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**PROJECT ASSISTANCE COMPLETION REPORT (PACR)
COMPUTER TECHNOLOGY
PROJECT NO. 664-0334**

I. INTRODUCTION

This Project Assistance Completion Report for Computer Technology relies heavily on archived subject files and discussions with the host country implementing organization. This reports covers the period September 27, 1985 through March 31, 1990 and describes the completed activities initiated by a grant agreement between the Republic of Tunisia and the United States of America, acting through the Agency for International Development.

II. PROJECT DATA

- A. Project Title and Number: Computer Technology Project
Project No. 664-0334
- B. Grant Agreement Date: September 27, 1985
Evaluation: Mid-Project Evaluation 12/88
- C. Project Assistance Completion Date: March 31, 1990
- D. Funding: \$3,500,00
Expenditures \$3,461,979
GOT Contribution: \$ 7,175,000 planned
\$12,000,000 actual
- E. Implementation/Organization: Government of Tunisia through IRSIT (Institut Regional des Sciences Informatiques et Telecommunications), the Ministry of Education (MOE), and the Academy for Educational Development (AED)
- F. Project Status: Project is completed

III. EXECUTIVE SUMMARY

On September 27, 1985, the U.S. Government represented by its A.I.D. Mission in Tunisia and the Government of Tunisia (GOT) signed a grant agreement to implement the Computer Technology Project (CTP). Under this agreement, USAID/Tunisia was to provide 3.5 million dollars, and the GOT the equivalent of \$7,175,000 in local currency (the Tunisian Dinar and in-kind contributions). This three-and-one-half-year project was extended for one year and was completed on March 31, 1990. By the end of the project, the GOT had contributed the equivalent of over \$12,000,000, or about 60 percent more than required by the grant agreement.

IV. PROJECT DESCRIPTION

A. Background

The availability of the microelectronics revolution poses a challenge to the developing world. Tunisia recognized this challenge and decided to pursue the opportunity of effectively utilizing computers in widespread applications for its economic development, including efforts in the private sector and government, as well as vocational applications. The GOT saw computer applications as leading to more efficient operations in the public and private sectors and to more effective use of limited resources. Support for activities in this area came from the highest levels of the GOT and was being directed throughout the country, including the educational system. The GOT recognized that the U.S. was a leader in computer technology and requested that the U.S. government provide assistance to the GOT in development of its national programs.

B. Project Purpose and Goal

Goal

The goal of the project was effective wide scale utilization of information technology to improve socio-economic performance in achieving Tunisia's development goals.

Purpose

To assist the GOT to institutionalize its critical capacity to evaluate, plan, design, modify, and implement microcomputer applications, primarily through public education and research, in a contextually appropriate manner.

C. Project Implementation

The project was implemented by the Government of Tunisia through IRSIT (Institut Regional des Sciences Informatiques et Telecommunications) and the Ministry of Education (MOE), and the Academy for Educational Development (AED) a U.S. contractor which provided the vast majority of technical support.

AED's Contract and Scope of Work

AED's original contract with USAID/Tunisia, signed in July 1986, was for three years, but was subsequently amended for an additional 6 months.

Project activities were grouped under four project components, (a) technical support for IRSIT, and the MOE, (b) pilot projects and applications research, (c) training, and (d) institutional planning, development and analysis.

AED's responsibilities consisted of coordinating activities in all project components and providing technical assistance to IRSIT. AED provided a resident scientific advisor to the project and short term TA advisors to work with IRSIT, the MOE and on pilot activities, institutional analysis and planning exercises. AED also arranged for short-term training, observational tours, consultancies, and procurement under the contract.

The level of effort for the performance of the AED contact (as amended) was established at 174 person months of direct AED support, 44 person-months of consultant assistance, 38 person-months of visits.

D. Project Activities

This project was implemented almost completely by IRSIT, which coordinated all project activities. IRSIT worked with concerned ministries, institutions and the private sector in carrying out activities in secondary and higher education and industry.

The project focused principally on strengthening the capacity of IRSIT to lead in planning, managing and conducting research strategies for a broader, contextually appropriate application of computer technology in Tunisia. Through training and technical support and the support of research and development the resource base of IRSIT improved.

Below is a description of various activities under each component.

a) **Technical Support**

The technical support provided guidance in all project components and provided leadership to the GOT through IRSIT, to develop the ability to critically assess the feasibility of computer research and development activities leading to applications throughout the Tunisian economy. In developing its capability in these areas, particular attention was given to the development of Tunisia's ability to objectively evaluate activities in the area of computer technology with a focus on impact, cost effectiveness and cost

benefit.

AED worked with IRSIT over the life of the project and provided a long-term U.S. resident scientific advisor for the overall project, a short-term computer expert directly to the GOT, as well as other short-term T.A. advisors to work with IRSIT and the GOT. The short-term computer science expert provided to the GOT helped to stimulate an environment conducive to designing research projects, developing proposals, and funding these activities. IRSIT provided a full time counterpart for project activities and established research and development teams to support project research activities.

A primary objective of the technical support component of the project was the establishment of linkages between Tunisian institutions, primarily IRSIT, and U.S. institutions and industry so that research could be driven by specific applications needs. AED was responsible for developing linkages with U.S. and third country institutions, for developing exchanges of teachers and scientists, for developing a program for training of trainers for secondary educators, and, for designing observation tours to the U.S. so that key Tunisian scientists and educators could contribute to developing and reinforcing experiences.

Technical assistance helped IRSIT, the GOT, and the private sector in establishing priorities for research in computer technology.

It was recognized early in the project that communication was necessary to stimulate quality research; therefore, the project supported an annual colloquium for presentation of research activities, findings and priorities. This drew heavy regional participation.

Some of the key linkages made between IRSIT and U.S. institutions are listed below. Several of the linkages established under this project continues.

- o PC Linguistics of Texas: developed a microcomputer-based Arabic-English and English-Arabic computer-assisted translation software. This linkage continues.
- o AT&T Bell Laboratories: with the speech and linguistics department of Bell Laboratories, IRSIT continues a relationship in areas of Arabic speech analysis and synthesis.
- o Columbia Teacher's College: with Columbia Teacher's College, through two department, the INBMI (National Institute for Administration and Micro-Informatics) developed, refined and conducted teacher training in computer assisted instructions.
- o Colorado School of Mines: with the Colorado School of Mines,

the Gafsa Phosphate Company (CPG), and Blast Dynamics, Inc. IRSIT developed relationships which resulted in substantial new automation at CPG.

- o U.S. Geological Survey (USGS): using data images available through the U.S. Geological Service, IRSIT is now able to customize maps for satellite data for North Africa to the specific requirements of individual clients.

Outputs:

- 442 volumes of technical literature purchased
- 27 new staff hired and working at IRSIT
- 6 long-term relationships established with Tunisian private sector companies
- clear research planning in the area of computer with IRSIT, and plans within the Ministry of Education and Ministry of National Economy for introducing computer technology and supporting activities.
- the capacity, within Tunisia, to continue developing and evaluating appropriate applications of computer technology to the education sector and the industrial and service sectors.
- a GOT statement of priorities in computer applications, including computer based education; and plans in both the MOE and departments of the University of Tunisia, Tunis, for introducing computer technology in an integrated, cost-efficient, and cost-competitive way to the curricula of schools.
- 8 linkages between IRSIT and U.S. universities and computer technology industries.
- Approximately \$900,000 worth of computer equipment and software purchased for the establishment of the Core Computer Center at IRSIT
- production of the first satellite maps in North Africa

b) Pilot Projects and Applications Research

Pilot project activities were aimed primarily at developing the institutional capacity of IRSIT, the Centre Bourguiba des Micro-informatique (CBMI), and the Ministry of Education to examine proposals for computer applications in education to determine feasibility, funding mechanisms, evaluation designs, and implementation plans.

Activities in this component fell into three broad categories; higher education and secondary education pilot projects and applications research. Pilot projects in all three categories introduced computers in a manner which was efficient and cost effective.

In higher education (college level), emphasis in the pilot projects was placed on computer applications to enhance the teaching environment. The goal of this activity was to improve the capacity of Tunisian higher education institutions in the areas of telecommunications and computer sciences, and to increase the coordination between educational departments, and the Tunisian industry, both private and public. At this level, computer applications were identified which would lead to greater productivity in post-collegiate employment and increase efficiency in use of the applications. Students who participated in these pilot projects were expected to be able to directly apply skills obtained immediately after graduation. Pilot activities in higher education were funded based on proposals for activities, including plans for evaluating the impact of the activity on the learning and in terms of cost effectiveness and cost benefit of the application.

In order to develop a computer-literate professional class in Tunisia, it was decided that computers should be introduced as early as practical into the secondary educational curriculum. To this end, three advanced Lycees were selected (Ariana, Bourguiba, and CBMI) as pilot institutions for the introduction of modern microcomputer facilities. The focus of the project was on developing specific pilot activities within carefully chosen content areas and student populations to evaluate the efficacy of computer use in teaching. Pilot activities required clear proposals defining the content to be delivered, the learning objectives to be achieved, and the methods for evaluating the impact and relative value of the computer-based activity. Through a sub-contract with AED, CBMI (Bourguiba Center for Micro-Informatics- later renamed INBMI-National Institute for Administration and Micro-Informatics) was the primary vehicle for assistance to this activity. This organization provided computers, software, instruction, and evaluation. It also provided "extension" type education to out-of-school and adult learners. CBMI distributed Apple McIntosh and IBM compatible computers and printers provided by the contractor to all funded education pilots.

Activities in application research included the following:

Arabization Program: The goal of this program was the mastery of hardware and software technologies for Arabized systems and the development of high technology products which promote the Arabic language. The program focused on techniques for Arabizing computer systems and also on processing the Arabic language, text and speech.

Phosphate Mines Planning: The objective of this activity was to improve the operating and engineering efficiency of the Compagnie Des Phosphates de Gafsa (CPG) through improved planning and use of computers by the engineering staff.

Processing of Seismic Data: The objective was to introduce advanced oil exploration and exploitation technologies to ETAP, the national oil company, so it could better use the data collected by private oil companies in Tunisia.

Telecommunications and Networks/Bilingual Videotext: The objective of this activity was to introduce bilingual (Arabic-Latin) videotext to executives, officials, and the general public of Tunisia.

PTT Telephone Network Services: The objectives was to measure the service characteristics of the voice telephone network as actually perceived by the subscribers.

A coordinating committee was established early in the project, under the auspices of IRSIT, to review all proposals for pilot activities. Evaluation of the proposal placed high priority on the potential of producing applicable products, cost implications, and likelihood of continuation of the activity after pilot funding terminated.

Outputs:

- 17 Pilot projects undertaken in higher and secondary school activities and other sectors
- 128 microcomputer and software purchased and in use in secondary schools
- Installation and acceptance of microcomputers at pilot schools
- Construction of a PC-based Arabic-English dictionary for computers
- 6 microcomputer and software purchased and in use at the Ministry of Education

c) **Training**

Training activities under the project fell into four categories: short-term U.S. training, in-country training, observation tours, and conference attendance. No long-term training was supported under this project.

Short-term U.S. Training

If IRSIT was to become the leader in state-of-the-art computer applications in North Africa, short-term training in the U.S. was necessary. U.S. based training consisted primarily of supporting Tunisians in short courses, exchanges, and similar activities of one semester or less, at U.S. institutions of higher education with outstanding computer programs and U.S. based research institutions. Candidates for U.S. training were selected from IRSIT or drawn from Tunisian institutions of higher education and organizations involved in application of computer technology. Preference was given to training which would lead to clearly applicable skills.

Observational Tours

Since research activities are clearly dependent on knowledge of existing research activities, previous findings, and present experiences, the project funded observational travel for key Tunisian researchers and planners involved in information technology. These visits included education institutions, research institutes, industry, and public and private sector organizations involved in computer technology. Logistical arrangements were made by the contractor (AED).

In-country Training

In-country training was targeted towards producing teachers qualified to introduce computer technology in educational settings and towards providing researchers, scientists, and end-users with skills necessary to apply computer technology in their work. While most of this training was conducted by Tunisians, the project supported the technical assistance necessary to develop curricula for training and to set up institutional capacity for IRSIT and GOT to maintain this training capacity after PACD.

Conference Attendance

Just as important as receiving training, the attendance at conferences was deemed important and necessary. Attendance at conferences kept scientists and researchers abreast on the latest trends and applications in computer technology.

Consistent with A.I.D. policy and regulations, the GOT funded all international airline fares for training.

Outputs:

- 36 individuals received short-term training in various computer technology related fields
- 2 major regional Conferences planned and held in Tunis
 - o Regional Conference on Informatics and Arabization
 - o 10th Tunisian-French Conference on Software Development
- Training of Trainers for 45 Tunisian secondary school teachers

d) Institutional Planning, Development, and Analysis

Activities under this project component focused on developing a capacity within Tunisian institutions to maintain relevant research and other activities in computer technology after the project. This was achieved mainly through the development and support of IRSIT. The project provided technical assistance to the GOT (through IRSIT) to evaluate the impact of computer technology on education and to examine its needs in the area of computer and related technologies. These needs considered existing resources, both human and institutional, and manpower and demand projections.

Project consultants also provided an analysis of Higher Education in Tunisia to examine the need for a new, discrete, computer-oriented, higher technology institute and/or expanding existing universities. The development of the GOT proposed American-oriented Carthage Institute of Technology (CIT) was closely examined. The idea of CIT was derived from the belief that highly trained manpower is essential in areas which are striving to achieve socio-economic development. The GOT envisioned that such an institution could not only play an important role in Tunisia's development but also West Africa, and the Arab World. By expanding the emphasis on computer technology and telecommunication to include fields relating directly to economic, social, and industrial development, CIT could train professionals in the technical knowledge and management capability to lead future development.

Based on the analysis of the higher education system, the consultants recommended the establishment of a new institution for the study of technology, rather than the expansion or creation of new programs within existing universities. The plans for the development of this institution was never carried out by the GOT.

Output:

- Study for the need of an institute of technology completed and submitted to GOT for review

V. END OF PROJECT STATUS

A. Institutional Status and Sustainability

IRSIT is now a leader in computer technology in North Africa. It has worked extremely well, particularly since PACD to establish a proper working environment for its staff, and to establish the infrastructure necessary to allow it to operate as a viable group in telecommunications and computer science. This effort has been accomplished very rapidly, given that it often takes five years to establish an applied research group. IRSIT already has a reputation within Tunis for:

- a) well-trained, U.S. educated working staff;
- b) technically up-to-date, serious, and hardworking staff; and
- c) a group able to respond quickly to demands.

IRSIT has a staff of more than 35 researchers and scientist compared to 3 at the beginning of the project. Its percentage of funding from the government has decreased by 60% to 45%.

VI. LESSONS LEARNED

- Effective institutional linkages must be based on mutual benefits between the institutions. This often requires considerable time and exchange between the institution and the potential partner just to recognize the mutual benefits. The time and cost (particularly communications cost) must be included in schedules and budgets.
- Being the first or only user of any hardware or software in a country has several disadvantages. "First and Only" users experience the most severe maintenance problems. Note that this guideline may conflict with the desire to be a technology gateway, so a balance must be reached.
- Buy for quality rather than price. Because of the cost and difficulty of maintenance in Tunisia, it was better to pay costs up front and purchase high quality equipment which fails less often. This also minimizes work disruptions when the equipment fails.
- It is essential to budget at least 10 percent of the total equipment funds for maintenance and/or spare parts. It is also important to investigate the willingness of local vendors to service equipment procured directly from the U.S.
- Short-term professional training proved to be a very effective way of augmenting the technical education of Bachelor and Master level staff. For those with a Ph.D., however, such short courses must be carefully screened to ensure high quality. Staff and management beyond the Ph.D. level

generally benefit most from attendance at seminars and conferences, and through meetings with executives and staff of cooperating institutions.

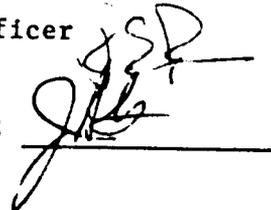
- Creation of an international institution of the size and scope as envisioned of CIT required considerable long-term political and non-political support within a country. It also requires exceptional stability within the government. Tunisia's change of government and successive appointment of three Ministries of Higher Education during the CIT project work made it difficult for the necessary long-term stability.

VII. RECOMMENDATIONS

- o Professional staff are perhaps the most important part of a project. The combination of training in the U.S. and experience in Tunisia of the IRSIT staff is much more difficult to replace than equipment. IRSIT should find ways to retain valuable professional staff in the face of intense competition from other institutions.

Clearance: Richard Rousseau/Private Sector Officer

James A. Graham, Director, USAID/TUNIS

A handwritten signature in black ink, appearing to read 'JAG', is written over a horizontal line. The signature is stylized and cursive.