. The purpose, scope, flow of operations, and estimated costs are described in this section.

This database should be built and maintained cooperatively by the information services for science and engineering, agriculture, biomedicine, and industry, each processing its respective segment of the literature. While it is possible — and initially probably more efficient -- to have such a database generated and maintained by a single organization, the strong reason for producing it cooperatively from the outset is to gain experience with distributed database technology. As discussed more amply in Section 7, the major new direction of database technology development is in the area of distributed databases. The Egyptian national STI system has an excellent opportunity to employ this technology from the outset, and so to join the avant-garde of the next database generation.

The proposed bibliographic database will provide a record, in machine form, of citations and brief summaries of selected Egyptian publications. The principal uses of this database are twofold: to produce printed indexes and current awareness bulletins for general distribution and sale (as described in Section 6 of this chapter), and to conduct bibliographic searches on specific topics. While several information services will each build their subject portion of the database, the distributed components will be

periodically merged into one database whose copies will then be mounted in full at all service sites. In this manner all information services will be able to offer search services to their clients using identical copies of the database. (Distributed database access, transparent to the user, is not contemplated at this time due to lack of suitable telecommunications.)

Final coverage selection is to be determined by consensus of the information service sites involved. The following considerations should be taken into account.

It is estimated that the number of Egyptian scientific, technical and trade publications is in the low hundreds. Some of those that appear in English (such as the major research journals) are covered by international abstracting and indexing services. It is not desirable to compete with these international services unless Egypt is prepared to meet or surpass them in terms of quality of abstracting and indexing, or by more timely coverage -- both being unrealistic goals in the short run. On the other hand, it is of importance to Egypt to create, maintain and publicize a directory of the country's printed output in science, technical and other applied fields. This implies that the database should contain surrogates of both English and Arabic language documents.

Since all of these publications are easily obtainable within the country, it is possible to relax somewhat the quality of abstracting and indexing, and to concentrate on generating a timely database containing "annotations" (brief, indicative summaries of what the document is about) rather than exact and extensive abstracts.

The flow of steps required to add a bibliographic surrogate to the database is shown in Appendix B-1. While most of the steps are self-explanatory, a few may require additional comment.

The purpose of the subject classification of a document is to aid the organization of the printed product or products that will be generated from the database (as discussed in Section 6).

A standard bibliographic citation form should be employed by all information services of the national system that will handle bibliographic databases. An acceptable standard for machine readable bibliographic decriptions was issued by Unesco (Martin, 1974); while in principle being a specification manual for formatting bibliographic information for exchange in magnetic tape form, it includes stipulations relating to the preparation of bibliographic records, and covers serials, monographs, reports, theses and dissertations, patents, and conference publications. For serial titles, the ISBD standard (IFLA, 1977) is recommended.

It is intended that the bibliographic database use two languages, Arabic and English. The surrogates of the document will appear in the database in the language of that document (Arabic or English) except that the titles of Arabic language documents should also have the citation entered in an English translation, so as to indicate the document contents for non-Arabic users.

Each document surrogate will contain an annotation in lieu of the abstract, either taken from the document (if a summary or abstract is available) or prepared by the abstractor in the language of the document. The international standard (ISO, 1976) or the American standard (ANSI, 1971) are appropriate guides to the preparation of indicative abstracts.

A common form is to be developed for recording document surrogates for input in the computer. The design of the form should facilitate online data keyboarding by entry clerks, and be compatible with the data entry software referenced in Section 7.

The indexing function involves decisions regarding the indexing language and terminology. Since the bibliographic database of Egyptian STI will be small (on the order of thousands of documents), the use of unmodified subject thesauri that exist for fields like chemistry, engineering, etc. is inappropriate, inasmuch as they contain too large numbers of indexing terms. Unfortunately, an adequate, internationally accepted macrothesaurus for the entire domain of science and engineering does not exist. The next best way is for each information service to generate its own thesaurus of terms in English (Unisist, 1973), with the assistance of existing relevant thesauri, and then translate it into Arabic (Austin, 1980). The suggested procedure for the development of such bilingual thesauri is shown in Appendix B-2. For a given field (e.g., pure science, engineering, medicine, agriculture) the thesauri can be reasonably well firmed up in 12 months of service operation. Social sciences present a fortunate exception in that an English/Arabic macrothesaurus for this field already exists (Macrothesaurus, 1979).

Elements of the database that pertain to English-language documents issued in Egypt may constitute also input to internatinal abstracting and indexing services (a la the current collaboration with AGRIS). Each service site will have to determine which documents are to be so included, and it may have to use the appropriate abstracting guide and indexing thesaurus, possibly having to augment initially assigned indexing terms.

The following figures are offered as guidelines to estimating the manpower and cost required to generate a bibliographic database of Egypt-produced scientific and technical literature.

In 1980, representative industrial-country costs of preparing an abstract and entering it in a database were about $21 (Williams, 1981). Table 3, which shows the distribution of this figure among different activities, implies that approximately 70 percent (or $15) is accounted for by labor costs. Taking the average industrial-country salary of an information professional to be $10/hour plus overhead, the average man-effort per abstract is less than one hour. It is unlikely that this level of efficiency can be initially attained in Egypt; perhaps four hours of effort is more realistic. Assuming the average hourly wage of a trained Egyptian professional will be $3, and non-labor costs in Egypt to be comparable to those in industrial countries (approximately $7 per abstract), we calculate the Egyptian cost for adding an abstract to the database to be $19.

TABLE 3. LARGE DATABASE CREATION: DISTRIBUTION OF COSTS

	LABOR (%)	NON-LABOR (%)	TOTAL (%)
INPUT			
ACQUISITIONING	2.4	4.5	6.9
DATA TRANSFORMATION	36.1	4.0	40.1
COMPUTING*	1.7	7.1	8.8
R & D	10.2	1.8	12.0
SERVICES	3.0	4.5	7.5
SUBTOTAL	53.4	21.9	75.3
OUTPUT			
PHOTOCOMPOSITION, PRINTING, DISTRIBUTION	2.0	22.7**	24.7
TOTAL	55.4	44.6	100.0

*DOES NOT INCLUDE SYSTEM DESIGN/DEVELOPMENT COSTS.

**ASSUMES SUBCONTRACTING FOR PRINTING AND DISTRIBUTION.

SOURCE: ELIAS, A.W. "THE ECONOMICS OF ONLINE DATABASE CREATION." PAPER PRESENTED AT THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE, MINNEAPOLIS, MI, OCTOBER 1979.

For purposes of illustration, if we assume further that the entire database will cover 50 Egyptian serials, each appearing six times a year and each contributing to the database 10 abstracts per issue, we arrive at a total of 3,000 abstracts per year. Using the above estimates of required effort (4 man-hours/abstract) the total number of man-hours per year (distributed among the collaborating sites) is 12,000 or approximately 6 full-time staff members, including five professionals and one data entry clerk. The annual cost of generating a database of 3,000 abstracts comes to $57,000.

3. Access to Foreign Databases

Providing access to existing databases, and assisting users to retrieve from them information relevant to their needs and interests, is a central function of all modern information services.

The global number of public machine-readable databases probably exceeds one thousand, and their growth since 1975 continues to be quite remarkable. As shown in Table 4, the number of bibliographic and natural language databases between 1977 and 1979 has grown by 46 percent, and the number of their records by 118 percent. The private sector produces some 75 percent of these databases, as compared to 25 percent produced by government agencies. Sixty percent of the bibliographic databases are in science and technology, slightly over 10 percent in social sciences. Nearly 50 percent of the bibliographic databases are of medium size (30,000 to 300,000 records).

Source databases outnumber reference databases; 60% of some 400 databases listed in the Directory of Online Databases (Landau, 1979) are of the former type. A large majority of source databases (75%) are numeric (Wanger, 1980).

In the U.S., some 90 percent of databases are available online (i.e., they can be searched interactively in real time from remote terminals connected to the database by telecommunications). Europe purports to have access to over 1,400 databases of the reference and the source types, of which some 500 are accessible online (EUSIDIC, 1981). Many databases are of course of considerable relevance to problem solvers in developing countries (Slamecka, 1979b). There exist several excellent database guides (EUSIDIC, 1981; Landau, 1979; Williams, 1979a; Luedke, 1977).

The major parties of the "online industry" are database producers and database vendors. The latter are organizations which license databases from producers and make them available for access by the general public against payment of fees, parts of which revert to the producers in the form of royalties. The largest U.S. vendor provides access to some 130 databases; the largest European vendor services about 30. However, many databases, particularly of the source variety, are available only from database producers. The global revenue from database searching is estimated at $90 million, and the annual growth of the online industry at 25-40 percent.

TABLE 4. GROWTH OF BIBLIOGRAPHIC DATABASES, 1975-1979

DATABASE ORIGIN	1975 DATABASES (NO.)	1975 RECORDS (MILLION)	1977 DATABASES (NO.)	1977 RECORDS (MILLION)	1979 DATABASES (NO.)	1979 RECORDS (MILLION)
U.S.	177	46	208	58	259	93.5
CANADA, EUROPE, JAPAN	124	6	154	13	269	54.5
TOTAL	301	52	362	71	528	148.0

ADAPTED FROM: WILLIAMS, M.E., "DATABASE AND ONLINE STATISTICS FOR 1979." ASIS BULLETIN, 7:27 (DECEMBER 1980).

Clearly, it is essential that the national STI system of Egypt obtain and maintain effective access to global databases. This objective requires considerations of a) identification of databases potentially relevant to the Egyptian clientele, b) means of obtaining access to them, and c) estimates of volumes and costs. These aspects are considered below, and are followed by a set of recommendations.

a) Relevance of Foreign Databases

Historically, the information profession has been preoccupied with attention to reference databases, particularly of the bibliographic kind; this is due largely to the facts that the information profession is the intermediary between these databases and their end users, and that it has contributed to the development of the databases. In contrast, most source databases are used directly by end users, with little or no assistance by the information "intermediary," and hence have received relatively little attention by the information profession.

There is increasing evidence, however, that source databases dominate the user market in industrialized countries. It is estimated that during 1980 some 6 million database searches were carried out in the Western industrialized hemisphere, and that 90% of these were directed to source databases. Two 1981 surveys (in the UK and the US) predict that as database users, managers will outnumber others (such as scientists and technicians) by a ratio of 9:1. A survey of 10,000 subscribers to Source, a U.S. computer utility that provides 1,200 databases, programs, etc., has determined that three times as many businessmen and managers are likely to use the service than other professionals, including computer professionals (MIS Weekly, 1981). Interestingly, the 1980 user survey in Egypt (Sarasohn, 1981) identified Egyptian managers as having the highest perception of the importance of information, and greatest awareness of the lack of information services in Egypt.

These indicators suggest strongly that the national STI system cannot ignore accessing foreign source databases, and, indeed, that its information services catering to managers and businessmen should give these databases priority. This conclusion has considerable implications, particularly on the staffing and personnel training of these services.

b) Options for Accessing Foreign Databases

There exist four options for Egypt to obtain access to foreign databases: licensing for domestic operation, online access, delayed online access, and batch search. This section examines the feasibility and economics of these alternatives.

i) Licensing. Some databases, although not the majority of them, can be licensed for annual fees ranging upward from several thousand dollars. Depending on the database in question, the fee includes a royalty for the database as well as a rental fee for the computer software needed to operate the database.

To become a vendor of foreign produced databases and to operate these databases in the online mode, Egypt would require, apart from skilled staff, appropriate hardware, suitable operating systems, and database retrieval software. For a large database of one million records or more, exemplified by the PREDICAST economic databases, the MEDLARS database of the National Library of Medicine or the COMPENDEX database of the Engineering Index, the monthly U.S. rental cost of adequate computer facilities, appropriate software, and maintenance contracts is about $25,000. (This estimate is based on the following configuration: IBM 4341 computer, two megabyte CPU, 2 gigabyte disk storage units, printers and terminals, operating system, database software, and maintenance. Egyptian cost is like to be 25 percent higher.) A minimum of ten employees would be required to maintain the system and perform inhouse searches. Adding the database licensing fee, the annual cost for Egypt to operate a single large database would be in excess of $300,000 per year.

The economic rationale for justifying this alternative is determined as follows. Assume that the average total cost of an online search from Egypt of a database located abroad is $60; then $300,000 will buy 5,000 such searches per year. It will be more economical for Egypt to operate such a database domestically if there exists a local demand for more than 5,000 searches. It is not probable that such a volume of one-database searches will be attained in Egypt during the next five years — at which time there is a possibility that new storage technology (optical discs) may cause major changes in the distribution of recorded knowledge. It appears prudent not to make such major investments at the present time.

It is also possible to establish a much more modest licensed facility in Egypt, by operating a large foreign database in a batch (rather than online) mode, using smaller equipment and older software, both obtainable at much lesser cost. For example, the PREDICAST database license cost is $27,000 per year, older IBM software ("type 3" programs) is available inexpensively if not gratis, and an IBM System 360 computer with magnetic tape drives might be found and used part-time in Egypt. Including maintenance and staff salaries, the Egyptian annual cost of operating the database in batch mode would nevertheless be at least $100,000, or equivalent to the cost over 1,600 retrospective searches abroad. The inadvisability of making a commitment to older hardware and old database technology should also be taken into account.

On the other hand, Egyptian information services should explore and pursue the possibility of licensing small foreign databases, provided their operation in Egypt is technically feasible (i.e., they can be reformatted to run on the equipment that will be provided), and cost-effective (i.e., inexpensive to obtain and of commensurate demand and usage).

ii) Online search. For the typical user, online access to databases poses two problems: the availability of adequate telecommunications for connecting the user to the database; and knowledge of the "query language" by means of which a given database can be searched. Query languages and search protocols vary considerably from one database to another; their incompatibility has led to the development of a new information profession, the so-called

"database intermediary" who specializes in database search. Since an intermediary is typically able to maintain high familiarity with only a small number of databases, information search services serving general clienteles (e.g., universities) must maintain a staff of these specialists. For Egypt, the training of intermediaries is a high-priority task, particularly with regard to source database access.

Direct digital communication between Egypt and the U.S. can be obtained in a number of ways; they are differentiated according to the communication facilities used, and they differ in cost. The communication facilities of primary interest are termed here "public data networks" or PDNs, and they include three types:

- o Circuit switched networks, using direct-dial voice telephony. At this time the number of voice telephone lines between the U.S. and Egypt is limited (although American Telephone and Telegraph Co. reports that the number will be doubled in September 1981). The cost of communications using this analog line, which requires modems, is equivalent to long-distance telephone calls; they usually offer transmission rates in the 0.3-4.8 kilobit range, although 1.2 kilobit is more prevalent and offers more reliable transmission. The Egypt-U.S. line currently uses half-duplex switches, not permitting simultaneous two-way (full duplex) transmission.

- o Leased circuit networks, which are conditioned voice lines typically providing point-to-point, half or full duplex circuits. They feature low error rates (less than 1 bit in 10 million bits transmitted), fast call set-up times of one second or less, and charges for connect time only. Circuit-switched lines are leased from an International Record Carrier (IRC) such as Western Union, RCA, or ITT. The leased lines optionally offer high speeds (9.6 kilobits/sec); their cost is in the range of $12,700 per month (International Telephone & Telegraph Co., 1981).

- o Packet switching networks, which share digital network paths among multiple, low-volume users. Data is transmitted over the network in fixed-sized blocs called "packets." The interface to packet networks is usually more complex; in turn, the network provides certain control functions, which are referred to as "value-added" services. The cost of using this network is independent of transmission distance, and consists of a low connect charge (about $12 per hour per user), plus a charge of $0.60 per 1,000 characters transmitted. (Packet switching data networks require, of course, that a line be leased by someone, usually the telecommunications agency, in each country that has access to the network. The cost of the leased line is $12-14,000/month; thus from a national point of view these networks are equally expensive as leased circuit networks. They are inexpensive from the viewpoint of a single user who assumes only a fraction of the total cost.)

Packet switching networks are most economical for low-volume data transmission such as occurs in online searching of databases. On the other hand, digital circuit-switched networks may be cheaper for transmitting large volumes of data, such as voluminous outputs from textual databases (Branscomb, 1979).

Assuming that online database access demand from Egypt averages 10 searches daily, at 30 mins/search, the total connect time required is 5 hours. It is quickly obvious that the cost of direct-dial long-distance telephone, at $4 per minute ($1,200/day) is untenable, as is the leasing of a channel from an IRC (AT&T does not permit data transmission). Clearly, the most economical are packet switching networks: a connect-hour costs about $12, plus a charge for each of the data packets transmitted. The approximate monthly costs of the three types of transmission, for the assumed 5 hour connect time/day, are compared in Table 5.

One immediately available online option is for Egypt to access a packet-switching network via a country other than the U.S., by using direct-dial line between Cairo and a network node in a nearby country (TELENET is available, for example, in Saudi Arabia and Bahrain). The cost of such connection has not been investigated; its major component is the direct voice line that would be engaged for hours per day. This cost can be obtained from the Egyptian national telecommunications authority.

iii) Delayed online search. This technique, developed by ASRT/NIDOC and Georgia Tech, involves forwarding search queries via telex from Egypt to a U.S. intermediary who, in turn, conducts an online search (using the search statements formulated in Egypt but having the option of optimizing them online). The query formulation, transmission and online execution can be accomplished in 24 hours; and depending on the mode of delivery of the search output (decribed in subsection c below), the average turnaround time of the entire process will vary from 5 to 21 days.

The total cost of the delayed online search is approximately that of U.S. online searches (including information labor). The economy is attained by shifting some professional activities to Egypt, and thereby compensating for the additional costs of international communications.

iv) Batch search. Another option for accessing foreign databases from Egypt is to have them searched in a batch mode. Search queries are formulated in Egypt and transmitted by telex to a foreign intermediary who enters them, online, in the database vendor's system. The batched queries are then executed in off-peak hours, and the output is forwarded to Egypt. Retrospective, demand batch searches are only somewhat less inexpensive than online searches, as the intermediary's time of interaction with the system is shorter; on the other hand, there is no opportunity to optimize the search logic. For the latter reason, batch searches are more suitable for recurrent, SDI (selective dissemination of information) searches using well-formulated, tested queries. (In the ASRT/NIDOC experimental search service, recurrent searches have been conducted in batch mode.)

TABLE 5. ALTERNATE COMMUNICATIONS COSTS OF ONLINE ACCESS*
TO U.S. DATABASES FROM EGYPT

COMMUNICATIONS	MONTHLY COST	COST PER SEARCH
DIRECT-DIAL	$24,000	$120,000
LEASED CIRCUIT NETWORK	12,700**	63.50
PACKET SWITCHED NETWORK	1,600	8.00

*ASSUMING 10 SEARCHES PER DAY, AT 30 MINS. CONNECT TIME, AND 20 DAYS PER MONTH.

**ITT QUOTE, AUGUST 1981.

It is apparent that the most economical, and affordable, online access from Egypt to U.S. databases must await the installation in Egypt of a node of a packet switching network. When one or more of these networks establish Egyptian nodes, it should be possible for Egypt to access foreign databases at a cost not exceeding that of, say, American users.

c) Options for Search Output

From Egypt's standpoint, another important question is that of the media for recording the database search results, and the method of delivering the output to Egypt. The factors to be considered are the costs of the different output recording media, of the means of delivering these media to Egypt, of output storage, and of output reproduction. Clearly (and importantly), each medium has different connotations as regards user acceptability.

i) Output recording media. The currently supported media for recording output from database search services are: online computer printout (on terminal screen or paper, at the user's facility); offline computer printout (on paper, at the vendor's facility); and recording the output in digital form on electronic media and transmitting it digitally to the user's site. The latter method has been successfully tested by Dialog Information Services, Inc. and the Georgia Institute of Technology.

Another prospective new search output medium is microfilm. One major U.S. vendor is currently (August 1981) studying the possibility of using a computer-on-microfilm (COM) printer to produce, online, microfiche of the search results; a decision is to be made before the end of 1981. Microfiche can also be generated at the user's site, from search output received in digital form. Current U.S. contract prices for producing a master microfiche run approximately $0.0065 per frame, or less than a dollar per 90-frame microfiche having a reduction ratio of 24:1. Microfiche copies, under a bulk price contract, cost $0.07 per fiche if made at the same time as the master, or $0.25 per fiche if made from the master.

ii) Output delivery. The method of delivery of search output is, obviously, related to the output medium. Thus offline computer printouts must be airmailed to Egypt. Printed matter airmail is limited to a maximum weight of four pounds, at $15.48 (1 lb, $4.44). Current delivery time for airmail is about two weeks. A more expeditious, but more costly, way is to use airfreight or courier service. Minimum charge for airfreight is $45.00; if the package is handcarried to the airport (which increases the cost of delivery), delivery to Cairo airport takes two to three days. Courier service (DHL, 1981) costs, which include door-to-door pickup and delivery in both countries, are as follows: $60.50 (1 lb), $66.00 (2 lbs), $94.05 (4 lbs), $130.63 (8 lbs).

The cost of digital transmission from the U.S. to Egypt varies with the rate of transmission and the channel type. Table 6 shows the theoretical times required to transmit a daily search output of 1,000 abstracts (200,000 words) at different speeds; actual times are one-third higher. Table 7 shows the comparative costs of sending the hypothetical daily search output to

TABLE 6. DIGITAL TRANSMISSION TIMES* FOR 1,000 ABSTRACTS

TRANSMISSION RATE (CHARS PER SEC)	TRANSMISSION TIME (MINS)
30	664
120	166
240	83
480	42
960	21

*THEORETICAL TIME: ACTUAL TIME IS ONE-THIRD LONGER.

TABLE 7. COMPARISON OF METHODS OF TRANSMITTING DAILY SEARCH OUTPUTS* TO EGYPT

METHOD OF TRANSMISSION	COST ($/DAY)	DELAY
AIRMAIL - HARD COPY (8 LBS @ $14.58/4 LBS)	30.96	14 DAYS
AIRMAIL - DISKETTES (2 LBS)	8.12	14 DAYS
AIRMAIL - MICROFICHE (1 LB)	4.44	14 DAYS
COURIER - HARD COPY (8 LBS)	130.63	3 DAYS
COURIER - DISKETTES OR MICROFICHE	60.50	3 DAYS
DIRECT-DIAL TELEPHONE - 240 CPS ($4/MIN)	333.00**	83 MINS
PRIVATE LEASED LINE (IRC)***	610.00**	21 MINS
PACKET-SWITCHING NETWORK - 960 CPS ($12/HR, $0.60/1000 CHARS)	724.00**	21 MINS

*200,000 WORDS (10 SEARCHES @ 100 ABSTRACTS @ 200 WORDS/ABSTRACT).

**THEORETICAL COST; ACTUAL COST TO BE HIGHER.

***24-HOUR LEASE OF 960 CPS LINE: ASSUMES NO OTHER USERS.

Egypt in one batch via different forms and channels. Table 8 compares the combined annual costs of online search and digital delivery of output. it shows that packet switching is most economical for negotiating the online search but not for the digital transmission of search results.

iii) Output storage. The medium of the search output (paper, microfilm, or electronic storage) carries with it implications of storage cost. Table 9 summarizes annual costs of storage, again assuming daily output of 1,000 abstracts.

iv) Output reproduction. It is likely that some search outputs will be produced, or reproduced, in more than one copy. Table 10 shows the costs of reproducing output copies from their respective storage media, as well as the combined costs of storage and reproduction. Figure 4, which illustrates the comparative annual costs of reproducing outputs from searches stored on different media, documents the economy of the microfiche.

d) Total Costs of Database Searching.

The total cost of an online search is the sum of manpower costs (for the search query preparation, the interactive search negotiation, and the output review and processing), and the database vendor's charge. Typically, vendors quote the cost of database services in terms of "dollars per connect hour" (the latter aggregating the vendor's prorated cost of facilities and operations, vendor's prorated royalty to database producer if different from vendor, and prorated cost of the use of the telecommunication line leased by vendor), and a unit cost per item of search output. (The charges vary from one database to another. For example, the "World Textiles" database from Dialog Info. Services, Inc. is $55.00 per connect hour and $0.10 per record printed. The MEDLINE database available from the same vendor costs $35 per connect hour, and $0.15 per abstract printed. AQUALINE, a database on water management, costs $35 per connect hour and $0.30 per abstract.)

For planning purposes, one may estimate the manpower effort to be equal to two manhours per search request. Based on worldwide estimates for 1980 (and recalling that 90% of them were of source databases), the average length of an interactive online search session is 15 minutes, and the average vendor's charge $15 per search. U.S. statistics cite 20 minutes per search of bibliographic databases, and the experience with ASRT/NIDOC searches supports this figure: for approximately 500 searches conducted, the U.S. vendor's charge for retrospective online searches averaged $20 per database; for offline SDI searches, $6.00. However, since the number of bibliographic databases queried per search averaged 1.75, the total costs averaged $35 and $10 respectively (Dodd, 1981). Online searches from Egypt may initially expect longer connect time per search; the estimates in this study assume 30 minutes.

An attempt has been made, in Table 11, to derive the total costs for each of the four methods of accessing U.S. reference databases. A search is taken to consist of 50 words of input, and 20,000 words (100 citations and abstracts) of output. Next, Table 12 shows the minimum and maximum per-

TABLE 8. ONLINE SEARCH AND DIGITAL OUTPUT TRANSMISSION COST COMPARISONS[A)]

COST CATEGORY	DIAL-UP LINE (240 CPS)		LEASED LINE (24 HRS, 960 CPS)		PACKET SWITCHED LINE (960 CPS)	
	MINS/DAY	$/YEAR	MINS/DAY	$/YEAR	MINS/DAY	$/YEAR
ONLINE SEARCH (10 SEARCHES x 250 DAYS)	300	300,000	300	10,400[B)]	300	10,400
DIGITAL OUTPUT TRANSMISSION (1.2 MIL. CHARS. x 250 DAYS)	83	83,000	21	152,400	21	180,000
TOTALS	383	383,000	321	162,800	321	190,400
TOTAL COST PER SEARCH	-	153	-	65	-	76

A) INCLUDES VENDOR AND TELECOMMUNICATION COSTS ONLY

B) SEARCH VIA PACKET SWITCHING LINE.

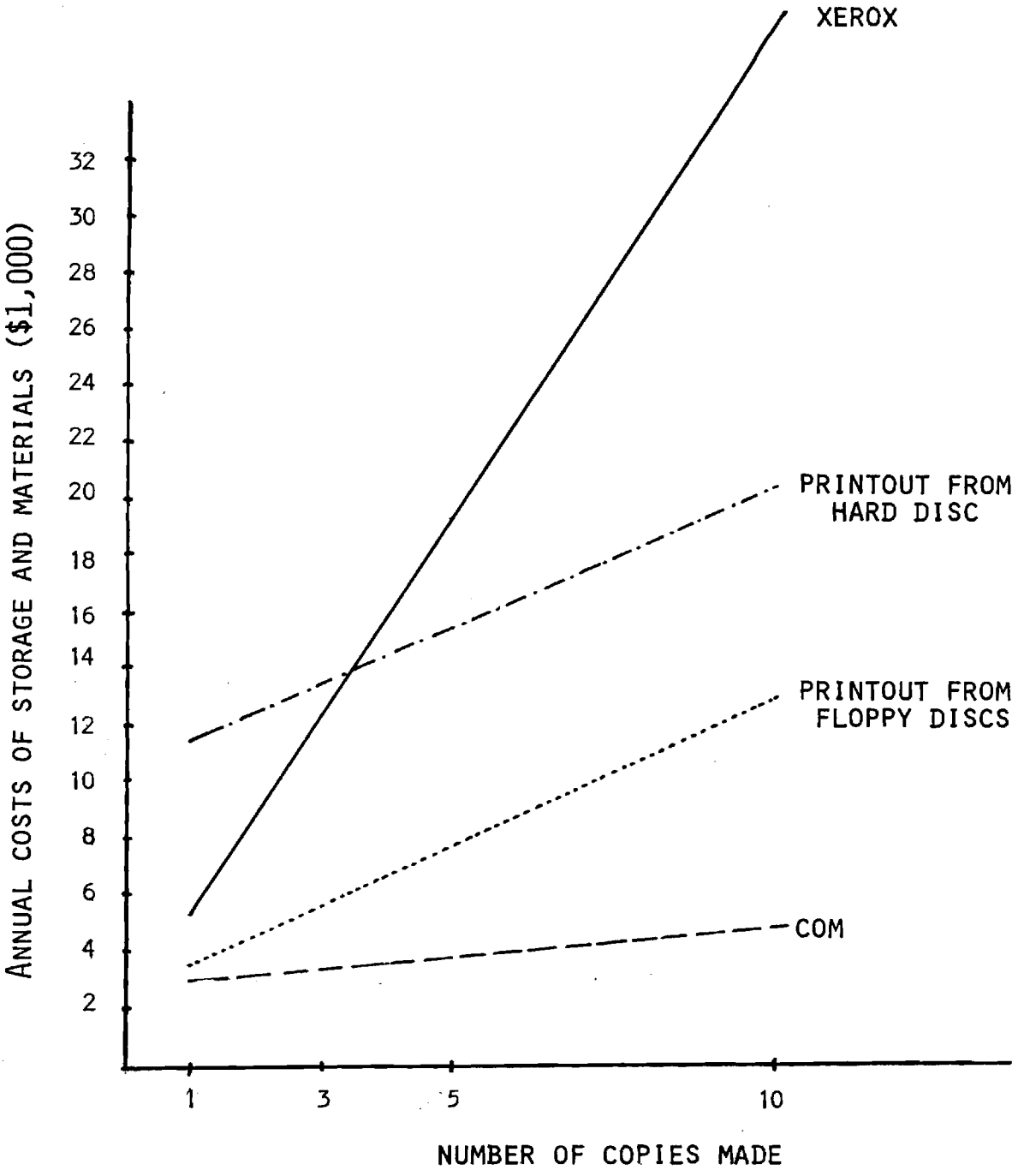


FIGURE 4. COMPARISON OF ANNUAL COSTS FOR COPYING 2,600 SEARCH OUTPUTS (@ 100 ABSTRACTS).

TABLE 9. COMPARATIVE ANNUAL COSTS
FOR STORING SEARCH OUTPUT*

	MEDIUM	VOLUME	UNIT COST	FACTOR	TOTAL COST/YR
1.	PAPER	70,000 PAGES 45 FT CABINETS	$0.015/PAGE $200/FILE	x70,000	1,000 800 } 1,800
2.	FICHE (COM)	2,000 MASTERS	$1/MASTER	x2,600	2,600
3.	DISC (HARD)	260 MBYTES	$40,000/DISC	:4**	10,000
4.	FLOPPY DISC	260 MBYTES***	5/DISC	x520	2,600

*ASSUMPTIONS: 2,600 RETROSPECTIVE SEARCHES/YEAR @ 100 ABSTRACTS AND 1,000 CHARACTERS/ABSTRACT.

**AMORTIZED OVER 4 YEARS.

***FLOPPY CAPACITY 0.5 MBYTE.

TABLE 10. ANNUAL COSTS OF REPRODUCING 2,600 SEARCH OUTPUTS*

MEDIUM	STORAGE COSTS	COSTS OF REPRODUCTION 1X	3X	5X	10X	TOTAL COSTS 1X	3X	5X	10X
1. XEROX OF COMPUTER PRINTOUT	1,800	3,500	10,500	17,500	35,000	5,300	12,300	19,300	36,800
2. COMPUTER PRINTOUT FROM DISC	10,000	1,050	3,150	5,200	10,400	11,050	13,150	15,200	20,400
3. COMPUTER PRINTOUT FROM FLOPPIES	2,600	1,050	3,150	5,200	10,400	3,650	5,750	7,800	13,000
4. FICHE DUPLICATION**	2,600	182	546	910	1,800	2,782	3,146	3,510	4,400

*MATERIALS COST: $0.015/SHEET OF COMPUTER PAPER, $0.05/PAGE XEROX, $0.07/FICHE DUPLICATE.

**DOES NOT INCLUDE COST OF MICROFICHE READERS.

TABLE 11. COMPARATIVE COST ESTIMATES FOR DIFFERENT METHOD OF SINGLE REFERENCE DATABASE SEARCH [A] (IN $)

SEARCH METHOD	EGYPT-BASED COST	INPUT TRANSMISSION COST	US CONTRACTOR COST	US VENDOR COST	OUTPUT TRANSMISSION COST [E]			
		TELEX			PACKET LINE	(HARD COPY)	COURIER (FICHE, FLOPPY)	AIRMAIL
LICENSING (1 DATABASE)	$100,000 [B]	-	-	-	-	-	-	-
ONLINE	$9 [C]	-	-	$20	$72	$13	$6	$3
DELAYED ONLINE	$6 [C]	$4	$20 [D]	$20	$72	$13	$6	$3
BATCH	$6 [C]	$4	-	$20	$72	$13	$6	$3

A) INPUT = 50 WORDS, OUTPUT = 100 ABSTRACTS = 20,000 WORDS PER SEARCH.
B) TOTAL ANNUAL COST FOR DATABASE SYSTEM AND PERSONNEL.
C) SALARY RATE $3/HOUR (OVERHEAD NOT INCLUDED).
D) INCLUDES OVERHEAD.
E) PRORATED FOR 10 SEARCH OUTPUTS: SEE TABLE 7 FOR DETAILS OF CALCULATION. THE ONLY TELECOMMUNICATION METHOD CONSIDERED IS PACKET SWITCHING.

TABLE 12. DIFFERENT METHODS OF SINGLE REFERENCE DATABASE SEARCHING: ESTIMATES OF COST PER SEARCH ($)

SEARCH METHOD	TOTAL COST/SEARCH MINIMUM	TOTAL COST/SEARCH MAXIMUM	TURNAROUND TIME
LICENSING[E] (1 DATABASE)	$67[D]	$200[C]	1 DAY
ONLINE	$32[B]	$101[A]	1 DAY
DELAYED ONLINE	$53[B]	$132[A]	4-21 DAYS
BATCH	$33[B]	$ 88[A]	5-21 DAYS

A) DIGITAL OUTPUT TRANSMISSION VIA PACKET SWITCHING DATA NETWORK.

B) OUTPUT TRANSMISSION VIA AIRMAIL.

C) BASED ON 500 SEARCHES/YEAR.

D) BASED ON 1,500 SEARCHES/YEAR.

E) ASSUMES FIXED DOLLAR COST TO BE $100,000/YEAR.

search costs that may be expected for each method, the hard currency component of that cost, and the approximate turnaround time for ech method. The reader should be cautioned that both tables are based on various assumptions, some of which refer to currently nonexistent facilities (e.g., packet-switching telecommunications).

e) Recommendations

The upshot of the preceding analyses are the following conclusions. The vast majority of global databases is, and will continue to be, located abroad. The economics of licensing databases for domestic access in Egypt will become attractive when Egypt develops stronger information markets and clientele; the process will take several years.

The most economical method for the Egyptian national STI system to obtain online access to foreign databases is via packet switching network where the leased line costs are shared with other parties. The packet switching line is not the most economical means of transferring to Egypt the search output in digital form. As Tables 7 and 8 show, direct-dial telephone transmission is cheaper if the search turnaround time is to be almost instantaneous; or, if a delay of 3-4 days is acceptable, delivery of digital output on diskettes via courier is most economical.

This study recommends two actions regarding Egyptian access to foreign databases: i) Egypt should install, as rapidly as possible, a gateway node to a packet switching network; and ii) meanwhile, Egypt should continue temporarily to search U.S. databases via the "delayed online" method of database access, and deliver search outputs to Egypt in digital form. The two recommendations are discussed in more detail below.

i) Access to packet switching network. The ASRT, as promoter of the national STI system, should approach without delay the Egyptian telecommunications agency and urge it to set up a network gateway node. Typically, the hardware switching equipment is supplied by the network; the one-time cost to Egypt to install a node with adequate capacity should be $100,00-200,000. The Egyptian network agent is to supply a network line. If the agent is the Egyptian telecommunications agency, the costs are borne by it; if the agent is a private operator, the cost of the line will be about $14,000/month. The network node operation will require the staff (two persons) to be trained by the network company.

Clearly, the volume of international database traffic from the national STI system will be quite small, and even a minimally configured gateway node should be operated as a public service and made available to other customers, such as banks, corporations, and government. The network operation could provide a nontrivial income for the Egyptian network agent (presumably, the telecommunications agency). The governing agency of the Egyptian national STI system might theoretically seek to become such an agent, so as to partially defray the otherwise deficit operations costs; assuming responsibility for operating an Egyptian network node would, however, require commitment to ancillary activities such as marketing, assuring adequate network capacity for

the growing clientele of its users, etc.

ii) U.S. database searching. Until such time that more economical public data network services are available in Egypt, it is essential for the national STI system to access foreign databases of the source and reference kind in an indirect manner. The "delayed online" access method is recommended for use by all the initial information service sites, employing TELEX for query transmission and, whenever possible, diskettes for output delivery by courier.

The process flow of this "delayed online" database search is shown in Appendix B-3. The flow is essentially that being used currently, except that each information service (and the U.S. intermediary) will employ its own computer system for managing information about users and searches, and its own TELEX line. A single Egyptian address (e.g., a post office box) should be used for forwarding all search outputs from the U.S. during this temporary setup.

The U.S. contractor organization which will carry out the online search step must meet certain qualifications. Primary among them is the necessity to have a large and experienced staff of search specialists (a minimum of ten professionals) assigned on a fulltime basis to database work. This staff must have familiarity with the major databases in all subject areas covered by the initial Egyptian information services, particularly with source databases. The U.S. contractor should have standing contracts with major database producers and vendors; have computerized administrative and accounting procedures; be prepared to execute search requests in 8 hours or less; charge Egypt prices that are charged to the contractor's inhouse staff; and be willing to train Egyptian intermediaries on the contractor's premises. The U.S. contractor must also have available machine-to-machine facilities to record and process digital output of database searches as well as dataphone communications to Egypt. The turnaround time for searches whose output is delivered by courier should not exceed five days; turnaround for searches with airmailed output should not exceed three weeks.

iii) Estimated search volume. There are no reliable models for estimating initial demand for online database searching in developing countries. Statistics from small industrialized countries indicate that an R&D employee with university education requests one to two searches per year (1.3 searches in Holland; 2.0 searches in Sweden) and that when working in a university environment, such an employee is likely to conduct several searches per year (5.8 in Holland; 7.7 in Sweden). If online usage increases annually by about one-third, the average usage figures in 1976 -- when online services became popular -- in Holland and Sweden would have been, respectively, 0.26 and 0.4 search per university-educated R&D worker, and 1.1 and 1.5 for university-based, university-educated R&D workers. In Egypt, which is said to have "more than 20,000 R&D workers" (ASRT, 1979), a corresponding theoretical figure would be on the order of 7,000 searches per initial year. Earlier, an independent study had predicted that 17,000 searches would be carried out from Egypt during three years (Romerio, 1977).

It is also reasonable to expect that the level of the national R&D budget, as a percentage of the gross national product, will have an effect on the availability of, and ability to use, information services. The Egyptian R&D budget, as a percentage of the gross national product, is about 40 percent of that of Holland or Sweden (CAPMAS, 1980). If the dependency between the R&D budget and information use were reasonably linear, one could assume the initial annual Egyptian demand for online searches to be about 3,000 searches.

Such reasoning is quite speculative, of course. However, the experience of the ASRT/NIDOC search service operated during 1981 indicates that the figure of 3,000 searches is not unreasonable. ASRT/NIDOC has processed, in six months, approximately 500 searches, at least half of which were in health-related disciplines.

Based on this experience, this study postulates that the number of (partially subsidized) Egyptian searches during the first three years of the existence of information services will be 2,500 per year (approximately 500 per year per information service site), or averaging 10 searches per working day. This figure (2,500 searches/year) has been used as the basis for the related cost estimates.

A uniform policy on user charges must be set and applied across all information services. Typically, search costs may be expected to be defrayed by the user's employer; large organizational customers should be encouraged to open accounts with the information service most appropriate to their interests. Whereas the eventual goal of the national STI system is to recover the full cost of the database searches, it is unlikely that this goal will be reached soon. To make the service more attractive a few "sample" searches may be offered to each customer gratis, to be followed by less-than-full charges for a year or so.

The shape of the "demand curve" for database services, and the effect on it of various marketing strategies, are reasonably well known (Lindquist, 1978), but have not been evaluated in developing countries.

4. Document Delivery

Providing the user with documents identified through database searches is an absolutely essential component of Egyptian information services. Unfortunately, Egyptian document repositories can be relied on to supply only a percentage of such documents, even after their holdings have been systematically strengthened. Consequently, the national STI system requires a set of policies and procedures to obtain such documents from abroad.

Appendix B-4 shows the sequence of steps involved in procuring requested documents from abroad.

In considering the design of the document delivery service, the key factors are speed, reliability, and costs. Document supplier services around the world are quite numerous (The Information Store, 1981). Some database vendors provide computerized ordering procedures tied to their database search services. Typically, the vendor will receive online requests for documents from an earlier search, and pass them to a document delivery service affiliated with the vendor. Major database vendors operate small networks of such affiliates, the latter often specializing in particular types of literature. (The largest U.S. database vendor, Dialog Information Services, Inc., operates such a service under the name "Dialorder." Another vendor, System Development Corporation, calls a similar facility "Electronic Maildrop.")

The typical cost of a document procured through these sources is based on a standard fee (about $7 per document), $.20 or more per page, plus postage. A copy of an average scientific article (six pages) will thus cost Egypt about $10; this cost covers also a copyright charge which reverts to the publisher.

When Egypt has available online telecommunications for accessing U.S. databases, the most efficient document delivery service will be to use the database vendors; this is so because the communication protocols are straightforward, allowing the Egyptian information services to identify requested documents by simply referring to them by their number on the database search output. Until then, however, Egyptian information services should engage a single U.S. contractor for all document requests from the United States.

It is preferable (but not necessary) that this contractor be the same organization as the U.S. intermediary carrying out online searches on behalf of Egyptian information services, as efficient communication formats for document requests will be easier to develop. It is important that the document delivery contractor be able to fill a large percentage of the requests from his inhouse document collections, and do so at low cost. This suggests that the document contractor be a large scientific library, and that it be located in a city having ample information resources. (As an indicator, the Georgia Tech Library which serves as a single source for document delivery in the experimental project phase, has been able to meet 95 percent of Egyptian document requests from the collection of the university library network in the Atlanta area, at about 60 percent of the commercial services costs.)

The U.S. document delivery contractor should use air freight to Cairo, batching the documents in one parcel mailed, say, twice a week. In contrast to air mail which takes about two weeks, air freight (from Atlanta via Frankfurt) will arrive in Cairo in 3 days, on the average. Technological developments indicate that within three to five years it will be feasible to transmit at least some copies of documents electronically by telefacsimile, at a cost more economical than the $10/page charged currently.

The purchase of documents from overseas is expensive, and the Egyptian national STI system should have a uniform policy regarding the financing of this service. Naturally, users prepared to pay the full cost of documents

requested need not be limited as to the volume of requests; other, however, whose requests will be temporarily or partially subsidized by the national system, must be prudent. As an incentive it is preferable to subsidize database searches rather than document delivery.

5. Referral Service

A referral service "refers the inquirer to the source or sources most likely to provide the desired information." This definition differentiates referral from other information services, and it clearly delimits its function to the suggestion of sources that are likely to satisfy the client's information needs. Referral does not duplicate functions of other information services, such as library reference, in which the preferred objective is to provide the actual data or information rather than pointing to their possible source. Referral service provides, in principle, answers only to questions which request information on available sources. The referral function is a vital one in Egypt.

Referral centers vary as to the orientation of their service, according to both the clientele they serve and the particular information needs of that clientele. In different countries, referral services are variously functioning within a national library, the national information system, or in specific agencies of the central or local governments. In Egypt, where the referral service is not a prevalent phenomenon, it is incumbent upon the national information system to initiate it. The proposed national STI system and its distributed information service nodes are an ideal substrate for the referral function, allowing each such node to specialize -- that is, to serve the specific referral needs of its particular clientele. Since one primary source of information is databases, the referral service may often direct the inquirer to the database search service provided by its node.

An indispensable element of an effective referral service is various internal files of information sources; these are the primary tools which the service must create and which allow it to perform the referral function. Although the specific referral orientation of each information service, and hence the specific types of information directories, will have to be developed after more insight is obtained regarding the particular user clienteles of each information service of the national system, it is possible to identify a priori a number of directories that are likely to be in demand by these services sites. These directories are shown in Table 13.

The directories have to be compiled by the referral service staff; procedures for doing this have been described elsewhere (Unisist, 1979). It is suggested that all nontrivial directories be produced in machine-readable form, using the standard computer and database software facilities to be provided for each information service of the national system (see below). This will assure not only instantaneous availability of the data but will be in-

TABLE 13. REFERRAL SERVICE DIRECTORIES OF INFORMATION SOURCES

SECTORS	SELECTED DATABASES
AGRICULTURE	GOVERNMENT AGENCIES' PLANS, PROJECTS AGRICULTURAL COOPERATIVES' CHARACTERISTICS RESEARCH AND TESTING LABS AND PERSONNEL EXPERTS (CONSULTANTS, EXTENSION WORKERS) DOMESTIC RESEARCH LITERATURE
ENERGY	GOVERNMENT AGENCIES' PLANS, PROJECTS RESEARCH FACILITIES (GLOBAL) EXPERTS
HUMAN SETTLEMENTS	NATIONAL AND LOCAL PROJECTS, AGENCIES SOCIAL SERVICE AGENCIES AND PROGRAMS LAWS, DECREES (E.G., ENVIRONMENT, HOUSING) VARIOUS FACILITIES (E.G., CULTURAL, RELIGIOUS, SPORTS)
INDUSTRY	PRODUCTION FACILITIES OF EGYPT PRODUCT CATALOGS FOREIGN PRODUCT SOURCES, PRICES EXPERT, IMPORT LAWS CONSULTANTS TESTING LABORATORIES STANDARDS AND NORMS PATENTS DOMESTIC TECHNICAL REPORTS SAFETY REGULATIONS
MEDICINE AND HEALTH CARE	HEALTH FACILITIES, AGENCIES, PROGRAMS PHYSICIAN'S ROSTER EPIDEMICS AND EMERGENCY FACILITIES DOMESTIC RESEARCH LITERATURE HEALTH RELATED LAWS HOSPITAL MANAGEMENT SYSTEMS
SCIENCE AND ENGINEERING	RESEARCH FACILITIES, PROJECTS ROSTER OF SCIENCE PERSONNEL THESES OF EGYPTIAN UNIVERSITIES DOMESTIC RESEARCH LITERATURE SCIENCE MEETINGS AND CONFERENCES IN EGYPT
TRANSPORTATION AND COMMUNICATION	GOVERNMENT AND OTHER AGENCIES' PROGRAMS SOURCES OF SCHEDULES TRANSPORTATION CAPACITY STATISTICS

strumental in keeping the directories easily uptodate, and allow publishing them periodically in printed form for more general distribution. The recently issued directory of ongoing research projects in Egypt is an excellent example of such a directory published from a machine-readable database (ASRT, 1981). Eventually, large directories in machine-readable form should be accessible online by Egyptian users.

In addition to the internally compiled directories, each referral service in Egypt will assemble a small collection of published reference works, dealing with information sources. Many such guides have been issued by international organizations and/or publishers.

Possibly the most important information source of referral services are human experts and expert organizations. While each information service node will presumably wish to maintain lists of Egyptian experts and firms in its domain of interest, access to foreign expertise is usually obtained through appropriate referral services in those countries. The Egyptian referral services must therefore establish direct contacts and communication protocols with such major U.S. institutions as the National Referral Center of the Library of Congress, the Technical Assistance Information Clearinghouse, and Volunteers in Technical Assistance. By the same token, a number of international organizations — UNIDO, UNEP, World Data Center, to name a few — provide leads to experiential knowledge. An extensive directory of expert, development-related organizations exists (Gaul, 1979).

It is not superfluous to reiterate that the Egyptian information services must provide access to possibly the most important and direct information source — people, and that the referral function is the classical method of rendering this service; its effectiveness depends, however, largely on the communication channels that the referral services will keep open.

The referenced Unisist publication details additional administrative aspects to be observed by the referral service, including the logging in of information requests, handling of replies, record of inquiries handled, and the publicizing of referral services.

6. Publication

The availability of databases in machine readable form offers an attractive possibility for generating rapidly and relatively inexpensively a variety of current, printed outputs. For example, many international bibliographic database producers use the database to publish printed abstract journals. Historically, development of bibliographic databases in machine form was the result of attempts to automate the abstract publication process, so as to make it more economical; only later did the availability of the database lead to the development of online database search services. Currently the use of online search services is beginning to have a negative effect on

the economics of printed abstract journals; for example, one major database producer estimated that whereas in 1979 the printed abstract journal accounted for 78 percent of income, in 1980 -- one year later -- this proportion would drop to 66 percent (Williams, 1981). Undoubtedly the trend will continue, as industrialized country users having access to online search services are discontinuing subscriptions to the printed product, and as inflation drives the printed product costs upward.

In spite of this international trend, the national Egyptian STI system should undertake the production of printed outputs from its public databases. Serious consideration should be given to the national STI system becoming the publisher of a series of publications in two forms: a periodic "STI Awareness Bulletin," and ocassional monographs issued as "separates" of the series.

a) STI Awareness Bulletin

The primary purpose of the STI Awareness Bulletin is to alert the broadest strata of problem solvers to the existence of easily available information in Egypt. Its emphasis is thus on timeliness, wide subject coverage, and broad audience penetration -- rather than on permanency and appearance. The contents of the STI Awareness Bulletin should include the following: i) summaries ("abstracts") of Egyptian STI literature; ii) selected bibliographies generated by nonproprietary searches of foreign and domestic databases; and iii) news and other materialspertaining to services of the national STI system.

Section 1 in this chapter presented the philosophy for and design of the database of Egyptian publications. Figure 5 shows the main characteristics of a monthly Awareness Bulletin of Egyptian scientific and technical literature; it can be derived almost entirely automatically from such a database, following the process flow in Appendix B-5. A camera-ready master copy can be prepared from the machine-readable database by the use of word processing programs that will be a part of the software capabilities at each information service. A notable characteristic of this Bulletin, which can be issued cumulatively for all subject sections or separately (depending on the volume of material), is its bilingual nature which allows it to be read by Egyptians who do not have a command of the English language.

b) Monographs

The occasional monographic publications generated from computer files may include directories prepared by the referral service of the information service organizations (cf. Table 13) as well as formatted printouts from numeric databases that have broad appeal. The number of these publications will understandably be small, but they will provide for increased service and visibility of the national STI system. Since the information services will be operated by autonomous organizations, the national STI system may wish to subsidize in part their printing, so as to become a co-publisher.

FIGURE 5. EGYPTIAN STI AWARENESS BULLETIN

CONTENTS:	o SUMMARIES OF EGYPTIAN-PRODUCED STI o SELECTED REPRINTS, BIBLIOGRAPHIC AND NON-BIBLIOGRAPHIC SEARCHES o NEWS, ANNOUNCEMENTS, CONTRIBUTIONS FORM NATIONAL STI SYSTEM
COVERAGE:	EGYPTIAN STI SOURCES (ARABIC AND ENGLISH)
ABSTRACTING:	INDICATIVE SUMMARIES, IN THE LANGUAGE OF DOCUMENT
INDICES:	AUTHOR AND SUBJECT (THE LATTER ARABIC AND ENGLISH) GENERATED FROM INDEXING TERMS IN DATABASE
LANGUAGE:	BILINGUAL, USING THE LANGUAGE OF THE DOCUMENT (EXCEPT THAT ARABIC DOCUMENT TITLES TO BE ALSO TRANSLATED INTO ENGLISH)
ARRANGEMENT:	BY MAJOR SECTOR (PARALLELS EGYPTIAN INFORMATION SERVICE NODES), AND WITHIN SECTOR BY DISCIPLINE (USING A GENERAL CLASSIFICATION, SUCH AS THE BROAD SYSTEM OF ORDERING)
FREQUENCY:	MONTHLY
DISTRIBUTION:	2,000 COPIES, FOR INDIVIDUAL SUBSCRIPTION

c) Cost Estimate

Assuming (from Table 3, which showed the distribution of the costs for creating a bibliographic database) that the cost of producing printed output from a database is approximately one-third of the cost of producing the database (for large international abstract publishing services, slightly over $7 per abstract), and that the cost of printing and distribution in Egypt is half of that of the industrialized countries, we arrive at an Egyptian equivalent cost of $3.50 per abstract. An estimate of the total annual publishing cost, based on 3,000 abstracts, is $10,500.

Assuming 2,000 issues to be printed and distributed monthly, the average cost is $0.43 per monthly issue; this is within the range of lower-end costs for inexpensively produced announcement bulletins reported from industrialized countries (Rowley, 1978).

7. Information Technology

There is evidence that the decreasing rate of national productivity in industrialized countries is contributed to by the information sector -- specifically, because the falling productivity of the growing white collar bureaucracies surpasses the productivity increases of the blue collar manpower (Thurow, 1981). While the overall effect may not be the same in developing countries, productivity of the white collar sector in countries such as Egypt which have a nontrivial information sector is a cause for concern. Improvement of the productivity of the information sector is thus of global importance.

The single factor which will have the most profound impact on the problem solving sector and the information industry itself is information technology. Modern information management cannot be cost-effective without the use of information technology. Indeed, information technology is being regarded as the single factor which will change most the way in which decision makers and problem solvers operate (Martin, 1981). Until very recently, however, much of this modern technology has been unwittingly denied to problem solvers, not only in developing countries but in industrialized countries as well. The reason is simple: this technology could be used, more often than not, only when supported by highly trained, expensive professionals and specialists. This condition was the result of the novelty and complexity of the technology, the magnitude of the development effort necessary to make it usable, and the low compatibility of the hardware and software on the market. Between 1955 and 1980, the ratio of U.S. software-to-hardware costs rose from 15 percent to nearly 90 percent (Ewers, 1981); and the number of information systems personnel that would be needed in 1985 has been estimated at 4.2 percent of the total U.S. labor force (Lecht, 1978). In some sense, despite its promise, the information technology itself may have helped to accentuate the declining productivity of the white collar sector.

It is essential that the introduction of information technology into the Egyptian national STI system be conceived on a different basis (Madkour, 1980). The resources — manpower and finances — that have been required until now to exploit this technology are unavailable in Egypt. Fortunately, recent advances in this technology are changing the situation (El-Kholy, 1979). These positive developments relate to both hardware and software, and their combined effort now renders the technology usable and attainable economically by Egypt.

Advances in the hardware technology are due to the introduction of large scale integration into the design of logical circuitries of the computer. Due to microelectronics, larger and larger computational capacities are becoming available in ever smaller physical size, at constantly decreasing costs, and with increasing reliability. Computer performance is increasing (or computer price is decreasing) by 28 percent a year; telecommunication cost decreasing by 11 percent a year (Branscomb, 1979). Some 100 computer manufacturers offer about 300 makes of business computer systems at prices ranging from $100,000 to a few thousand dollars; the average price of a small system with one work station was $18,000 in 1980; of small multistation systems, $43,000 (Datamation, 1980). The distinction between "personal" computers (costing between $1,000 and $5,000) and small business systems has begun to erode as major manufacturers have entered, in 1981, the mass market with systems priced in that range. A computer is becoming a personal machine, and extension of its capacity is being made possible by distributed computing which provides access to shared resources, when needed, via telecommunications.

The parallel developments in software are no less significant. The major change in data processing management relevant to Egypt is the use of information technology without programmers. The use of computers by the non-programmer and layman has been made possible because now the interface between man and the machine is a small set of simple instructions (commands) whose "menu" is often displayed by the machine itself. The emergence of user-operated systems is creating new types of software, new computer languages, and new systems analysis techniques. The concept of the database has emerged as a fundamental cornerstone of the software technology of the 1980's. Distributed computer networks allow databases to be generated from or at different geographical points via "word processing" terminals operated by clerical personnel.

These dramatic advances in the ease of application of information technology must be exploited by the national STI system of Egypt.

a) Functional Specifications

It is intended that the functions assigned to each information service site will be supported by information processing technology having the following capabilities:

i. Online generation of bilingual databases (bibliographic, full text, and numeric);

ii) Inhouse online searching of local databases using, at the searcher's option, either Arabic or English search commands;

iii) Remote online searching, from user terminals, of Egyptian databases stored at any service site, in Arabic and English, using a domestic public data network;

iv) Online searching, by English commands only, of foreign databases, using public data networks;

v) Online editing and formatting of camera-ready printouts, Arabic and English, of selected portions of database contents;

vi) Forwarding and storing of Arabic and English messages between any two service sites of the national STI system, and between the sites and remote users, initially using TELEX, later a domestic data network;

vii) Support of administrative functions at each site: files maintenance, billing, training, and hardware/software maintenance.

To support these applications, the national STI system service nodes will operate a "ring computer network" communicating via circuit switched communication channels; the latter will also connect individual remote terminal users to any of the system sites. The network is illustrated in Figure 6. Although adequate telecommunication channels are not yet available in Egypt, their eventual implementation is certain; therefore, the computer system to be installed at each information service site should now provide for asynchronous communication, in serial transmission mode. These facilities should also allow each site to access directly an international packet switching network, when available in Egypt.

Meanwhile, each service site should be provided with a narrow band communications facility (TELEX), allowing it to communicate with others, and to forward requests for foreign database searching.

b) Software

The key requirements for the software of the Egyptian national STI system are that i) when delivered and installed, it will constitute a complete, finished product requiring no additional effort on the part of either systems or applications programmers in Egypt; ii) the software must be operable by the professional and clerical staffs of the information service sites, after appropriate training; and iii) the software must have certain bilingual capabilities. In residence at each site as a member of the staff will be one person acting as computer operator and software instructor; these staff

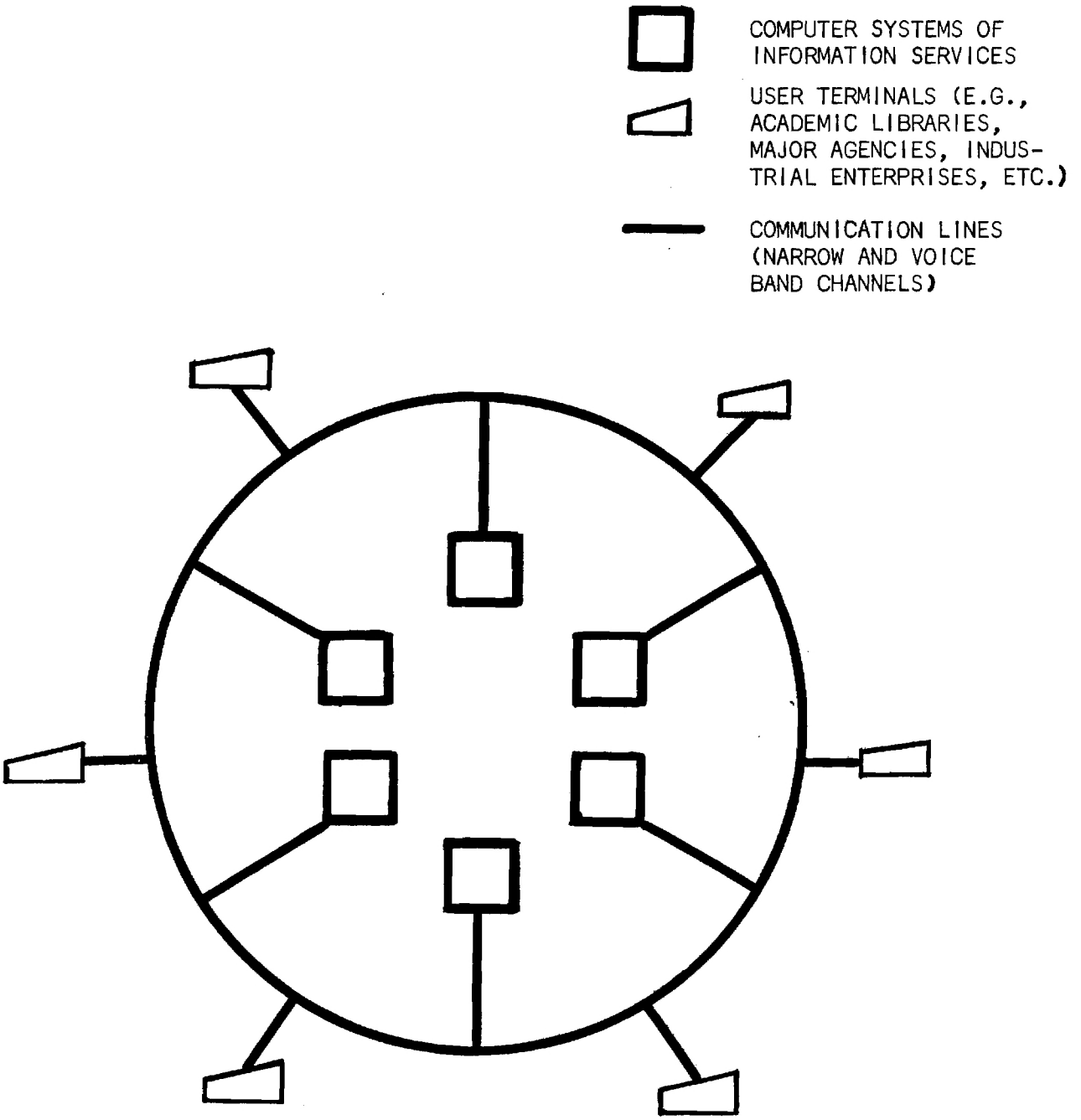


FIGURE 6. THE EGYPTIAN NATIONAL STI SYSTEM AS A "RING" NETWORK

members are to receive in-depth training in the use of hardware and software, but their function should not involve program development.

These requirements have the following implications as regards software. The operating system must be transportable to equipment of more than one manufacturer, so that the standard software of the national STI system can be used even if in the future new information service sites choose a different make of hardware (because future hardware is likely to be even more cost-effective). The operating system should be able to differentiate among different categories of users, and allow them access to only those software facilities that are necessary to perform their respective functions. In this manner, the computer system will achieve a degree of security, as well as facilitate the training of users. The user categories to be so differentiated are: the systems and database manager; database searcher staff; remote database searchers (outside users); data entry staff; secretarial staff; publication preparation staff; and administrative staff using internal databases.

The database software should be able to support the development, maintenance and searching of both reference and source databases, and use a single high-level command language. The desideratum of simplicity and ease of use (Barnhardt, 1980) points strongly in the direction of the relational database model (Codd, 1970). Although most relational database software has been written for source databases (with few exceptions, such as the Canadian MINISIS system which is, however, restricted to a single vendor's hardware), its advantages for bibliographic data storage and retrieval are being recognized (Crawford, 1981), as is the desirability of extending it to support both types of databases (Rabinski, 1981).

Certain software facilities should be bilingual, so as to allow the handling of Arabic-language data in Arabic, and more importantly, allow monolingual users to access and search databases, regardless of the language of the data. Automatic or semiautomatic translation from English to Arabic is approaching operational status but its cost is high; more importantly, the proposed functions of the information services in the first five years do not require such capability. Rather, what is desirable is that certain functions of the information services can be performed in their original language, and that the staff can create, and the users interrogate, mixed Arabic/English databases using, at the their option, Arabic or English commands. To implement this capability, the software requires two facilities: a bilingual thesaurus (for indexing and searching of bilingual databases); and Arabic equivalents of the English commands.

Table 14 summarizes the desirable bilingual functions. Appendix B-2 shows the steps required to generate an English/Arabic thesaurus. The set of Arabic commands should be created by translating English commands, probably entailing some changes to the source code. Arabic-language input/output requires appropriate peripherals — terminals and printers.

Given these software specifications, it is unlikely that an adequate, off-the-shelf software complex (operating and database systems) can be lo-

TABLE 14. ARABIC LANGUAGE FUNCTIONS OF COMPUTER SYSTEM

FUNCTION	ENGLISH	ARABIC
A. DATABASE/FILE CONTENTS		
NAMES OF RELATIONS, ATTRIBUTES	✓	✓
BIBLIOGRAPHIC FILE (ATTRIBUTE VALUES)	✓	✓
BILINGUAL THESAURUS	✓	✓
ENGLISH KEYWORK DICTIONARY	✓	
ARABIC KEYWORD DICTIONARY		✓
USER DIRECTORY	✓	
SEARCH REQUEST FILE	✓	
DOCUMENT ORDER FILE	✓	
ACCOUNTING FILE	✓	
NAMES OF MACROS (SHELL PROGRAM NAMES)	✓	✓
B. DATABASE/FILE OPERATIONS		
DATABASE CREATION, MAINTENANCE COMMANDS	✓	✓
DATABASE QUERY COMMANDS	✓	✓
TEXT PROCESSING COMMANDS	✓	
OUTPUT FORMATTING COMMANDS	✓	
O/S COMMANDS	✓	

cated; rather, a nontrivial software development effort will be required to render suitable programs compatible, and to arabize them. The software development should be a joint Egyptian/U.S. effort, and a period of nine calendar months should be allowed for a four-person team to implement it. (It should be noted that although a considerably more modest, monolingual software could be implemented in Egypt with little additional development, the proposed effort is highly desirable. The proposed system, which will be tailored to the current and foreseeable future information processing requirements of a national STI system, will support the vernacular language of its users, and will be completely user operable, shall constitute a leading edge of computer applications. The cost of this software development, estimated at about $250,000, is relatively modest when compared with the investment necessary to build a new bibliographic database system.

c) Hardware

The primary requirement of the computer hardware to be selected is that it support reliably and efficiently the chosen software system. The equipment should obviously employ the latest technology and architecture.

The size and configuration of the computer facility for each information service site is a function of its information processing and data storage requirements. These are considered first, followed in turn by general hardware specifications.

i) Processing requirements. The number of geographic sites is the same as the number of information service nodes — possibly six in the initial three years. The total number of users seeking online access to the databases of the national STI system will initially be comprised of only those having access to terminals that are hardwired to the computers (on account of the unavailability of public data networks); these are staff members of the information services, plus possibly users of one or two other cable-connected terminals at each site (up to a distance of 50 meters). When a public data network becomes available in Egypt, the number of organizations having online remote access to Egyptian databases via telecommunications is not likely to exceed, initially, 10 per service site. This is based on the premise that each service site will first cater to large organizations in its subject domain (e.g., research institutes, large enterprises, administrative agencies), and that each of these organizational users will obtain acess to the database network from remote terminals operated by its personnel.

The service staff members using the computer system at each site will initialy number about ten. They fall into three groups: inquiry/response users (database searchers, publications composers), data entry users (for database development), and administrative users (maintaining and querying administrative files, billing, training, and computer system maintenance). Virtually all of these functions are interactive, not batch (with the possible exception of billing). Assuming that each site will perform all the functions suggested for the information services, and assuming that the site

staffing will be that shown in Table 1, Table 15 shows the initial numbers of users in each category, and the number of users to be supported simultaneously (since with the exception of the data entry function access to the system will be intermittent).

The desirable response times for each category of user are as follows: inquiry/response, 2-20 seconds (depending on complexity of search); data entry, less than 2 seconds; administrative, less than 5 seconds (except database updating and batch operations).

ii) Storage requirements. The approximate sizes of the databases that are likely to be maintained in the first three years at each site are estimated in Table 16. These estimates are derived, in part, from Appendices C-2 through C-12, which list the principal record elements of each database, and by making assumptions regarding the record size and the number of records of each database.

iii) Hardware Requirements and Configuration. The information processing and storage requirements identified above imply the following hardware system size.

As regards peripherals, a minimum of five monochromatic terminals per information service site is required. Since some of the databases will be bilingual, all terminals should have capability to generate Arabic and English characters. A single dual speed (50-200 cps), multifont printer is adequate to support the output at each service site for 3-5 years. One of the terminals will require a Telex conversion box to send, receive, and store all Western Union message formats, including Telex, TWX, Mailgram, cable and telegram, within Egypt and abroad. A diskette drive or magnetic tape drive is desirable as back-up storage, and as data-exchange media.

As regards mass storage, the calculations above show that the applications at one site are likely to require, in three years, 40 million bytes of disk storage (the bottom capacity of fast access disks). Since the price differential between a 40 Mb disk and an 80 Mb is small, it is recommended to double the theoretical storage capacity and purchase an 80 Mb disk for each site.

As regards the central processing unit, it is theoretically possible to estimate the processing times for each usage type expected at each information service site, given five simultaneous users and the database size estimated above; it is more difficult to say, however, how realistic such estimates are. On the other hand, ample operational experience with small to medium size databases suggests that a 0.5 Mbyte central processing unit (CPU) will support 6-10 simultaneous dumb terminals on current 16- and 32-bit machines. Allowing for the facts that bibliographic database searching is demanding on the CPU, that for some operations the relational database software is slower than other database software, and that central memory is relatively inexpensive, it is suggested to procure a CPU of 1.0 Mbyte. Depending, among other things, on the internal cycle speed of the hardware, 1.0 Mbyte CPU should support 16-32 simultaneous users. Sixteen

TABLE 15. ESTIMATED TOTAL AND SIMULTANEOUS USERS OF COMPUTER SYSTEM AT A SERVICE SITE

TYPE OF USER	NUMBER OF USERS	
	TOTAL	SIMULTANEOUS
INQUIRY/RESPONSE	3	2
DATA ENTRY	2	1
ADMINISTRATIVE	3	2

TABLE 16. ESTIMATE OF REQUIRED DIGITAL STORAGE CAPACITY PER SERVICE NODE

FILE	SIZE OF RECORD (BYTES)	NO. OF RECORDS	5-YEAR VOLUME (BYTES)
USER DIRECTORY	150	500	375,000
SEARCH ORDERS	200	2,600	2,600,000
DOCUMENT ORDERS	75	2,600	975,000
BIBLIOGRAPHIC DATABASE	1,500	3,600	27,000,000
BILINGUAL THESAURUS	100	10,000	1,000,000
ENGLISH KEYWORD DICTIONARY	15	10,000	150,000
ARABIC KEYWORD DICTIONARY	15	10,000	150,000
OTHER REFERENCE DATABASES	1,000	5,000	5,000,000
UNION CATALOG	300	2,000	600,000
TOTAL			37,850,000

asynchronous ports should be provided for each initial system configuration at all service sites.

iv) Maintenance. The preferable way to initially maintain the systems at each service site is by contracting with a single hardware representative in Egypt. In parallel the national STI system should employ and train two Egyptian computer maintenance engineers to service all systems, and provide for them an adequate supply of spare parts. One may expect the electromechanical devices such as printers and disks to require more maintenance than the processors themselves; the latter are typically contained on one or more boards that are exchangeable once the malfunction has been diagnosed, usually with the assistance of diagnostic programs provided by the manufacturer.

d) Estimated costs

The configuration of the computer facility recommended for each information service node is shown in Figure 7.

Given the technology and U.S. prices of 1981, the configuration described above (1 Mbyte CPU, 16 ports, 80 Mbyte disk, 5 graphics terminals, a diskette or magnetic tape drive, 1 dual-speed multifont printer, and 1 Chat Automated Telex) is in the vicinity of $100,000. One-time software license costs are likely to be in the range of $5-10 thousand per site. Operating costs will include maintenance (typically, two percent of the purchase cost), computer supplies such as disk packs, ribbons, paper, etc. ($3,000 per site per year), and line communications costs (Western Union telex rates).

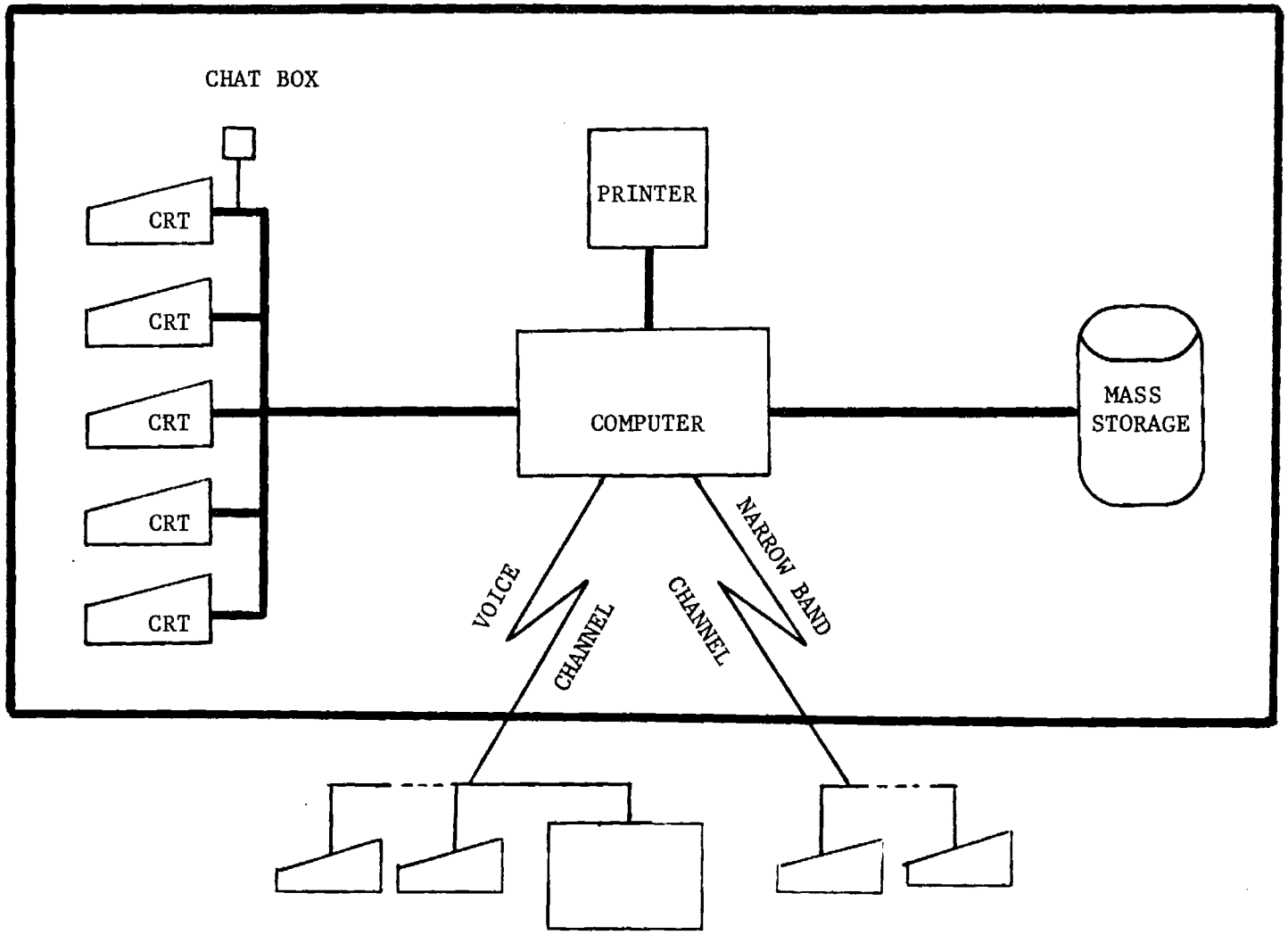


FIGURE 7. INFORMATION SERVICE NODE COMPUTER SYSTEM.

CHAPTER IV. STRENGTHENING EGYPT'S INFORMATION RESOURCES

Chapter II outlined briefly the necessity for and the role of the document repository subsystem of the Egyptian national STI system. This chapter offers technical details and design.

1. Local Document Availability

One may approach the question of adequacy of national document availability in Egypt in the following manner. In 1980, there were roughly 62,000 journal titles published globally, up from 19,000 in 1960; 20,000 titles (McEwan, 1981; Bourne, 1962)). Bradford's Law (Bradford, 1946) suggests that in order to have local access to 90 percent of the significant literature in a given scientific field one would have to subscribe, in 1980, to 500-1,000 different titles in that field. Garfield's Law (Garfield, 1971), which postulates that the core of highly cited literature in all science is only moderately larger than the literature core of a single discipline, is partially borne out by the experience of the British Lending Library: in its collection of over 45,000 titles, 80 percent of requests are met by 5,000 titles, and two-thirds of the collection are never requested (Line, 1981). Figures such as these offer some support for the position that "the important literature of science is encompassed by less than 1,000 titles, and that secondary information services (abstracts and indexes) need to cover only about 3,000 titles" (Garfield, 1972; Garfield, 1976).

Recently developed "core" lists of books, abstracting and indexing (A&I services), and journals for biomedicine, agriculture, science, and engineering (King Research, 1980a) contain 3,057 books, 245 A&I titles, and 2,500 serial titles. In terms of cost, serials comprise the largest percentage (64 percent) of the 1980 costs of this core collection, the remainder being for books (22 percent) and A&I services (14 percent). These core lists were used to check the holdings of major Egyptian academic and special libraries (Zehery, 1981). The results, shown in Table 17, document the unevenness of coverage in terms of both the type of materials and the discipline.

At 1980 prices (McDonald, 1981), making up the difference between the titles of the core lists and those actually held by the Egyptian libraries, as shown in Table 17, would cost approximately $120,000 for the first year, of which $75,000 would be the recurrent annual costs of A/I and serials subscription. In very rough figures, providing ten-year A/I and serial subscriptions (five-year backfile, five years future subscription) and allowing a total of $125,000 for the purchase of books over the next five years, the required investment is about $820,000 ($1 million when allowing for 20 percent inflation).

The financial considerations of local document repositories versus document delivery requests are as follows. Assume that to import a copy of a

TABLE 17. LARGEST "CORE" LIST PERCENTAGES OF STI MATERIALS HELD BY AN EGYPTIAN LIBRARY

TYPE OF MATERIALS	DISCIPLINE	PERCENT HELD	INSTITUTION
BOOKS	BIOMEDICINE	76	FACULTY OF MEDICINE, MANSOURA UNIVERSITY
	AGRICULTURE	33	FACULTY OF AGRICULTURE, ASSYUT UNIVERSITY
	SCIENCE/ENGINEERING	40	FACULTY OF SCIENCE, CAIRO UNIVERSITY
A&I SERVICES	BIOMEDICINE	54	FACULTY OF MEDICINE, ALEXANDRIA AND MANSOURA UNIVERSITIES
	AGRICULTURE	84	NIDOC
	SCIENCE/ENGINEERING	69	FACULTY OF SCIENCE, CAIRO UNIVERSITY
JOURNALS	BIOMEDICINE	55	FACULTY OF MEDICINE, MANSOURA UNIVERSITY
	AGRICULTURE	28	FACULTY OF AGRICULTURE, ASSYUT AND TANTA UNIVERSITIES
	SCIENCE/ENGINEERING	87	FACULTY OF ENGINEERING, MONOFEYA UNIVERSITY

SOURCE: MCDONALD, 1981

journal article from abroad costs ten dollars and that the average annual subscription of serials runs from a low of $52 for agriculture to a high of $131 for science and engineering (Table 18). Then, if the number of requests for article copies from a particular journal is higher than five for agriculture, six for medicine, and thirteen for science and engineering, it is more economical to subscribe to that journal than to procure the single copies through a document delivery service -- regardless of other reasons why it is important to have documents available locally. At the national level, if each of the postulated 2,500 annual database searches generates a request for five documents that are unavailable in Egypt, the cost of the document delivery service will be $125,000 per year. This is more than the annual cost calculated above for completing the core lists of holdings by Egyptian libraries.

Having all the core list titles available in Egypt does not, of course, completely obviate the need for foreign document delivery (nor does it mean that local document delivery is free of cost). However, if there is a high correlation between the titles held in Egypt and those requested by users, the demand for foreign document delivery could be reduced by, say, two-thirds. Assuming then that Egyptian libraries continue subscribing and paying for materials already in their possession, an additional annual investment of about $140,000 should satisfy over 90 percent of document delivery requests (two-thirds of which would be met rapidly from local resources), and it would guarantee Egypt to possess a minimal adequate collection of scientific and technical documents comprising the highest quality scientific and technical information. Having such a collection within its borders is of considerable strategic importance to Egypt.

a) Selection of Repository Libraries

The economic importance of configuring the repository subsystem from existing libraries is thus clear. Unless the national STI system can rely on the collaboration of major academic and special libraries it would have to spend 2.5 times more funds on duplicating their existing holdings. The cost to the STI project would be $2.5 million instead of $1 million. Since this is clearly not affordable, other alternatives -- all suboptimal -- would have to be sought, such as procuring only a fraction of the resources and managing it centrally, or simply supporting only a foreign document delivery service. Everything else being equal, the last option would be the most economical alternative.

The rationale for recommending that the document repository subsystem of the national STI system be comprised of selected Egyptian academic and special libraries is thus inescapable: unless Egyptian libraries agree to share their resources, Egypt cannot extricate herself from the quagmire of information insufficiency. The question is not whether any single library can become comprehensive, for it cannot; the question is whether the sum of Egyptian libraries can provide a minimally adequate national resource of STI. This they can do only through resource sharing, and through partial, volun-

TABLE 18. "CORE" LISTS: AVERAGE SUBSCRIPTION COST (1980)

MATERIALS	COST ($)			
	MEDICINE	AGRICULTURE	SCI/TECH	ENGINEERING
BOOKS	32.49	19.75	30.89	36.35
A/I SERVICES	168.48	269.21	307.57	208.44
SERIALS	64.72	51.91	131.55	131.55

SOURCE: MCDONALD, 1981

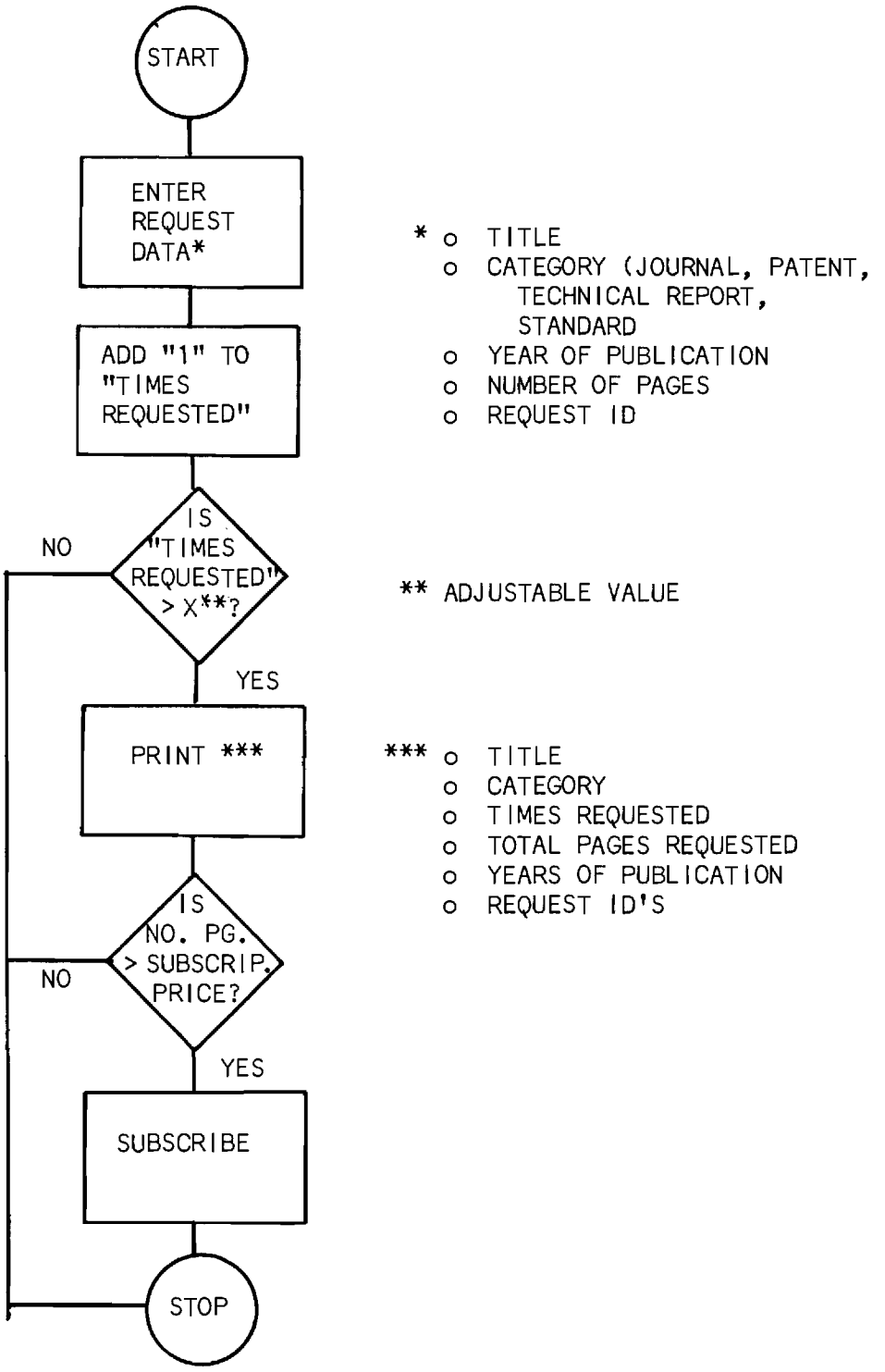


FIGURE 8. SUBSCRIPTION DECISION ALGORITHM

tary coordination of their acquisitions. It is essential that academic and special libraries of Egypt grasp the significance of national considerations over those of individual libraries.

The selection of document repository libraries for the national STI system is thus a critical undertaking, and it should be carried out judiciously but with dispatch. As a minimum, responsibility should be allocated for the following bodies of materials: biomedical literature; agricultural literature; literature of physical sciences and engineering; social science literature; technical reports; industry and trade literature; patents; and standards and norms. The selected repository libraries will become de facto national Egyptian resource centers for materials in their subject domains, and their collections will be supplemented through the acquisition program of the national STI system. Other libraries having substantial collections (particularly libraries of foreign agencies (such as NAMRU and the American University) should definitely be invited to joint the document delivery subsystem.

In return for the libraries' participation as Egyptian document delivery agencies, the national STI system will reciprocate by offering them several incentives. These are: i) development of a union list of STI journal holdings of the repository subsystem; ii) supplementation of their holdings by selective acquisitions, iii) selected staff training; iv) provision of reprographic equipment for document delivery service, and personnel training in its use; and v) early access to the information services of the national STI system.

The first three functions are described in more detail.

b) Union List of STI Holdings

The 1980 survey of 29 Egyptian libraries conducted under the auspices of the STI project has identified Egyptian holdings of items in the "core lists" discussed above. Although these are not the total STI holdings in Egypt, it is essential that the data be compiled into a machine-form union catalog, reproduced, and distributed. The ASRT microcomputer system is quite adequate to generate this temporary tool.

The minimal elements of the database design should include: title, library holding the title, years available, subject field and ISSN Code (ISO, 1975); the latter two to be added to the survey data. As the core lists are arranged by BLLD rank, it will be useful to alphabetize them by title. This can be accomplished by "dumping" the file, sorting it, adding sequential numbers, and reinserting it into the database. Once so conditioned, indexes to the file can be produced and printed. Such printouts may list: titles by library; titles by discipline; and holding gaps by library and title. The cumulative union list should be printed in 200 copies, and distributed or sold.

At 5 minutes per title entry, the data entry effort is estimated at 6 manweeks.

2. Supplementation of Holdings

The ability to correlate a national acquisition policy for STI with document delivery service boils down to finding near-optimal fit between local information resources and the expected needs for documents by users of the national STI system. Although the core lists are based on a plausible rationale and empirical evidence, they are not guaranteed to reflect exactly the Egyptian user's requirements; therefore, a selection algorithm needs to be devised.

a) Selection

In order to improve the probability of supplementing Egyptian libraries with the materials most relevant to Egyptian needs, the following rules are recommended: if the document request is for a serial title that appears in the core list, the title should be subscribed to (unless already available in Egypt); if the title does not appear on the list, the decision algorithm shown in Figure 8 is applied. This algorithm calculates the cost of the document delivery vs the subscription cost, and when a certain (adjustable) ratio is attained, the title is selected for subscription. The selection and acquisition process is shown in Appendix B-6.

The decision algorithm can be applied to materials other than serials provided they are grouped into subject classes. The latter applies particularly to technical reports (issued by NTIS in over 500 subject categories), and patents (the class/subclass categories of the U.S. or international patent classification). Thus, since procurement of the entire NTIS file is exorbitantly expensive, the proposed acquisition rule can point out the more demanded subject categories for eventual subscription in microfiche.

The allocation to repository libraries of serials and other materials acquired will be on the basis of the document's subject discipline. The discipline is apparent from the inclusion of the title in a particular core list, or else will be determined on an ad hoc basis. A running record of "assignments" of acquired materials shall be kept and analyzed periodically, so as to assure a reasonably equitable distribution of materials among the cooperating libraries.

b) Technical Services

Performing the STI acquisition function in a cost-effective manner gives the national STI system an opportunity to provide an exemplary showcase of modern techniques of managing library resource. The acquisition function must be carried out centrally, so as to retain control over the purchasing, billing, and allocation of materials. For this purpose the national STI system should establish an "acquisitions bureau," and either operate it from the project headquarters or, preferably, contract its operation to one of the re-

pository libraries.

The acquisitions bureau will perform the following functions:

i) selecting, for subscription titles indicated by the application of the rules described above;

ii) placing subscriptions and other purchase orders through a reliable, experienced jobber;

iii) receiving and processing all deliveries of materials so ordered (serials check-in, provision of catalog cards, etc.);

iv) promptly forwarding processed materials to designated libraries;

v) maintaining necessary files;

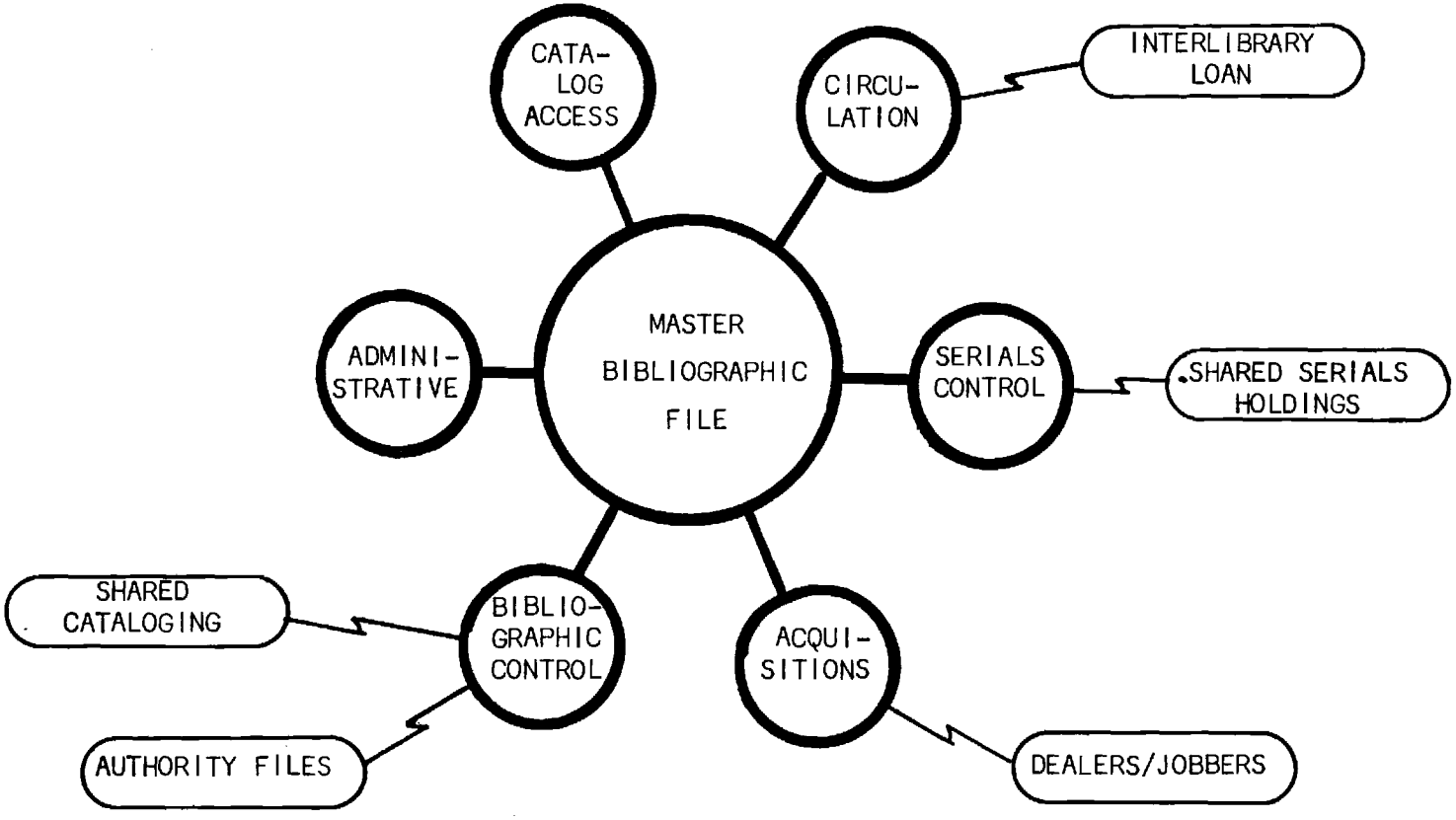
vi) submitting invoices for approval and payment to the appropriate authority (Egyptian or U.S. project director); and

vii) periodically, producing specified administrative reports.

The acquisitions bureau will acquire an off-the-shelf computer-based facility having the necessary capabilities. The system recommended for this function is the Integrated Library System (ILS), a microcomputer-based hardware/software package being developed under the auspices of the National Library of Medicine (NLM, 1981).

ILS is designed as a modular, general purpose, transportable library system, featuring the philosophy of one master bibliographic file supporting all library functions (acquisitions, cataloging, circulation, etc.). The system is implemented on small hardware but does not preclude its being scaled up to larger systems in large libraries. The goal has been to make it easily maintainable and transportable, thus being compatible with the criteria for application of information technology described in the previous chapter.

ILS Version 1.0 (Figure 9) performs the following functions: i) bibliographic control, which maintains integrated bibliographic file and links to shared cataloging and authority files; ii) catalog access, which provides an online catalog for patrons and staff; iii) circulation, which supports circulation processing and overall collection control; iv) serials control, which maintains serial holdings and supports processing of serial issues; v) acquisitions, which processes order data and produces preliminary bibliographic records; and vi) administrative services, which provide summary reports on library activities, and features that allow the library to control system processing. These subsystems are able to interact with related bibliographic activities and organizations outside the local ILS library, such as interlibrary loan, shared serials holdings, shared cataloging, and dealer/jobber files.



SOURCE: NLM, 1981

FIGURE 9. THE INTEGRATED LIBRARY SYSTEM SOFTWARE.

Not all of the above functions need to be performed by the acquisitions bureau, of course. However, the capability of creating a master bibliographic file (which supports a MARC-like format, and allows it to be searched through indexes constructed for online searching) is a useful tool for maintaining the bibliographic records of the acquisitions bureau. As regards cataloging, ILS supports both the method of loading records from a shared cataloging utility and local catalog record creation (a future module will support multiple character sets). The catalog can be searched online by library staff and library patrons, via author, title, subject, conference and corporate name, call number, and identification number; explicit boolean searches are to be implemented shortly. The circulation module, although not of immediate interest to the acquisitons bureau, has a capability of maintaining patron files.

The immediately most useful module to the acquisitions bureau is the serials check-in, which records the receipt of individual serial issues and prepares them for filing and/or circulation. Detailed holdings are maintained in the serial title record showing every volume and issue that has been checked into the system. For issues checked in ILS generates labels and routing slips.

The administrative module provides features which allow the administrator to set up and operate ILS without inhouse data processing staff. The automated reports module features a number of predefined summary reports, database activity reports showing total bibliographic records, a master patron list, etc. An online user manual is available on the ILS.

It is recommended that ILS be purchased to run on the smallest hardware system available (64 Kbyte CPU, 40 Mb of disk storage, 2 monochromatic terminals, and a slow speed printer). The hardware purchase cost is approximately $35,000; software licenses for ILS and its associated operating system are about $10,000 (one time cost). Annual hardware and software maintenance and supply costs are estimated at $6,000.

The acquisitions bureau can be operated by a staff of two professionals and one clerk. One of the professionals should have some experience with computing equipment, and should undergo a two-three week training in the architecture and use of ILS.

While the purchase and operating costs of ILS may be above needs of the acquisitions bureau, an important secondary objective is to bring into Egypt a model library management system that can be demonstrated and used experimentally by the repository libraries of the national STI system. The master bibliographic file and networking capabilities of ILS should go a long way toward providing the necessary technical facilities for inducing a degree of collaboration and resource sharing among these libraries. One of the important purposes of the acquisitions bureau will therefore be the ability to demonstrate these functions to library executives, to assist them in exploring the potential of this technology for the management of their libraries, and to provide a training site for staff members of libraries wishing to ex-

plore this technology. The long term impact of the acquisitions bureau of the national STI system can be most significant.

c) Other Equipment

It is reasonable to expect that the repository libraries of the national STI system will need new equipment allowing them to provide document delivery service. This equipment consists of a xerographic printer, and a microfiche reader/printer. The equipment would possibly be given to the resource libraries on loan, and may have to be maintained under a central contract by the national STI system. Operator training will also have to be provided centrally, as part of the development of procedures for document delivery request and supply. Operating costs (staff time and reprographic supplies) should be part of the document delivery charge.

As an additional incentive later on, the national STI system may consider placing in each library a computer terminal allowing that library access to the information services of the system. Such a gesture should be made in conjunction with the marketing efforts by information service sites.

d) Estimated costs

The overall Egyptian costs of the program to supplement the STI resources include the following elements: cost of information materials, $1 million; purchase cost of ILS facilities, $50,000; operating and staff costs of the acquisitions bureau, $20,000 per year (half for salaries); foreign document delivery, $100,000 per year (gradually decreasing as more information resources become available in Egypt); and $50,000 for the cost of six microfiche reader/printers and six xerox machines. Additional costs should be anticipated in connection with staff training and consulting assistance.

CHAPTER V. GOVERNANCE OF THE NATIONAL STI SYSTEM

The choice of the structure of a national STI system is a function of the system's goals. Some goals, such as the diffusion of information functions and information technology into the problem solving strata of the nation, cannot be optimally served by a structure in which these functions are physically performed at one central site. The proposed structure of the national STI system of Egypt therefore conforms to a distributed system model.

Whereas in a centralized structure the question of governance is often academic (since the central agency is also the governing agency), in a decentralized structure governance becomes a key issue. There are several reasons for this (Kent, 1979): any structure that brings together diverse organizations invariably involves a partial loss of their autonomy (or flexibility, or both). In turn, loss of autonomy or flexibility is an impetus for participation in governance, partly because the system functions may require organizations to modify their legal mandates (for example, allowing them to serve patrons other than their own employees).

Governance has been defined as "the set of processes through which an organization confirms its goals, establishes policy, selects its leaders, and insures the necessary resources to carry out its purposes" (Mathews, 1979). Governance requires "mechanisms for identifying goals and objectives . . . ; for the establishment of policies . . . ; and for the resolution of conflict" (Montgomery, 1979). The purpose of the governing body may be said to be "the exercise of authority to set policy and objectives that serve the needs . . . of the constituency, and to direct management to attain these objectives" (Avram, 1979).

At this time there is no single preferred model for the governance of a national STI system. The Unesco General Information Programme favors governance through a "national focal point" (Unesco, 1973). Beyond this, "the choice must depend almost entirely on national circumstances . . . . The most important need is for the machinery to work well and to command respect among ministers and senior administrators" (Gray, 1978). Among the countries that have described their proposed approaches to governance are China (Tell, 1980); France (Chambaud, 1980); Federal Republic of Germany (Lohner, 1980); Great Britain (Gray, 1979); India (Seal, 1980); Japan (Japan, 1981); Mexico (CONICIT, 1978), Pakistan (IDRC/UNDP, 1978), Saudi Arabia (Burchinal, 1981), Sweden (Swedish Government Commissions, 1978), USSR (Losev, 1980); and the U.S. (Carter, 1967; Ackoff, 1976; Gapen, 1981).

In principle, governance of a national STI system may be exercised by one of three mechanisms: the government, a quasi-governmental body, or a private body (Stevens, 1977). A government-governed mechanism is appropriate, if not mandatory, in states where private enterprise is, for all practical purposes, nonexistent; this is not the case in Egypt, of course. In other countries, including Egypt, which are prepared to support a vigorous

growth of a national (rather than solely governmental) information sector, a more attractive form of governance of a national STI system is one which includes governmental participation but allows greater freedom (and, usually, greater efficiency) of operation. This quasi-governmental, legislative form of public governance is typified by the "public corporation, such as the Communications Satellite Corporation (COMSAT) or the Public Broadcasting Corporation of the United States.

The third, "private" type of governance of the STI system is one exercised by the membership itself, under a legal charter and by-laws. In this form of governance, relationship to the national and local governments is more ancillary. While attractive to the highly dynamic private sectors of some countries, this form of governance may be premature in Egypt, for several reasons: some government-agency members of the national STI system might be precluded by law from participating in and supporting such a private consortium; most member organizations of the system are probably not prepared to fully subsidize the functions of the consortium (or their own); and a private consortium is less likely to generate consistent and adequate financial subsidy for its operations.

1. Council for Information Resources and Services

The method of governance of the Egyptian national STI system is indicated strongly by the system's structure and constituency. Since all its subsystems are composed of autonomous organizations belonging to the government, the public sector and the private sector, the form of governance must clearly be participatory rather than authoritarian, and be one that is hospitable legally and acceptable psychologically to all three groups of organizations. A public, rather than the governmental or private, form of governance is thus indicated.

A near equivalent of the "public corporation" concept in Egypt are the National Councils, such as the Science Council. The Councils are non-governmental, established by legislation, and able to accept tax monies; they have a well-focused mandate; and they command national prestige and importance. Using them as an approximate model, it is recommended that a "Council on Information Services and Resources" be established in Egypt at the earliest possible time and that it be given the legislative mandate and resources to guide the development of the Egyptian national STI system.

Figure 10 shows the characteristics of the proposed Council.

a) Functions

The Council is seen as a policy, planning, coordinating, and funding agent, not involved in operating information resources or services. Its primary objective is to assure that the national STI system performs its role adequately, and that it meets its objectives; accordingly, it constitutes a

FIGURE 10. COUNCIL ON INFORMATION SERVICES AND RESOURCES

ESTABLISHMENT:	- PRESIDENTIAL OR PARLIAMENTARY LEGISLATION
PURPOSE:	- PLAN FUTURE DEVELOPMENT OF SYSTEM - STUDY INFORMATION NEEDS - ASSIST DEVELOPMENT OF NEW SERVICES - FACILITATE DEVELOPMENT/IMPLEMENTATION OF COMMON POLICIES AND FUNCTIONS - COORDINATE NETWORK SERVICES - ALLOCATE FISCAL RESOURCES
FUNDING:	- BY GOVERNMENT AND MINISTRIES
FORMS OF BUSINESS:	- CONTRACT WITH AUTONOMOUS ORGANIZATIONS FOR INFORMATION SERVICES, TECHNICAL CONSULTING, DOCUMENT DELIVERY, TELECOMMUNICATIONS, ETC.
BOARD OF DIRECTORS:	- APPOINTED BY PRESIDENT - NO CONFLICT OF INTEREST
ADVANTAGES:	- PUBLIC RESPONSIBILITY - VISIBILITY/ACCOUNTABILITY - STABILITY - REGULAR FINANCIAL BASE - DECISION-ORIENTED - INCENTIVE VIA FUNDING SUPPORT - SMOOTHER TRANSITION TO DOMESTIC FUNDING

planning and coordinating platform. It assures, furthermore, performance of functions that exceed the responsibility or capability of any one member of the STI system -- functions such as policy formulation, user education, and manpower training.

The Council is to be responsible for the following specific functions:

i) Continuous monitoring and revision of national information requirements. By regularly monitoring and studying the national socioeconomic plans, executive decisions, and develoment trends of the public and private sectors, the Council shall correlate the provision of information services with changing national information requirements.

ii) Continuous monitoring and optimization of the performance of the national STI system. The Council shall examine the level and equity of information services to different user constituencies in Egypt's socioeconomic development activities, and recommend and take appropriate steps such as expanding the existing number of services, expanding their coverage, arranging for supplementary or advanced personnel training, transferring responsibility for information service from an ineffective member of the system to an existing or new node, revising the principles and rules for building Egypt's STI resources, etc. The Council shall study and recommend appropriate applications of new technology in the national STI system. It shall use administrative reports (Appendix D) of the national STI system nodes to monitor the level, quality, availability, penetration, and cost of information services, including document delivery, and recommend steps to increase the utilization of information by Egyptian problem-solvers.

iii) Contracting for information services. The Council shall have the power to enter into bilateral contracts with autonomous Egyptian and foreign agencies and organizations for performance of specific information services, document delivery, education and training, and such research and studies as may be required. (Contracts using foreign donor funds may be subject to additional regulations.)

iv) Formulation of national information policy. The Council shall pursue the enactment of national information policies in Egypt, insofar as they pertain to the national STI system, and monitor their implementation.

v) Implementation of broad educational programs to increase the use of STI by Egyptian problem solvers. The Council shall formulate and implement multipronged programs aimed at different strata of the problem solving population (executives in government and industry, researchers, production managers, and knowledge transfer agents such as educators, extension workers in the agricultural and health sectors, librarians, editors, and mass communications specialists), exploiting a range of appropriate devices such as high level seminars, conference presentations, printed campaigns, demonstrations, awards, and other incentives.

vi) Planning, instituting, and monitoring the development of professional and paraprofessional manpower. Using a manpower planning model to predict staffing requirements of the national STI system, the Council shall contract for and supervise appropriate educational and training programs in Egypt and abroad.

vii) Submitting annual budgetary requests on behalf of the national STI system. The Council shall develop, justify, and present to the government annual requests for funds, and subsequently allocate these funds for the system operations (financing of the national STI system is discussed later in this chapter). Included in the budget requests will be funds for the operation of the Council as well as for the programs under its auspices, such as policy promotion, manpower training, user sensitizing, research, and international activities.

viii) Functioning as a national focal point vis-a-vis international informational programs. The Council shall review the utility of international programs to Egypt and arrange, preferably through existing nodes of the national STI system, for appropriate participation in such activities. Bilateral or multilateral international projects involving nodes of the national STI system should have the endorsement of the Council if they impact the functions, procedures, standards or financial resources of the national STI system of Egypt.

ix) Organizing regular meetings of the heads and other senior professionals of all information service and document repository nodes of the national STI system. The objective of these roundtable meetings is to share common experiences, record common problems and formulate approaches to their solution, and obtain firsthand input into further development and planning of the national system. The sessions should properly be organized by the Advisory Committees of the Council.

x) Sponsoring an annual national conference of the information service sector of Egypt. The Conference may be cosponsored with other professional and scientific groups. In addition, the Council shall pursue and assure participation by the national STI system in other relevant national meetings held in Egypt and abroad, and be instrumental in organizing technical sessions and/or discussion panels at such meetings.

b) Organization

Figure 11 shows the proposed organization of the Council of Information Services and Resources.

i) Board of Directors. The Board of Directors consists of 8-12 members. Appointees to the Board should be instrumental in promoting acceptance of the Council's recommendations and budget requests; presumably the initial members would be appointed by the President, partially from nominations by the three constituency groups (users, information services, and document repositories). Members of the Board of Directors should not be affiliated with the organiza-

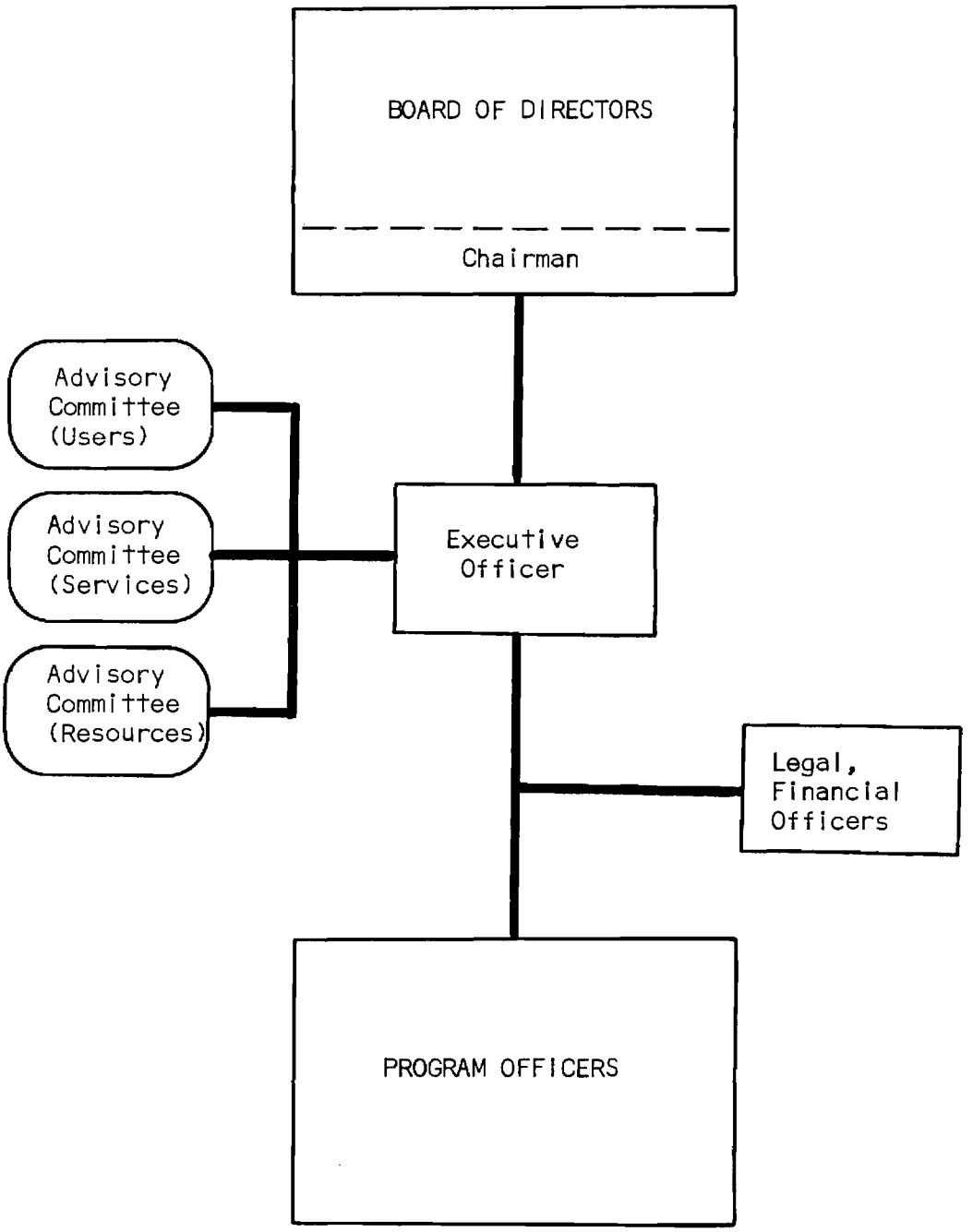


FIGURE 11. COUNCIL ON INFORMATION SERVICES AND RESOURCES: ORGANIZATION CHART.

tions comprising the national STI system. Board members serve a six-year term, with two members rotating every year. The chairman of the Board will be elected by the Board for a period of three years, except that the first chairman will be appointed by the President. Board members should meet no less than quarterly for a period of two days.

ii) Staff. Since the Council will contract for the functions and operations performed by the national STI system, including some of those performed centrally under the auspices of the Council, it is not intended to have a large staff. The professional staff should initially consist of a full-time Executive Director, two full-time program officers, and part-time legal and financial officers. The full-time professional staff should hold no other major salaried employment. The following quote captures the essence of the appointments of the Council's professional staff:

> The national focal point should be staffed by fulltime officers from the outset. Quality is more important than quantity. Taken as a whole, the staff must be well-motivated, must have ideas of their own and the ability to mobilize other people's ideas, must be able to keep up to date on a wide range of topics, must be able to plan and control studies — and perhaps experiments —, must have good writing ability, and must be able to "win friends and influence people." . . . One should seek staff from the widest possible range of intellectual and administrative ability. (Gray, 1978)

The Executive Director and his staff will be assisted by permanent Advisory Committees representing users of the national system, its information services, and its document repositories. Advisory Committee members are appointed by the Chairman of the Board of Directors, in a manner assuring equitable and meaningful representation of the constituencies of the national system. Advisory Committees shall elect their chairmen, and shall meet once a month. Minutes of the meetings shall be recorded, with such recommendations as have been formulated and adopted by the Committees; and copies shall be forwarded, via the Executive Director, to members of the Board of Directors, and to chairmen of other Advisory Committes.

The Council should be housed in suitable quarters, with access to meeting rooms equipped with audiovisual media, and be supported by suitable clerical staff. Communications capabilities are essential, including a terminal and printer coupled via dialup telephone lines to the computational facilities of the information services nodes, and telex.

2. Funding

There are four sources of funds that should be counted upon to support the Egyptian national STI system: income from services; subsidy from the government; operating funds from the parent organization of information service nodes; and grants and donations from other sources.

a) Income from Services

The national STI system should develop and adopt a uniform "price list" of its key services. The principal services whose partial or full costs are to be passed on to the user are database searches and document delivery. User charges should not include the cost of the development of the system and of its facilities, inasmuch as these are at least partly covered by an existing grant. Charges should be reasonable, lest they impede use of services and of information. Database search fees will presumably distinguish between domestic and foreign searches. Although foreign database search costs vary, the user charge for this service should minimize such differences, so as to simplify accounting procedures and make the service more transparent to the user. Service fees should not penalize users resident outside the main metropolitan areas of Egypt.

b) Funding Formula

The desire of industrialized countries is for information services to be self-supporting (i.e., to distribute all costs of service operation among its users). In practice few if any information services attain this objective; the great majority of database producers and database vendors are still deficit operations. It is therefore unreasonable to expect that the Egyptian information services will recover their cost in full; indeed, trying to do so would almost certainly undermine or defeat some of the goals of the national STI system.

The question thus arises as to the division of the costs among the various parties concerned — the users, the central government, and the parent organizations of the information service nodes. Although agreement on a formula for subsidizing the main cost of the national STI system must await discussions by these parties, the following are a few thoughts toward such a discussion.

Having the central government assume the full financial burden, and having the annual allocations distributed by the Council of Information Services and Resources, has the appeal of simplicity. On the other hand, having the parent organizations of information system nodes share the cost of services will assure higher degrees of commitment and attention by the management of these organizations, and hence more effective use of financial resources. Similar reasons dictate that users (or their employers) be levied charges, or else the value and cost effectivenes of the national STI system will remain moot.

One approach to the funding of the national STI system might be the following:

i) the information service nodes contribute the cost of their personnel and premises;

ii) the users meet the Egyptian-currency costs of services and materials (this income reverts to the service node);

iii) the government supplies the hard-currency cost of the services;

iv) the government and foreign donors subsidize other extrinsic costs, such as the operation and programs of the Council for Information Services and Resources, purchase of additional equipment for lease to information service nodes, system research and development, foreign travel, and other central functions.

Reverting the income from users to the service node should provide the latter with a considerable marketing incentive.

3. Budget of the National STI System

The total annual cost of the Egyptian national STI system is estimated at approximately $1.3 million (Table 19). This figure does not include budgets of other existing information agencies; for example, it is assumed that Egyptian libraries will continue, at their expense, subscribing to STI materials they currently hold.

The cost estimate is based on assumptions made throughout this study: six information service nodes; 2,500 foreign database searches/year; foreign document delivery at a rate of five documents per search; and document acquisitions by Egyptian STI repositories up to the level recommended by "core lists." The prorated equipment cost item may be viewed as the annual budget for additional equipment to be acquired for new services (initial equipment will be provided gratis).

The estimated annual budget is equivalent to about 2.5 percent of the R&D budget of Egypt. This figure is half of the typical national operating budget for STI services in developing countries (five percent of the annual R&D budget) and less than one-fourth of the typical start-up cost in developing countries (10-15 percent of the annual R&D budget).

TABLE 19. NATIONAL INFORMATION SERVICES:
ANNUAL COST ESTIMATE

FOREIGN SEARCHES (2,500 @ $56)	$ 140,000
FOREIGN DOCUMENT DELIVERY (5 DOC/SEARCH @ $7.50)	93,750
INFORMATION CENTER: PERSONNEL ($100,000 x 6)[A]	600,000
INFORMATION CENTER: OTHER COSTS ($10,000 x 6)[B]	60,000
EQUIPMENT ($750,000 PRORATED FOR TEN YEARS)	75,000
EQUIPMENT MAINTENANCE (3% OF COST)	22,500
INFORMATION COLLECTIONS (1/3 OF CORE LIST)[C]	125,000
PRINTING/PUBLISHING	20,000
OVERSEAS TRAINING (1 MAN/YEAR)	25,000
COUNCIL ON INFORMATION SERVICES AND RESOURCES[D]	130,000
TOTAL	$ 1,291,250

A) BASED ON SIX INFORMATION SERVICE CENTERS.

B) SUPPLIES, LOCAL TRAVEL.

C) INCLUDES OPERATING THE ACQUISITION BUREAU.

D) ADMINISTRATIVE COSTS, TRAINING, CONFERENCES.

CHAPTER VI. REFERENCES

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APPENDIX A
INFORMATION SERVICE NODES

APPENDIX A-1.

INFORMATION SERVICE: AGRICULTURE

PRIMARY CLIENTELE:	MINISTRY OF AGRICULTURE MINISTRY OF IRRIGATION MINISTRY OF LAND RECLAMATION FACULTIES OF AGRICULTURE (36,000 STUDENTS) AGRICULTURAL COOPERATIVES
SECONDARY CLIENTELE:	MINISTRY OF SUPPLY MINISTRY OF INTERNAL TRADE MINISTRY OF FOREIGN TRADE ASRT MINISTRY OF PLANNING

APPENDIX A-2.

INFORMATION SERVICE: ENERGY

PRIMARY CLIENTELE:	MINISTRY OF PETROLEUM/EGYPTIAN GENERAL PETROLEUM CORPORATION MINISTRY OF PLANNING FACULTY OF PETROLEUM/MINING (1,000 STUDENTS)
SECONDARY CLIENTELE:	MINISTRY OF INDUSTRY MINISTRY OF FOREIGN TRADE MINISTRY OF RECONSTRUCTION GENERAL AUTHORITY FOR INVESTMENT

APPENDIX A-3.

INFORMATION SERVICE: HUMAN SETTLEMENTS

PRIMARY CLIENTELE:	MINISTRY OF RECONSTRUCTION AND NEW COMMUNITIES INSTITUTE FOR RECONSTRUCTION PLANNING MINISTRY OF HOUSING MINISTRY OF PLANNING
SECONDARY CLIENTELE:	MINISTRY OF TRANSPORTATION MINISTRY OF DEFENSE MINISTRY OF TOURISM MINISTRY OF FINANCE MINISTRY OF HEALTH MINISTRY OF SUPPLY ASRT

APPENDIX A-4.

INFORMATION SERVICE: INDUSTRY

PRIMARY CLIENTELE:	200 LARGE PUBLIC INDUSTRY FIRMS MINISTRY OF INDUSTRY GOFI GOVERNMENT RESEARCH INSTITUTES
SECONDARY CLIENTELE:	15,000 SMALL PRIVATE ENTERPRISES MINISTRY OF PLANNING MINISTRY OF INTERNAL TRADE MINISTRY OF FOREIGN TRADE GAFI

APPENDIX A-5.

INFORMATION SERVICE: MEDICINE AND HEALTH CARE

PRIMARY CLIENTELE:	MEDICAL SCIENTISTS/PRACTITIONERS (4,000) MEDICAL SCHOOLS (60,000 STUDENTS) MINISTRY OF HEALTH MILITARY MEDICAL ACADEMY
SECONDARY CLIENTELE:	NURSING FACULTIES (1,000 STUDENTS) MINISTRY OF PLANNING MINISTRY OF SOCIAL SECURITY ASRT

APPENDIX A-6.

INFORMATION SERVICE: SCIENCE AND ENGINEERING

PRIMARY CLIENTELE:	ASRT UNIVERSITY RESEARCHERS (2,868 PURE SCIENTISTS, 2,347 ENGINEERING SCIENTISTS, 30,000 SCIENCE AND TECHNOLOGY STUDENTS)
SECONDARY CLIENTELE:	INDUSTRIAL RESEARCH INSTITUTES NATIONAL INSTITUTE FOR MANAGEMENT DEVELOPMENT

APPENDIX A-7.

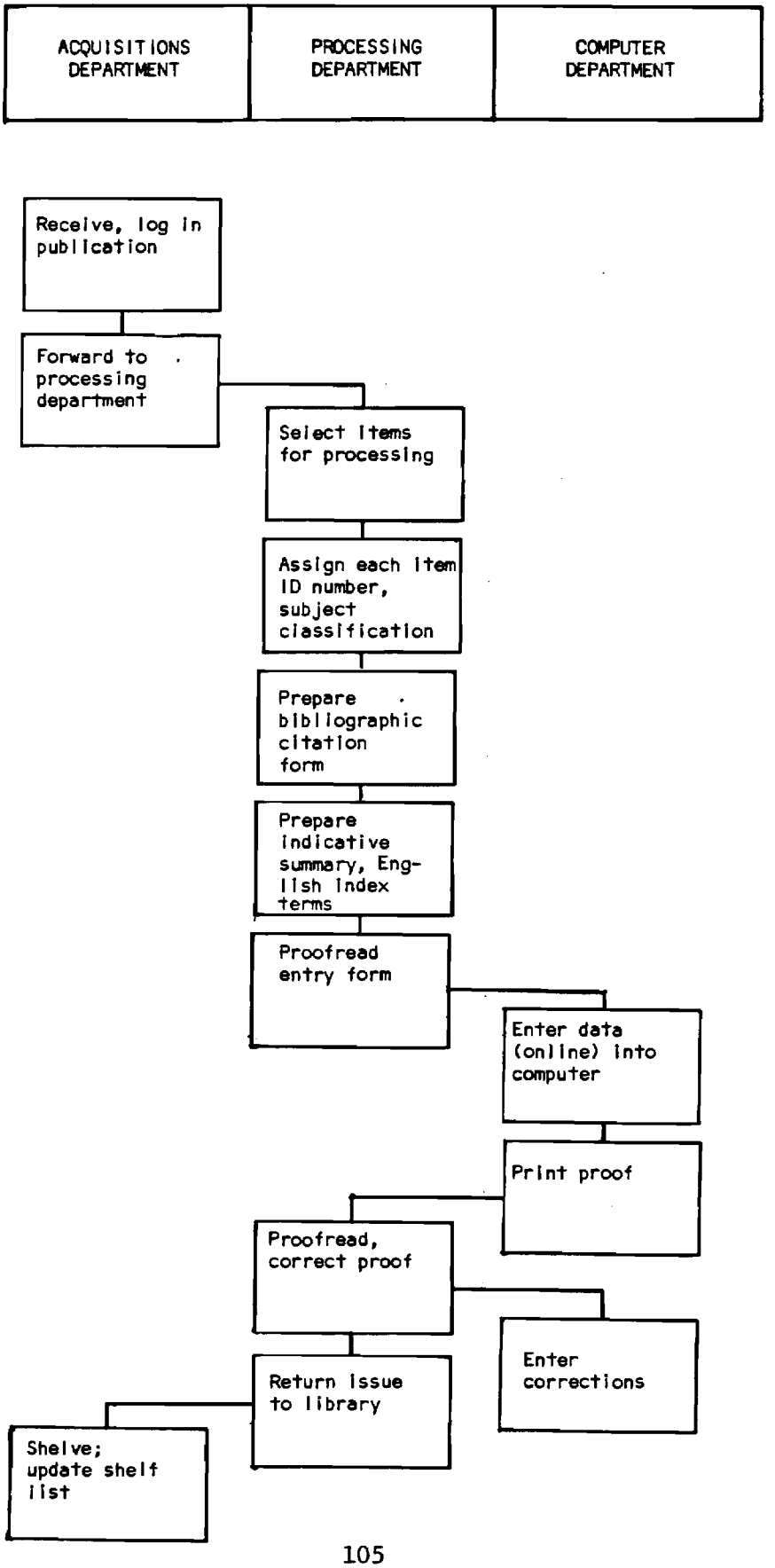
INFORMATION SERVICE: TRANSPORTATION AND COMMUNICATIONS

PRIMARY CLIENTELE:	MINISTRY OF TRANSPORTATION MINISTRY OF MARITIME TRANSPORTATION MINISTRY OF CIVIL AVIATION SUEZ CANAL AUTHORITY MINISTRY OF COMMUNICATIONS MINISTRY OF PLANNING
SECONDARY CLIENTELE:	MINISTRY OF SUPPLY MINISTRY OF DEFENSE

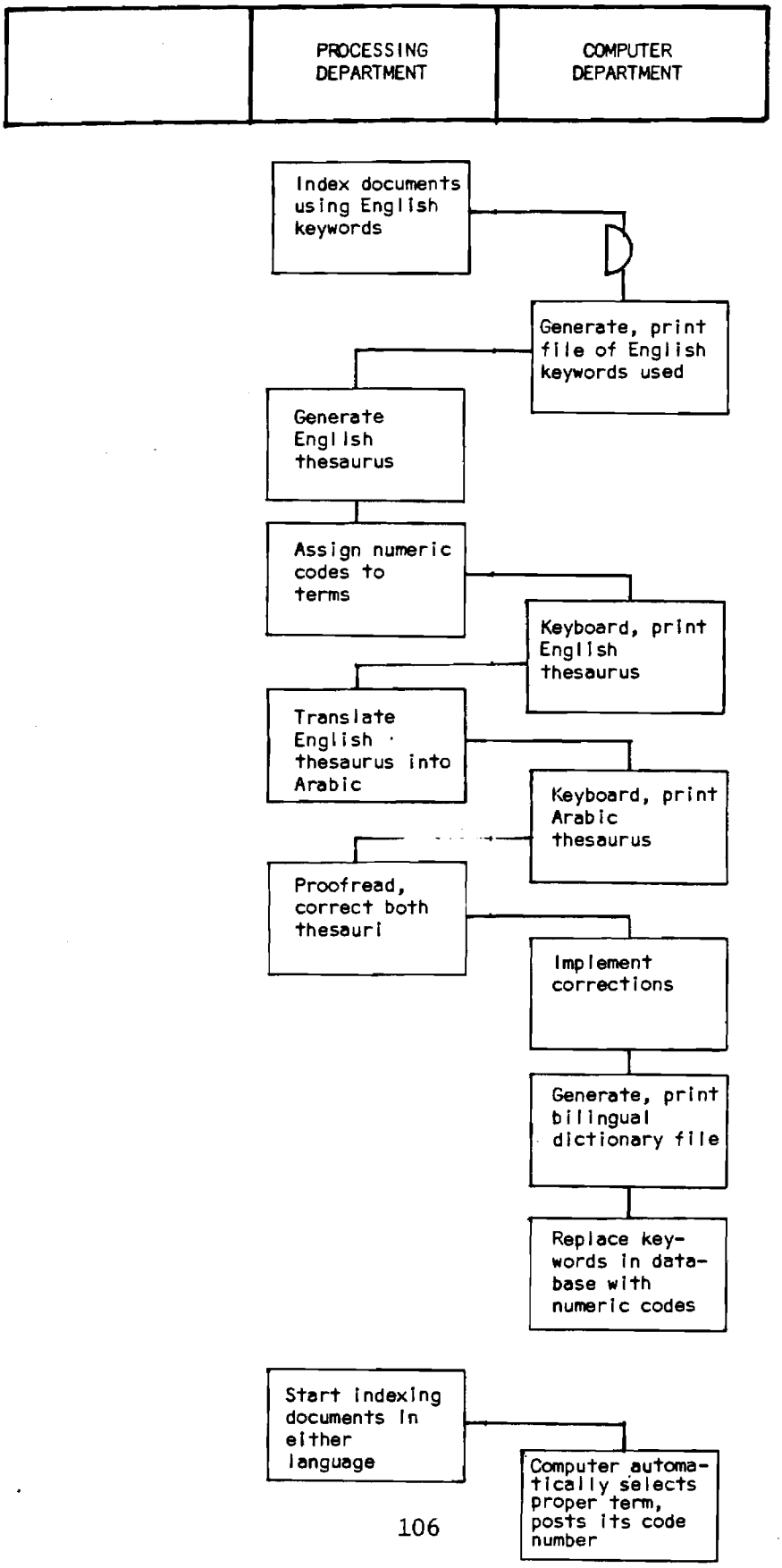
APPENDIX B

PROCESS FLOW CHARTS

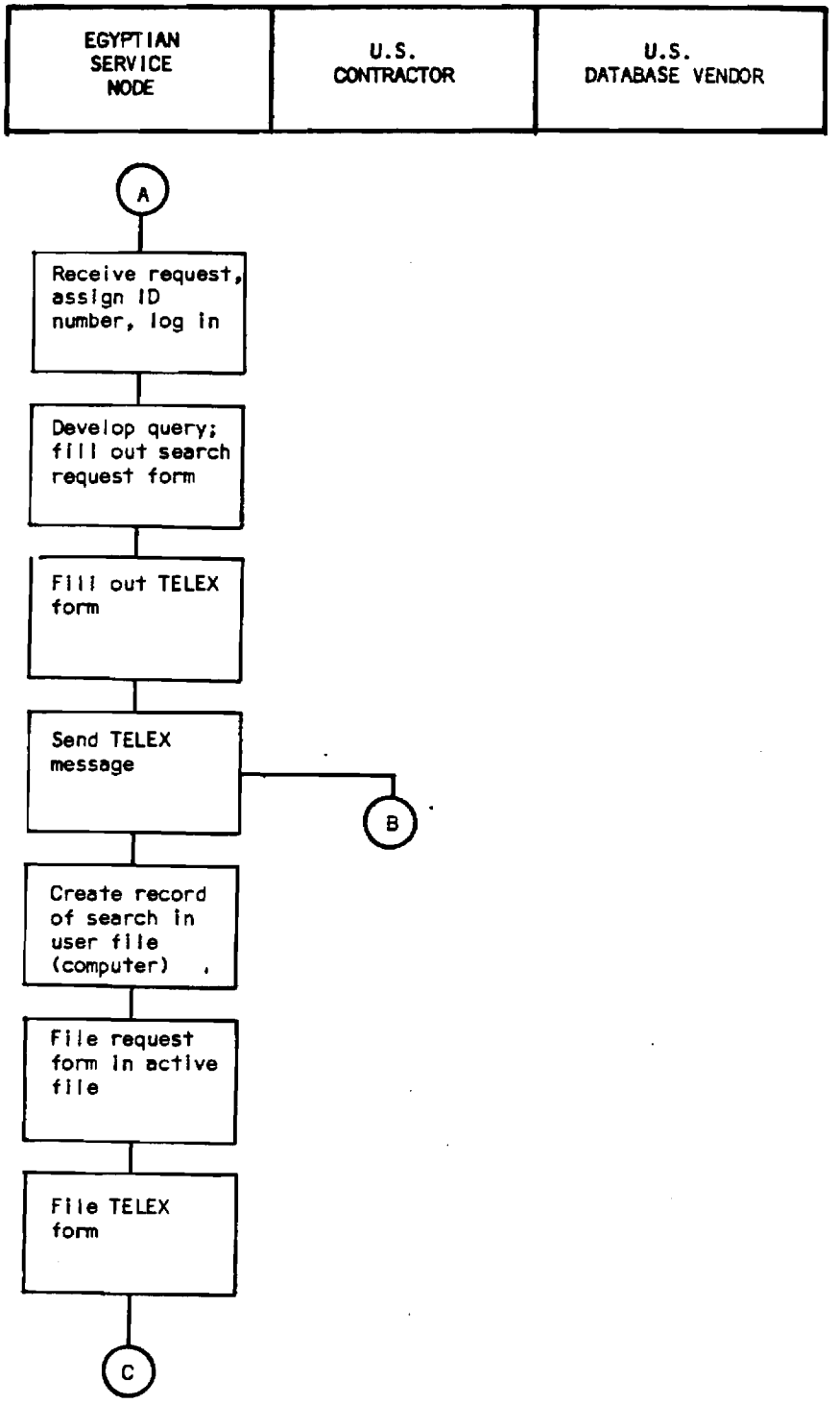
APPENDIX B-1. STI DATABASE DEVELOPMENT: PROCESS FLOW



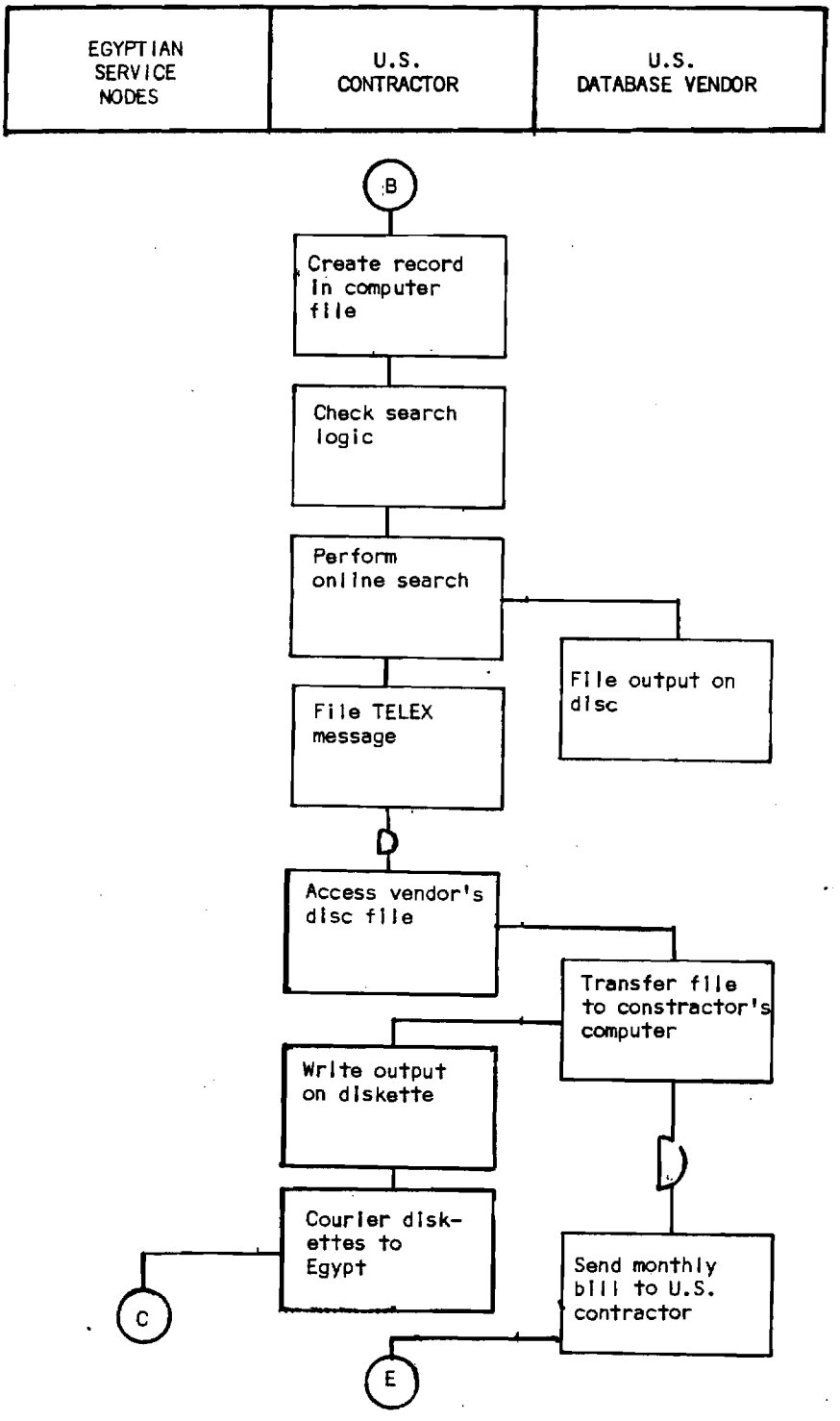
APPENDIX B-2. BILINGUAL THESAURUS GENERATION: PROCESS FLOW



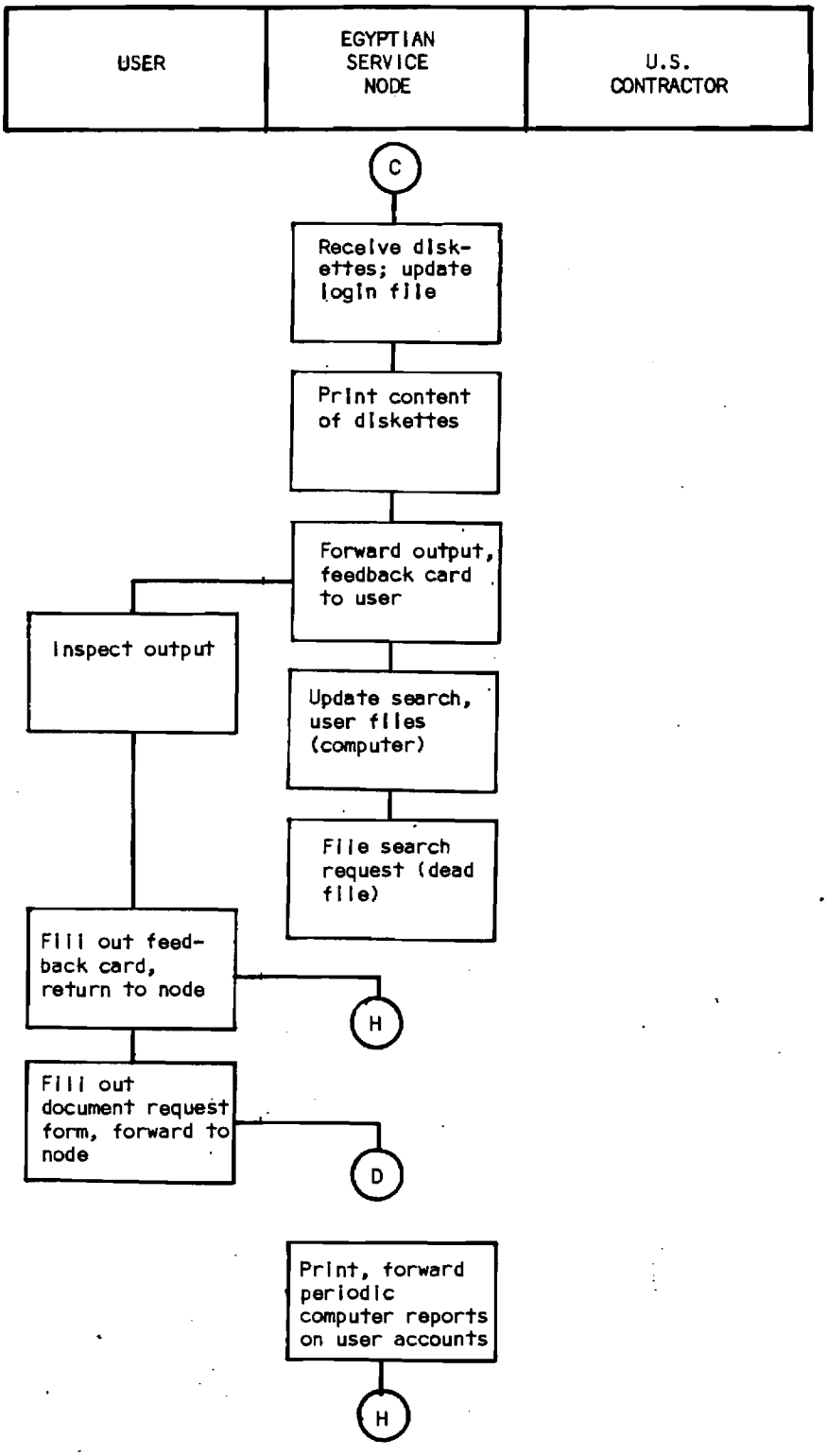
APPENDIX B-3. "DELAYED ONLINE"SEARCH OF U.S. DATABASES: PROCESS FLOW



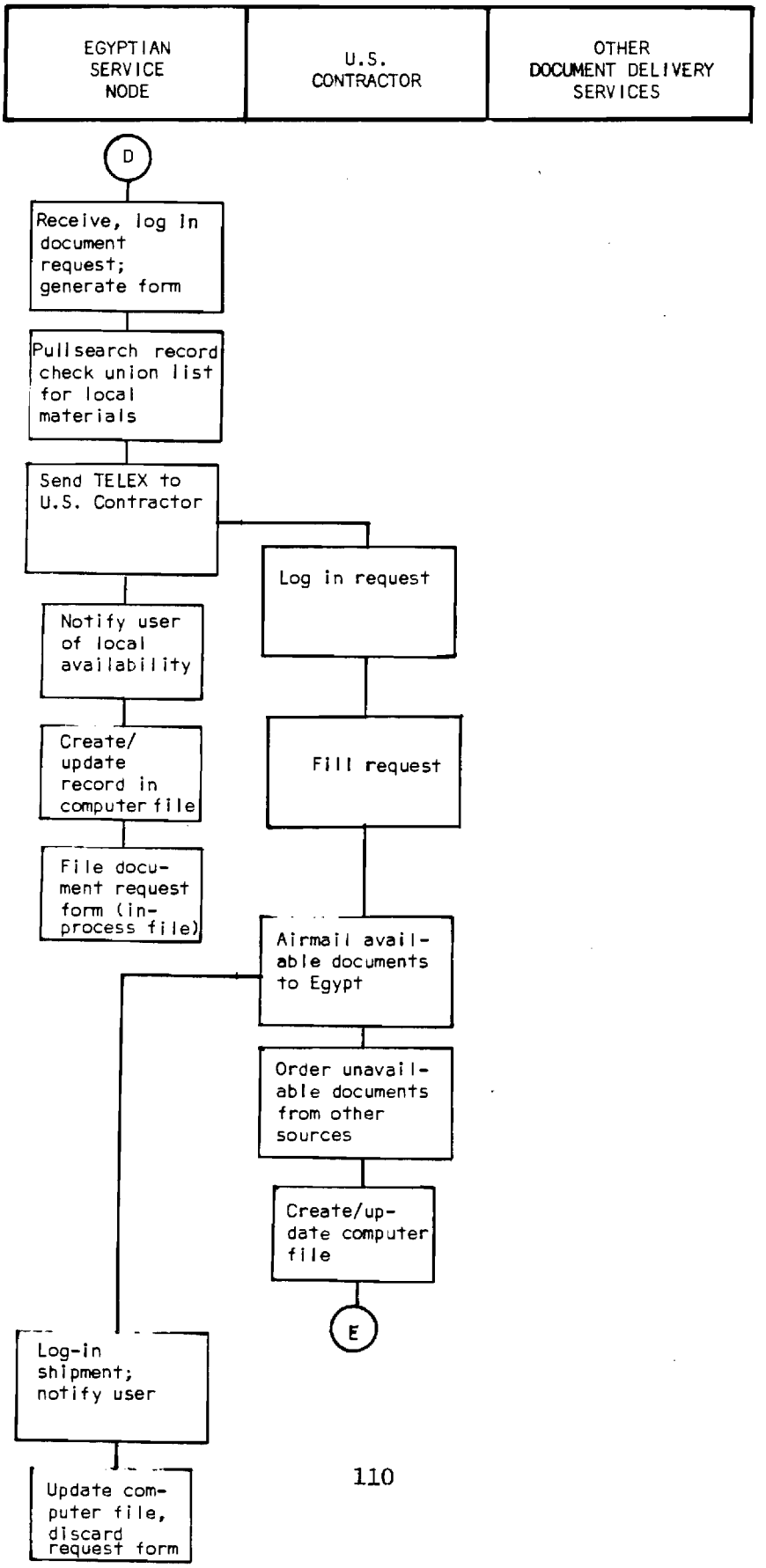
APPENDIX B-3 (CONT'D)



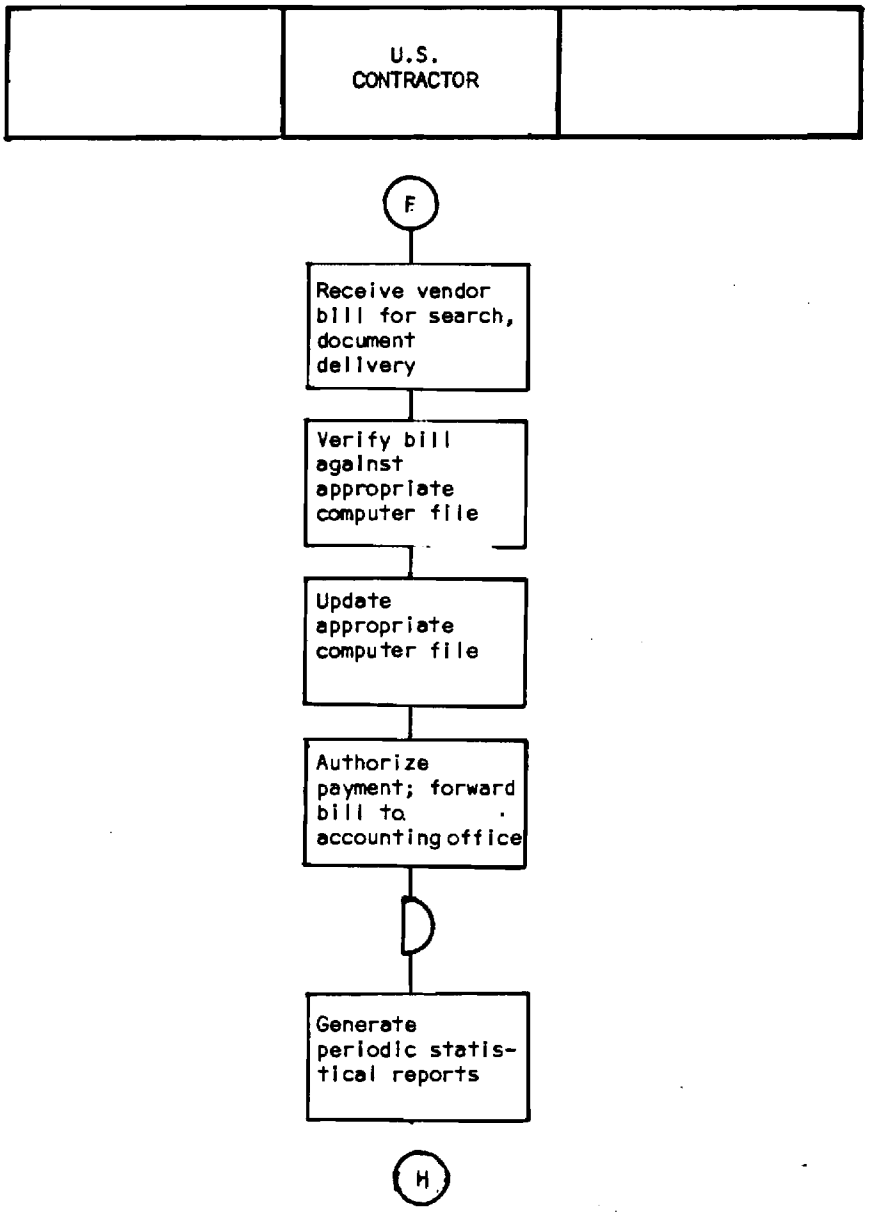
APPENDIX B-3 (CONT'D)



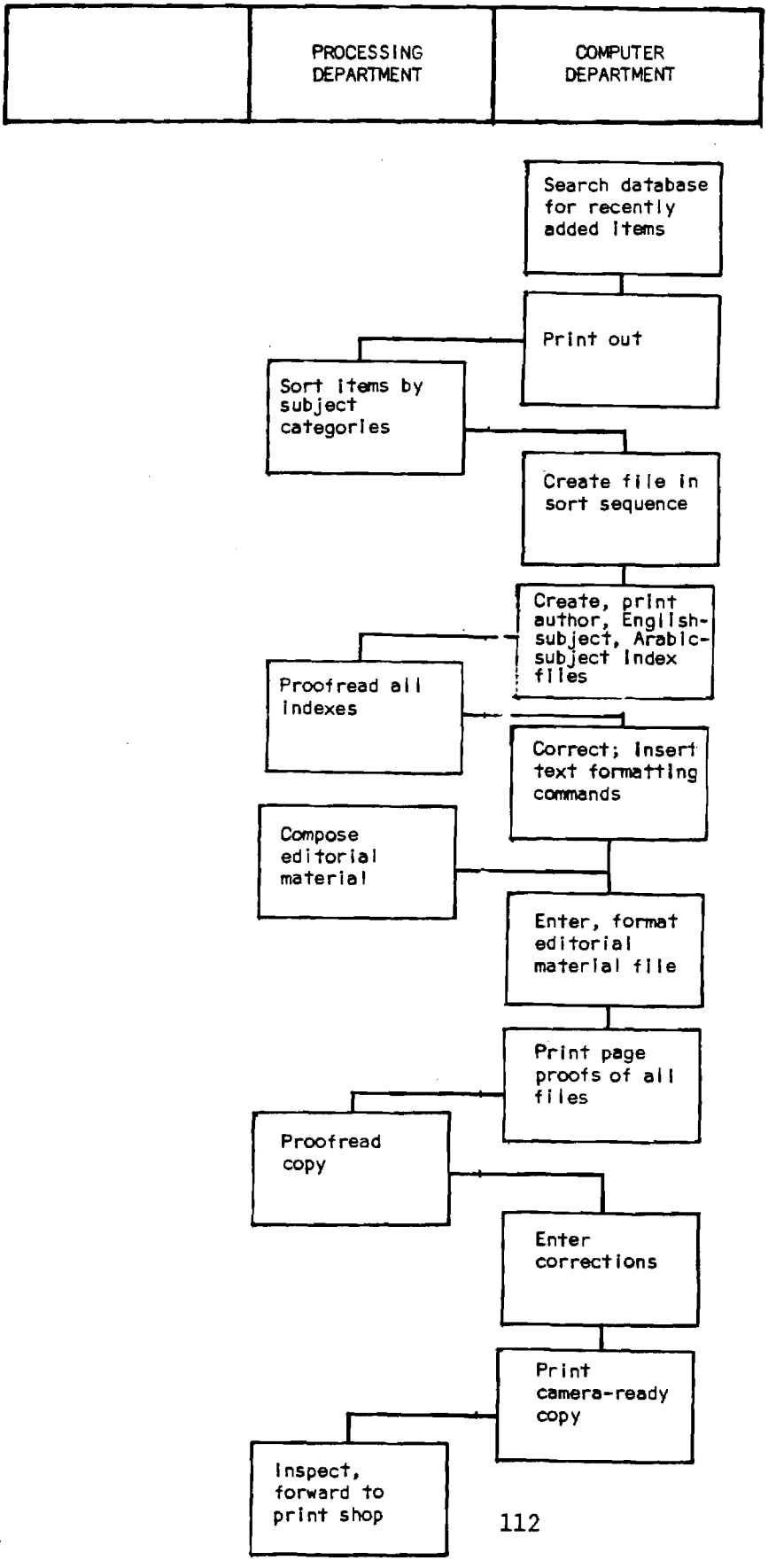
APPENDIX B-4. FOREIGN DOCUMENT DELIVERY: PROCESS FLOW



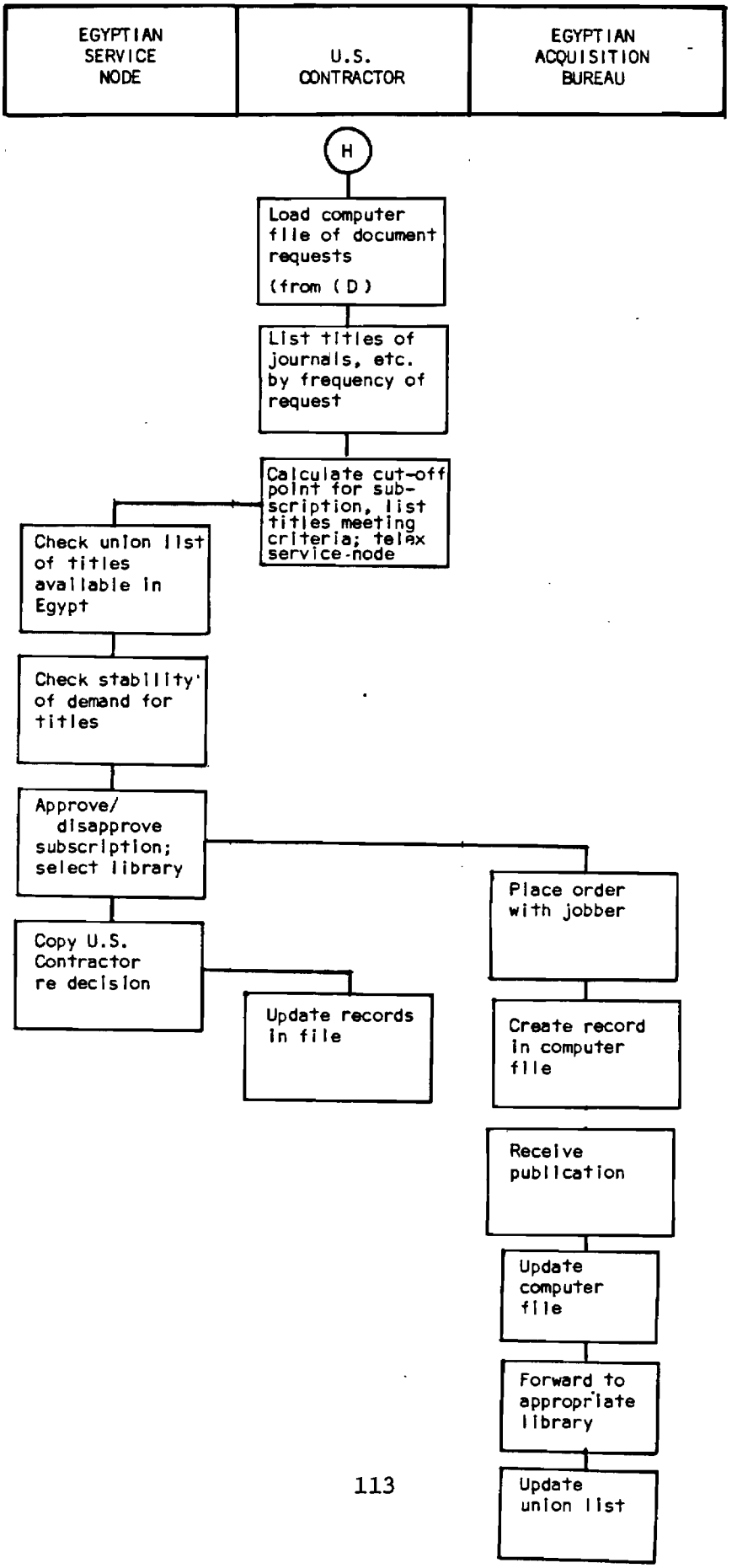
APPENDIX B-4 (cont'd)



APPENDIX B-5. AWARENESS BULLETIN GENERATION: PROCESS FLOW



APPENDIX B-6. DEMAND-DRIVEN ACQUISITION: PROCESS FLOW



APPENDIX C
ADMINISTRATIVE FILES

APPENDIX C-1. MANUAL FILES (EGYPT)

FILE	ARRANGEMENT BY		
	Search no.	User no.	Date
Search request forms (in process)	x		
Search request forms (completed)	x		
Document order forms (in process)*	x		
Telex messages sent			x
Telex messages received			x
Search outputs (COM)	x		
Feedback forms received	x		
Invoices sent		x	
Invoices received			x

*After document arrival, order forms are discarded.

APPENDIX C-2. USER DIRECTORY (EGYPT)

CONTENTS: Identification of Users with accounts.

Elements	Remarks
User account no.:	Identifies Egyptian service node plus sequence number
User classification code:	Security, access type, service type, corporate vs. personal
Name:	Personal or corporate name
Other names:	First names, or department name
Employer:	
Address (street):	
Address (city):	
Telephone:	

APPENDIX C-3. FINANCIAL ACCOUNTS FILE (EGYPT)

CONTENTS: Record of customer charges and payments.

Elements	Remarks
User account no:	See "Search File (Egypt)"
Account:	$, L.E.
Reference:	Pertinent Search ID
Transaction date:	Day, month, year
Transaction type:	Deposit received First invoice Second invoice Reimbursement received Refund to user Quotation/estimate Other
Amount:	Sum
Entered by:	Last name of operator

APPENDIX C-4. DOCUMENT ORDER FILE (EGYPT)

CONTENTS: Record of document delivery requests and their disposition.

ELEMENTS	REMARKS
Search no.:	See "Search File (Egypt)"
User account no.:	See "Search File (Egypt)"
Date request received:	Day, month, year
No. of items requested by user:	Numeric total
Date of telex:	Day, month, year
Document vendor:	Name of document delivery service(s)
No. of items requested in telex:	Numeric total
First shipment - date received: no. of items:	
Second shipment - date received: no. of items:	
Comment:	

APPENDIX C-5. DOCUMENT ORDER FILE (U.S.)

CONTENTS: Record of requests for document delivery and their disposition.

ELEMENTS	REMARKS
Search no.:	See "Search File"
Date received telex:	Day, month, year
No. items requested:	Numeric total
First mailing -	
date:	(refers to documents
no. of items:	{ copied from local collection
cost:	{ of U.S. Contractor
Second mailing -	
date:	(refers to documents
no. of items:	{ ordered from other collections
cost:	{ in U.S. or abroad
Comment:	

APPENDIX C-6. SEARCH REQUEST FILE (EGYPT)

CONTENTS: Egyptian record of search requests and their disposition.

ELEMENTS	REMARKS
Search no.:	Identifies Egyptian service node, plus sequential number
User account no.:	Identifies Egyptian service node, plus sequential number
Search title:	Narrative subject of search
Search category codes:	Retrospective, SDI, bibliographic, numeric
Frequency of SDI search:	Weekly, monthly, quarterly, semiannually, annually
Cutoff date of SDI search:	Day, month, year
Date received from user:	Day, month, year
Received, processed by:	Last name of Egyptian searcher
Date telexed to U.S.:	Day, month, year
Date of output receipt:	Day, month, year
No. of citations in output:	Numeric total
No. of requests in output:	Numeric total
Comments:	Notes on other telexes, delay reasons, etc.

APPENDIX C-7. SEARCH REQUEST FILE (U.S.)

CONTENTS: U.S. record of search requests and their disposition.

ELEMENTS	REMARKS
Search no.:	Identifies Egyptian service node, plus sequential no.
Search type:	Retrospective online; SDI batch
Date telex received:	Day, month, year
Date performed:	Day, month, year
Databases searched:	Standard abbreviations of names
Searcher's name:	Last name
Vendor's name(s):	E.g., BRS
Searcher's notes:	Narrative comments
Vendor's charge:	$
Date vendor's bill approved:	Day, month, year
Comments:	

APPENDIX C-8. PUBLICATIONS FILE (U.S.)

CONTENTS: Frequency count of serial and other publications ordered, used as guide to the acquisition program of Egypt.

ELEMENTS	REMARKS
Document category code:	Journal, patent, technical report, etc.
Name of journal, class of patent:	For journals, use ISSN or CODEN
Search ID:	See "Search File"
No. of requests from search:	Numeric total
Date of request:	Day, month, year
Comments:	

APPENDIX C-9. BIBLIOGRAPHIC FILE(S) (EGYPT)

CONTENTS: Indexed surrogate of selected publications issued in Egypt.

ELEMENTS	REMARKS
Document number:	A code uniquely identifying each publication
Title:	
Author(s):	(Repeating group)
AUthor(s)' address(es):	(Repeating group)
Date of publication:	
Publication name:	
Publisher:	
Volume:	
Issue number:	
Pages:	
Summary:	A short indicative abstract
Keywords:	Coded terms from and authority list or thesaurus

APPENDIX C-10. BILINGUAL THESAURUS (EGYPT)

CONTENTS: Coded keywords (English and Arabic), with their synonyms and related concepts, arranged in numerical sequence of the code.

ELEMENTS	REMARKS
Code number:	Unique numeric identifier of each concept
Term (E):	English keyword corresponding to code
Synonym (E):	English synonym of Term (E)
Related term (E):	Other English keywords similar in meaning to Term (E)
Term (A):	Arabic keyword(s) corresponding to code number
Synonym (A):	Arabic synonym of Term (A)
Related term (A):	Other Arabic keywords similar in meaning to Term (A)

APPENDIX C-11. ARABIC KEYWORD DICTIONARY (EGYPT)

CONTENTS: An alphabetic list of Arabic keywords, with their code numbers.

ELEMENTS	REMARKS
Term (A):	Arabic keyword
Code number:	Numeric identifier of keyword

APPENDIX C-12. ENGLISH KEYWORD DICTIONARY (EGYPT)

CONTENTS: An alphabetic list of English keywords, with their code numbers.

ELEMENTS	REMARKS
Term (E):	English keyword
Code number:	Numeric identifier of keyword

APPENDIX D
MANAGEMENT REPORTS

APPENDIX D-1. INFORMATION SERVICES: MANAGEMENT REPORTS

REPORT TYPE	FREQUENCY	CUMULATIONS	RESPONSIBILITY	DATA SOURCE
TITLES OF COMPLETED SEARCHES	QUARTERLY	SEMIANNUAL	E	SEARCH REQUEST FILE (E)
USER STATISTICS	QUARTERLY	ANNUAL	E	USER DIRECTORY (E) FINAL ACCOUNTS FILE (E)
SEARCH STATISTICS	MONTHLY	SEMIANNUAL	E	SEARCH REQUEST FILE (E)
SEARCH STATISTICS	MONTHLY	SEMIANNUAL	US	SEARCH REQUEST FILE (US)
DOCUMENT DELIVERY STATISTICS	MONTHLY	SEMIANNUAL	E	DOCUMENT ORDER FILE E)
DOCUMENT DELIVERY STATISTICS	MONTHLY	SEMIANNUAL	US	DOCUMENT ORDER FILE (US)
US CONTRACT ACCOUNT	MONTHLY	QUARTERLY	US	(US CONTRACTS OFFICE)
BIBLIOGRAPHIC DATABASE STATISTICS	QUARTERLY	ANNUAL	E	USER DIRECTORY (E) BIBLIOGRAPHIC FILE (E)