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A UNIVERSITY LINKAGES PROJECT PROPOSAL FOR THE ADVANCEMENT OF THE UNIVERSITY OF MAURITIUS

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AED

Academy for Educational Development, Inc.

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EXECUTIVE SUMMARY

Dr. William A. Stuart, a consultant to the Academy for Educational Development, presents a proposal for development of a "Center for Informatics and Computer Services" at the University of Mauritius. The proposal calls for USAID to support technical assistance, informatics and computer application demonstration projects, training, faculty development, curriculum revision and improvement, and commodities, as part of a a five year project.

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Introduction

Mauritius' economy has undergone a significant transformation over the past decade. The country is now poised for another phase of its industrial revolution. Given the small size of its local market, the Government of Mauritius is continuing to focus attention on export-oriented industrial production but it is also increasing its emphasis on the diversificaiton of the industrial base by encouraging the manufacture of high value added products in the Export Processing Zone. Recent studies have identified two major areas in which national and international investment is particularly warranted: informatics and electronics. In support of the Government's industrial diversification efforts, proposals originating in the Ministry of Economic Planning and reinforced by USAID, have been made which call for the development of a linkage between one or more U.S. universities and the University of Mauritius to assist the institution in keeping pace with these rapidly changing economic trends. Discussions with members of the business community, the Government, and the University point to the need for improvements in faculty development, enhancement of the academic program, upgrading of facilities and equipment, and the computerization of University operations.

The University of Mauritius must position itself to respond to the country's rapidly changing needs and to support the growth and diversification of the Mauritian informatics and electronics subsectors.

I recommend that the University Linkages project to be formulated under the aegis of USAID should focus on the design, installation, and development of a major university-wide informatics and computer services facility to be headquartered in the new computer center wing currently being planned on campus. Construction of this addition is scheduled to begin in February. Initially, most of the support activities provided by the center would be dedicated to the development of the Departments of Electrical/Electronics Engineering and Computer Science in the School of Engineering. In short order, however, services would be expanded to include other departments and schools, selected administrative offices, and eventually, the entire university community. USAID assistance would include technical support, informatics/computer application demonstration projects, training, faculty development, curriculum revision and improvement, and commodities such as a computer hardware, software, and ancillary support equipment. A five year project is envisioned to ensure the firm establishment and smooth functioning of a new and complicated service operation, the introduction and evaluation of

innovative computer science, electronics, and management courses (such as MIS, computer engineering, and computer technology), and the training of key faculty and staff members in the U.S. at Phd and Master's degree levels. The new service facility might be called the Center for Informatics and Computer Services, or CICS.

The Center for Informatics and Computer Services

The University Linkage project would focus primarily on the development of a computer service center of maximum usefulness to faculty, students and central administration.

Academic Computing Services. CICS should be designed to provide academic computing services for the entire academic community, but with special reference to the development of computer science and related engineering courses and activities. Assistance would be made available on a regular basis for consultation with faculty on the use of available CICS computer equipment and on software for applications in classroom teaching and relevant research work. Advice would be given on programming, de-bugging problems, program and systems designs, and operating procedures. More importantly, computer time would be provided for applications development and operation and for running programs. CICS would keep faculty informed about changes in center services, new software, and recently acquired computing equipment designed to facilitate applied research and teaching. In addition, CICS staff would, when feasible, attempt to evaluate relevant software for faculty and to counsel them on suitable equipment acquisitions for the Schools and Departments. Group and individual training sessions, including workshops and mini-courses, would also be arranged for faculty to familiarize them with new applications, improved techniques, and the use of CICS compatible equipment. All computer acquisitions, however, would be coordinated by the Center.

In similar fashion, staff assistance and computer facilities would be made available to students not only for regular classroom use but also for "drop-in" advisement, homework, assignments and informal group instruction. Since, in all likelihood, basic-computer literacy will eventually become a requirement for every matriculating UM student, CICS should be prepared to provide the practical means to achieve that goal.

At the same time, students in computer science, computer engineering, electronics engineering, MIS, and similar courses would be serviced in greater depth by the Center from the outset. Relevant journals, periodicals, software, videos, etc. of interest to informatics-oriented students would be purchased in greater volume; seminars, conferences and workshops would reflect this same preference; and mentors would be provided in greater supply, locally and from abroad. For these students, CICS would become and especially stimulating resource center, and actual techniques and systems used by professionals in both the private and public sectors would be highlighted for their benefit.

Administrative Computing Services. In addition to academic computing services, CICS would provide training and consultation to the administrative offices on the business side of the University, including the library, concerning the computerization of their operations.

There are presently many commercial programs offering automated systems in fund accounting, financial management, payroll, inventory control, student admissions, registration, faculty records, etc. As a result, the university has a golden opportunity to capitalize on the computer technology of data-base management and to design and implement a comprehensive MIS system. Advanced hardware and sophisticated software, together with the expertise and technical back-up supplied by the project, could be provided to install a centralized on-line, interactive MIS system to maximize services to faculty, staff and students. The computer design team should take advantage of this opportunity and explore its feasibility.

As discrete administrative systems are developed by CICS staff and gradually come on line, the CICS would provide all operating services needed to process data and produce required output. Unlike academic computing, administrative computing is driven by deadlines; also additional CICS staff members may be required to handle an ever-increasing volume of work. Central Administration should be forewarned.

While the managment of administrative computing services should be centralized in CICS, many of the services themselves would be decentralized for the convenience of users. The new technology makes this convenience possible. The configuration of central and peripheral equipment, the networking of hard-wired equipment and other issues related to hardware and systems design should be left to the technical experts.

The Management Information System. Assuming that a central data-based MIS system is feasible, decisions must be made concerning the degree of operational centralization that CICS is able to accept and the extent to which administrative staff can be schooled and trained to access the system and participate effectively in the functioning of each component of the system. Depending upon the administrative staff concerned, central operational activity on the part of CICS can be expected to vary considerably. Flexibility must be built into the MIS system at the design stage.

To collect, sift, and evaluate information from the Vice Chancellor, Registrar, Budget Director, Heads of Schools and Departments, Librarian, and their staffs, and in other ways to put together a practical proposal for the design of a "master plan", one must have a clear idea of the steps or tasks to be undertaken to develop and implement each integrated sub-system in its entirety. In practice, experience shows that it is advisable for

each sub-system to be implemented in stages as the MIS system expands to meet priority needs. Moreover, it is essential that each sub-system should have the capacity of being implemented as an independent, free-standing operation of, say, the business office or the library, in conjunction with CICS.

The basic tasks required to design separate sub-systems are virtually identical with those required to design the larger, more comprehensive, university-wide system. These entail:

1. Conceptualization of the overall MIS design into which discrete sub-systems will fit.

2. Investigation of the technical and logistical requirements of the installation and operation of an MIS system at the University of Mauritius, including the evaluation of appropriate software offerings available locally and in the U.S.; the rating of computer hardware, operating systems and programming language options, with special reference to management, maintenance, and customer service; and the assessment of personnel, facilities and budgetary implications of the most promising software/hardware.

3. Systems design: Development of descriptions of the proposed sub-system's major functions, based on the conceptualization of the system and the logistical findings.

4. Formulation of systems implementation procedures in the form of internal user manuals, forms, sets of instructions, and other documentation concerning the adoption of recommended hardware/software, availability of support personnel (the existing staff is small), expectations of funding levels during and after the life of the project (the university's recurrent budget is less than modest), and the scope of the final systems design.

5. Investigation of (a) the strength of professional and technical assistance available to the university in Mauritius, the U.S. and elsewhere which is required in the design, development, and operation of sub-systems and the University-wide MIS system through the life of the project and beyond. In accounting, financial reporting, and management systems, for example, the University might tap expertise provided by Deloitte, Haskins and Sells or Price Waterhouse and in other ways to establish ties to other local firms; (b) the strength of local resources in computer techniques, technical "know-how", equipment operating systems, maintenance, etc.; (c) the experience of selected U.S. colleges and universities, comparable to UM, in designing and implementing MIS systems, i.e. linkages.

6. Development of timetables for the design and development work.

7. Preparation of relevant cost estimates.

Communications Services. CICS would undertake to organize and manage all communications resources on the campus for the University. Services would include planning and maintaining telephones and the telephone system, broad-band and base-band data transmissions, radio and television networks, teleconferencing facilities, voice amplification and visual presentation facilities, even the alarm/life safety support sytems. In addition, it is proposed that audio/visual equipment and aids for classroom use would be made available through a separate unit in CICS to facilitate the provision of these services to the teaching faculty. Finally, CICS would arrange for the most cost-effective and efficient access to remote data-bases as possible for use by faculty and the administrative staff.

In a university as small and manageable as the University of Mauritius, CICS would be able to make a significant contribution in strengthening the teaching functions of the faculty by promoting the wide-spread use of up-to-date communications technology. Television, for example, is particularly suited as an instructional medium. CICS would develop and provide TV services that concentrated on support for traditional classroom activities. It would assist faculty in the creation of educational materials such as video tapes of lectures or special events and it would acquire commercially available video tapes appropriate for use in the University's regular course offerings. Other possible uses would include: taping events that would otherwise be difficult to bring into the classroom; and taping off-campus lectures or other activities for later broadcast in class. CICS might also arrange interactive closed-circuit television links between on-campus and off-campus classroom sites.

Operational Services. The CICS would also be responsible for managing, maintaining, and operating all campus-wide computing systems. The Center staff would be authorized to purchase equipment and supplies, contract for maintenance and repairs, monitor machine performance, determine the procurement of operating systems, etc., to ensure a minimum of down-time and a maximum of continuous service to all users on campus. In addition, CICS would negotiate with vendors to enable individual faculty members to acquire computer equipment and software at educational and/or group discount rates.

An important part of the University Linkages project, of course, would be the provision of equipment directly supporting efforts to strengthen the University's curricula and teaching program and to increase its capacity to conduct applied research and deliver consultancy services. Included would be a more powerful mini-computer and additional microcomputer and terminal lab facilities for classroom instruction, independent study, and research; software, books, periodicals and journals; and selected ancillary equipment, such as photocopiers, FAX, and diagnostics machines.

Staffing and Organization of CICS. Building on the existing computer center of the School of Engineering, the University Linkages project would help to establish and organize a new, university-wide, service facility whose director, it is recommended, should report directly to the Vice Chancellor. Here, too, experience has shown that without direct personal support and financial commitment at the top, computer centers and MIS systems, whether in universities or industry, simply do not achieve their objectives.

CICS would be headed by a senior Information Systems Manager, whose services would be provided for the entire life of the project. It is recommended that UM identify a Mauritian counterpart to this administrator as soon as possible. If the full support and commitment of the University's chief executive officer is essential to the success of CICS, the leadership provided by its director is equally vital. The IS Manager, who would also be the project's Chief of Party, would assume responsibility, under the Vice Chancellor, for (1) the establishment of CICS, working closely with the relevant faculty and Head of the School of Engineering, and (2) the achievement of project goals. In this latter role, the IS Manager would lead a long-term assistance team composed of an Academic Computing Specialist experienced in computer services -- as seen from the users point of view (in the classroom, laboratory, and in the field) and a Computer Operations Specialist with "hands-on" experience as a provider of a wide range of services to faculty, students and administrators, as well as "outside" clients in industry and government.

To augment the team, the Manager would also administer essential short-term technical support recruited from U.S. universities and colleges: Administration Computing Specialists; MIS Specialists; and Programming and Systems Specialists. As with the Manager, Mauritian counterparts for these CICS staff positions should be recruited early on -- even, if necessary, on a part-time basis.

Demonstration Projects in Computerization

One of the important objectives of the University Linkages Project in strengthening the University in areas of informatics and the use of computers should be to demonstrate the power, versatility and utility of computers in classroom teaching, in learning and training, in applied research, in industrial and business applications, and in the administration of the University itself. Toward this end, the project should develop its work plans in ways that single out computer applications demonstrating these qualities as dramatically as possible. Highly visible, successful demonstrations, implemented early in the project, will attract wide support and stimulate experimentation among faculty and students. Some possibilities include:

- o Use of the electronic classroom in the teaching of telecommunications;
- o Applied research in international marketing, using statistical packages and spread-sheet analysis;
- o Experimentation with graphic design in the fields of textile design and electronics;
- o A model computer program for conducting University admissions.

Targeting specific project funds to support such projects would be useful in ensuring that each demonstration project was fully developed, documented and implemented.

Faculty Development

Universities are labor-intensive enterprises; as a result they are expensive to operate. However, they are designed to provide services without regard to profit. They must generate new resources continuously if they are to meet these goals. At the University of Mauritius, these resources come entirely from the GOM. In attempting to achieve its stated goals in the areas of informatics and electronics, the bulk of the University's engineering faculty will be drawn from disciplines that are in the highest demand in both industrially developed and developing countries -- engineering, computer science and business. To be successful in its recruiting efforts as well as in its faculty retention program, UM will have to be extremely resourceful in providing incentives for its best people. Unfortunately, UM faculty salaries are scale-driven, not market-driven. As a result, the institution must look to other means to maintain a faculty of excellence, such as improved facilities and accommodations, attractive leave programs, faculty-in-training programs, and increased consulting opportunities.

The University Linkages project would support these efforts by offering at least two PhD fellowships and five MSc. fellowships for selected members of the teaching staff of the School of Engineering and/or CICS to study in U.S. universities. It would be important for the contractor of the Linkages Project to be in a position to provide adequate logistical and monitoring support for these fellowship recipients. In addition, the project would support attendance of UM faculty and staff in U.S.-based short courses at universities, state colleges and perhaps community colleges. In-country, the project would under-write workshops, seminars and short courses at CICS for the UM community, and conferences and colloquia to include interested professionals from business, government, and perhaps from the public at large.

Curriculum Development

If the University is to produce more highly trained and technologically educated men and women who will have an impact on the development of the informatics and electronics sub-sectors, it must offer courses of study which will place UM graduates in the forefront of the emerging technology. To accomplish this objective, the University Linkages Project would provide not only the teaching aids and physical resources of CICS, together with the expertise of its staff specialists, but in addition, the professional and academic support of visiting professors of computer science, computer engineering, MIS, and other related disciplines from the United States over the life of the project.

The Head of the Computer Science Department, G. Nuckchady, has already proposed the first steps needed to upgrade the Diploma course in computer science and to initiate a new BTech Degree course in computer science. He has the full support of his Head of School, Dr. J. Baguant, and the Vice Chancellor, Professor Manrakhan, and is fully prepared to work with U.S. faculty to upgrade, broaden, and improve the course offerings of the department. Moreover, the entire School of Engineering has had considerable experience in working with and benefiting from linkages with several distinquished British universities, and the School and Department Heads are quite comfortable with the prospect of working closely with U.S. faculty and establishing new linkages with American institutions. The Head of the E/E Engineering Department, C. Bhurtun, is also enthusiastic about establishing such linkages and would be amenable to a joint effort to explore the possibility of developing a new course of study in computer engineering, probably at the BTech level. Such a venture would require a considerable amount of help from U.S. faculty members and from the U.S. specialists based in CICS.

However, it must be recognized that an advanced curriculum of this sort will require a faculty development program that has a long-term horizon. Immediate assistance can be provided from project personnel but, over time, Mauritian professors will be needed who are conversant with matters of stochastic processes in engineering and such but who, in addition, are well versed in discrete time filters, digital systems design, microprocessor-based digital systems design, and digital communications as essential components of an exciting new course of study for engineering students. The School of Engineering is proceeding quite properly, in my judgment, to upgrade its existing lower-level courses gradually and to offer them only as more adequately trained and qualified faculty can be recruited and/or as regular faculty members are given leave and financial assistance to study abroad and return to the University with advanced degrees. Visiting professors from the U.S. would expedite and hasten this process not only by taking the lead in the design of new innovative courses of study but also, beyond the life of the project, by ensuring that the professional relationships and lines of communications established during the project would be

cultivated and nurtured long afterwards. However, this is a slow, complicated process. It is clear that the University has a long way to go if it is to develop the calibre of faculty and the institutional infra-structure that are required to maintain and continuously update a computer science/engineering curriculum designed to meet the demands of the changing Mauritian economy.

If, as is likely, the emerging curriculum in computer science/engineering is tied directly to corporate and governmental interests, the faculty will be required to adopt a more integrated "interdisciplinary" approach to course development. There will be demands for combined courses in computer science and electronics engineering, computer science and electrical engineering, and computer science and management, to cite some expamples. The University must be prepared to offer the program flexibility and provide the resources needed to implement combined courses of study of this sort.

In summary, the primary purpose of the University Linkages Project, which is proposed in this paper, is to strengthen and enhance the capacity of the University of Mauritius to develop facilities and skills in areas which are critical to the industrial diversification efforts of the Government and the country. The project's centerpiece is the Center for Informatics and Computer Services, a new university-wide facility dedicated to the provision of academic and administrative computing services and communications services to students, faculty, administration, and selected external clients, with special reference to the departments of computer science, electrical/electronics engineering, and to a lesser degree, management. Augmenting this central thrust, and of equal importance, are two complementary components: faculty development and curriculum development to strengthen and enrich the academic program in the fields of informatics, computer science, and electronics engineering. Since the provision of all long-term and short-term technical assistance and training support from U.S. universities, together with the procurement of computer equipment and other commodities, would be concentrated and focussed on the accomplishment of these closely related objectives, the project's impact would be infinitely greater than the impact of support that is distributed more widely throughout the University. Looking ahead, the benefits of a well-staffed, up-to-date, service oriented informatics/computer center, providing faculty, students, and administrators with ready access to state-of-the-art computers and computer technology, will touch every member of the University community and affect most of its constituencies, directly or indirectly. Furthermore, the linkages which are established during the life of the project between UM faculty and staff and their U.S. college and university colleagues should, if properly cultivated, last for many years to come. After all, the benefits to be derived are mutual.

PERSONS MET

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Mr. R. Bheenick, Director, Ministry of Economic Planning and Development
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Numerous unidentified faculty and students on campus.

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