

CHAPTER 6

INFORMATION TECHNOLOGY

6.I BASIC FEATURES

6.I.1 In recent years, Information Technology (IT) has become pivotal to the process of economic development. Because of the tremendous strides which have been made in this discipline over the past two decades or so, information technology now provides the most efficient and cost-effective ways of exchanging information and transacting business. In addition, it has changed the very nature of the world's financial and other service sectors. Perhaps its most important potential contribution to the social and economic development of countries such as Guyana, however, is the fact that it embodies in its mechanisms and modalities the means of considerably enhancing our human and institutional capacities.

6.I.2 In this globalised world in which we live, information technology is now arguably one of the most important determinants of competitiveness and social and economic growth. Countries and firms are becoming more competitive because of their knowledge, rather than because of their natural resources and the low cost of their labour. What now determines a country's advantages are its access to information technology and knowledge. What is now more important than ever in the attack on economic underdevelopment is man-made not "natural", in the traditional sense of the term. And since man-made comparative advantages can only be acquired by knowledge, the implications with regard to labour markets, technical education, and human capital formation are tremendous and far-reaching. Countries that invest in, and quickly adapt, information technology will develop socially and economically. The inhabitants of those countries which do not so invest and adapt are, more than likely, doomed to lives of abject penury.

6.I.3 The prerequisites for the creation of an information-based economic structure are the existence of an efficient telecommunications infrastructure and effective telecommunications services. Unfortunately, Guyana's telecommunications infrastructure is far from adequate, mainly because there is a very serious shortage of telephones in the country, and the demand for inexpensive data connections, with adequate band widths, far outstrips their availability.

6.I.4 Until 1st June 1990, when an agreement for its privatisation was signed, Guyana's telecommunications sector was serviced by the Guyana Telecommunication Corporation (GTC) which was a public corporation wholly owned by the government. GTC had, at that time, 21,000 telephone lines and there was a waiting list of potential subscribers of well over 40,000. Moreover, the telephone system in use was obsolescent, there was the greatest difficulty in making overseas calls, and there were problems of audibility and speed of connection even with respect to local calls. In short, the sector suffered from the constraints which are usually associated with state monopolies.

6.I.5 GTC was privatised by converting it into a private limited company called the Guyana Telephone and Telegraph Company Limited (GT&T), and by selling 80 percent of the shares of the new company to an overseas investor – the Atlantic Tele Network Limited (ATN).

6.I.6 The agreement between the Government and ATN, and the licence granted to GT&T, provided the new company with monopoly rights, in respect of some of its telecommunications operations, for a period of twenty years. These rights are renewable, at the option of the licensee, for another twenty years.

6.I.7 In return for this partial monopoly, ATN agreed to formulate a plan, the objective of which would be to expand GT&T's facilities and operations, in a significant manner, within a period of three years. ATN also agreed to raise the resources that would be required to implement the plan. The original date for completion of the plan was December, 1993. However, the first proposals were amended, and the termination date was

extended to February, 1995. Even so, by the end of 1999, GT&T had not yet completed the exercise. Accordingly, the Government has referred the matter to the Public Utilities Commission (PUC), an independent body with responsibility for regulating the telecommunications sector in Guyana. Its task is to act as an objective referee in order to ensure that both the consumer and GT&T are treated in a fair and just manner.

6.I.8 In addition, the agreement included *inter alia* the obligations to provide universal service to all subscribers, to fulfil all service requests that are deemed to be reasonable, and to interconnect the telecommunications system of licensed operators whenever practical, on a compensation basis.

6.I.9 It should be noted that no reference is made in the licence to value-added services; that the government can direct GT&T to provide interconnection to third party operators, and to license third party operators for the provision of long-distance services for distances greater than 50 kilometres; that the government can operate its own domestic and international network with interconnections to the public switchboard network; that GT&T must maintain quality-of-service standards that are equivalent to internationally recognised specifications; that GT&T is prohibited from entering into arrangements with international carriers which may unfairly restrict access to third party operators and must inform the PUC of all joint ventures; and that the government has the right to license a second mobile wireless operator.

6.I.10 Since 1991, GT&T has introduced a number of telecommunications-related services to Guyana: it has installed over 400 public telephones across the country; it maintains three public telephone centres from which the public can make international and domestic calls; it has increased the numbers of international circuits from 75 to just over 1,000; and it has established two satellite earth stations, one for international circuits and the other to connect remote interior locations. Moreover, it has invested in a wireless local loop service, a cellular service, and a fibre optic cable network which connects most of GT&T's switches. In addition, the number of telephone lines had grown to 63,500 by October 1999. However, the backlog is still immense. Indeed, it is now higher than when the new company signed the Agreement in 1991. Moreover, there appears to be little rationality in the allocation of telephone connections for, frequently, areas that are sandwiched between serviced districts are ignored and, far too often, individuals in particular streets are by-passed.

6.I.11 GT&T has contended that the primary reason for its failure to provide the universal service it has contracted to give the Guyanese public is the fact that the PUC has not given it the necessary permission to raise rates, even though the terms of the agreement and the licence warrant the granting of such permission.

6.I.12 Information Technology is currently utilised in Guyana in a very modest way. In the Public Sector, the government has introduced Personal Computers (PCs) to assist in its general administration, the Ministry of Finance, the Revenue Authority, the Lands and Surveys Department, and the Public Service Ministry being the main users of computer systems. They employ them, however, in a somewhat rudimentary manner. In the private sector, information technology is utilised largely to provide financial information.

6.I.13 There are many retailers of personal computers, and back-up support is available in Guyana. Computer hardware is duty free.

6.I.14 There are four internet service providers. There are also a few internet cafes which offer access to the internet. In addition, many local businesses and NGOs have developed websites. It must be again emphasized, however, that growth in the country's utilisation of the internet system is severely restricted by the unavailability of a suitable national telecommunications infrastructure.

6.I.15 Computer training has been introduced into some schools, primarily in the leading secondary schools, about twenty percent of which possess computers. Computers in such schools are usually located in a small

computer laboratory, and are not generally distributed in classrooms. Moreover, computer literacy classes have been started in a number of schools and a few are actually teaching CXC information technology and CAPE information technology courses. A few primary schools also possess computers and offer elementary training in their use. Because a very small proportion of the schools which have computers possess telephones; most of them have absolutely no access to the internet.

6.I.16 The National Centre for Education Research and Development (NCERD) is in the process of formulating an information technology curriculum, mainly for secondary schools. NCERD has a small information technology unit and laboratory which also provides some support to teachers of information technology. It also utilises computers for administrative tasks and curriculum development. CPCE has a functioning information technology laboratory and offers courses for trainee teachers.

6.I.17 It is planned to establish through one of the projects of the Secondary Schools Rehabilitation Programme a pilot system in which a number of schools will each receive four computers to be utilised in the delivery of their curricula.

6.I.18 The main offices of the Ministry of Education have small networks of computers for administrative purposes. The Planning section maintains databases of information on schools.

6.I.19 The University of Guyana uses computers both for administrative purposes and for tuition. Unfortunately, coverage is very incomplete in both areas. Indeed, only one computer laboratory service is available for the entire student population. In general, students on campus have no Internet access, and staff access is normally limited to e-mail, using one terminal.

6.I.20 Instruction in computer science, to the diploma and degree levels, is provided by the Faculty of Natural Sciences, which includes the Department of Mathematics and Computer Science. However, the success of the programmes is constrained by inadequate staffing, the large sizes of the classes, and the inadequacy of practical training.

6.I.21 A number of private commercial computer schools exists in many parts of the country. They provide short business-oriented courses on basic computer skills, and are usually based on one particular software package. The emphasis in these schools is on the acquisition of practical skills. Unfortunately there is limited hands-on time, and the standards are not always high.

6.II ISSUES AND CONSTRAINTS

6.II.1 Telecommunications

6.II.1.1 As has already been pointed out, the basis of any efficient information technology sector is an adequate telecommunications system. Such a system should provide a number of services that are considered essential for the creation of an information-based economy. Among these, at the very minimum, are 'universal' services, (which term is interpreted to mean the provision of telephone lines to all who apply for them); and adequate band-widths for any number of computers. As we have noted, these essential requirements are not yet available in our country.

6.II.1.2 The reasons for this sorry state of affairs include the nature of the franchise of GT&T and the imperfections of the PUC. Indeed, the Public Utilities Commission seems unable to resolve issues pertaining to the levels of revenue to which GT&T is entitled, the true nature of the rights and obligations of both the government and ATN under the terms and conditions of the agreement, and the payment of management fees

to ATN by GT&T. If these problems are not solved expeditiously, the citizens of Guyana will derive little or no advantage from the tremendous advances which have been made, and are still being made, in Information Technology. If these issues are not resolved, Guyana will be obliged to continue to utilise outdated and obsolescent information mechanisms at a time when the country's development cries out for the employment of modern processes.

6.II.1.3 It is not the intention of the NDS even to attempt to resolve the *contretemps* between the Government and ATN. These are essentially of a legal nature, and ought therefore to be settled either by the PUC or by the courts. It is our opinion, however, that a word on the nature of "telecommunications monopolies", in this day and age, might not be remiss. **First, GT&T's licence does not appear to embrace a great number of the new services that are becoming available through the rapid changes which are occurring. It is more than probable that if there was competition in Guyana, many of these new facilities would have been marketed. Second, competition in telecommunications is now occurring to a rapidly increasing degree throughout the world in both developed and developing countries. This almost universal trend towards the curtailment of telecommunications monopolies is obviously of great importance to Guyana. We must not be left behind, again, in this matter. We must, therefore, explore every possibility of modernising this sector, if only because it is so basic to our development. Third, it is becoming more and more evident that the telecommunications industry in some developing countries has been able continuously to meet the demands of their consumers, and to provide universal service. In others however, it has been unable to do so. Why is this so? The simple answer appears to be that those countries which have been successful in satisfying the telephonic needs of its citizens have encouraged competition, while those which have failed to do so have tended to be monopolistic. And fourth, it is now becoming generally accepted that there are few, if any, economies of scale in the modern telecommunications industry. This was the contention that was made in the past to justify telecommunications monopolies. This argument does not now appear to be relevant. This is so because there is a range of technological advances which currently enables telecommunications companies to make profits even when competing with others in relatively small markets.**

6.II.1.4 **It therefore seems that in order to be sure that the basic telecommunications infrastructure which is required for the country's development is established, the nation's objective should be the liberalisation of its national telecommunications system.** In doing so the strategy should be first to provide a non-contentious environment in which a framework for the modernisation of telecommunications can be negotiated; second, to take advantage of those escape clauses, in the existing GT&T agreement and licence, which already permit competition in some areas; third, the government should seek to renegotiate the GT&T agreement and licence with ATN; and to develop new partnerships among the regulating authorities, entrepreneurs, consumers and itself; and finally, failing all else, it should resort to the courts.

6.II.2 Trade

6.II.2.1 As has been strongly emphasised in the Chapter on Macro-economic Strategies, Guyana's economic future is to a great extent dependent upon trade, and upon its capacity to be competitive in a globalised world. Indeed, our capacity to export will determine the degree to which investments and economic growth are expanded without the encountering of balance of payments deficits and debt repayment problems. Trade is, therefore, of the most crucial importance to our social and economic development.

6.II.2.2 Information technology can assist our trade prospects in several ways. First, it can enable us to discover new markets not only for our traditional exports, but also for those new products that would result from our diversification programmes.

6.II.2.3 Second, we can improve our trade performance and our efforts at trade promotion by quickly and regularly accessing, through the internet and other means, relevant information on prices, the demand and supply of particular products and services, their specifications, potential buyers, and the periods in which they are frequently required. The inadequate exchange of such data is one of the main reasons for the low-level of commercial trade between Guyana and, for example, the rest of CARICOM. Trade thrives best when producers, exporters and consumers know about each other's products, product quality, and supply and demand capabilities.

6.II.2.4 Third, the use of computer technology for data processing could speed up delivery time, and reduce transaction costs.

6.II.2.5 Fourth, the application of information technology could help producers to deal directly with exporters thus circumventing the middle-man and, thereby, increasing their profit.

6.II.2.6 Fifth, small-scale producers, in various areas of the country, could, through the use of computers and the internet, combine with each other to obtain and supply export orders which they might not have been able to service on an individual basis.

6.II.2.7 And finally, information technology could extend the scope of our tradeables in the service sector. Through the adoption of electronic commerce we could be in a position to provide or receive, for example, a range of legal, accounting, medical, educational, financial, data processing, retailing and tourism services. Indeed, new types of jobs and new fields of endeavour could become available through access to the information economies of the world: software development, translation services, data entry and data housing services, and data conversion, to mention only a few of the already available opportunities.

6.II.3 Macro-economic and Public Sector Management

6.II.3.1 Although a most significant amount of progress has been made since 1989 in the management both of the country's economy and its public sector, very much still remains to be done. As we have seen, the country's economy has not yet been placed on a path of self-sustaining growth, and the incidence of poverty, though reduced, is still disturbingly high. There is also strong evidence that there are inefficiencies both in the mobilisation of resources, and in their utilisation once mobilised. Efforts in stabilising the macro-economic environment, and in improving the efficiency, transparency and accountability of our governance can be greatly assisted by the application of information technology. Such systems can also help us to design, implement and monitor the performance and the effects of the various policy reforms which have been initiated.

6.II.3.2 Moreover, we can use information technology to (i) follow-up on tax collection and validate revenue collection against expenditure; (ii) apply simulation techniques simultaneously to maximise revenue and minimise the tax burden in selected income groups and (iii) help to simplify purchasing procedures. In short, information technology systems, and computer-based modeling, should be used in as wide a range as possible of our governmental transactions.

6.II.4 The Small and Medium Scale Entrepreneur

6.II.4.1 One of the main thrusts of our economic development strategy between 2001 ad 2010 will be, as has been described elsewhere, the upgrading of the capabilities of small and micro-enterprises (SMEs) in Guyana. In this regard, we have emphasised that particular attention will be paid to the provision of credit, the liberalisation and reform of our land tenure system, and the training of small-scale entrepreneurs. In addition to all this, however, because the members of this group operate in an information-starved

environment, it will be necessary to provide them with the most basic types of data. Moreover, the means of delivering technical learning to these budding Guyanese entrepreneurs are, as yet, poorly developed. Indeed, they often do not exist. We must therefore utilise information technology effectively to increase the flow of information to these fledgling business–persons and to increase their capacity to "learn–by–copying."

6.II.4.2 Information technology can also help small and medium scale enterprises to form networks and to build alliances. In many developing countries, the building of alliances and networks has led to the formation of clusters of SMEs which reinforce each other, improve their international competitiveness, and expose them to technological change.

6.II.5 Agriculture

6.II.5.1 Although one of the main objectives of this National Development Strategy is the diversification of our economy, Guyana, for a significant time to come, will have to rely on agriculture, in both its traditional and non–traditional guises, for much of its development. Consequently, specific strategies have been put forward in the sectoral chapters that are devoted to various aspects of agriculture, with a view to improving the sector's productivity and efficiency. The implementation of these strategies would, however, be much enhanced through the adoption of information technology. For example, information systems could be developed to monitor our draining and irrigation systems, the utilisation of our land resources, and the control of crop diseases. Moreover, through information technology, access to new techniques and technologies for improving agricultural production would be considerably increased. Extension officers would then be able to advise growers on ways to step up their productivity. Indeed, the type of knowledge now being disseminated by information technology systems include advances in genetic engineering which could offer opportunities for Guyanese to use seeds and plants that are adaptable to areas of relatively low water availability and sub–optimal soil conditions, and would therefore be of infinite assistance in our utilisation of such locations as the Intermediate and Rupununi Savannas.

6.II.5.2 If Guyana is to emerge quickly from the morass which now seems to hinder its social and economic development, it cannot afford to follow time–worn and beaten paths. We must piggy–back on the new knowledge bases that are being established. We must leap–frog our development. Agriculture is one of the areas in which this process can best occur. Indeed, this is already taking place in many developing countries. For example, in Nigeria and Indonesia the utilisation of information technology has helped immensely in developing agricultural research databases; in Kenya, microcomputers are being used to improve crop forecasting; and, in Thailand, they are assisting in the regulation of irrigation systems in accordance with environmental parameters. The opportunities for the utilisation of information technology to develop Guyana's agriculture appear to be limitless.

6.II.6 Education and Training

6.II.6.1 Rapid human capital development is essential for sustained economic growth and poverty alleviation in Guyana. As shall be demonstrated later in this National Development Strategy, our country does not currently possess critical masses of trained personnel in almost any of the main areas of our developmental thrust. The inadequacy of our manpower base is therefore one of the main obstacles to our future progress.

6.II.6.2 Serious problems pervade the entire educational system. We need *inter alia*, to improve both its quality and its relevance; to increase teacher–student ratios; to overcome the limited availability of instructional material; to provide more exposure to science and technology in our schools; and to enhance the access of our University students to international journals and adequate research facilities.

6.II.6.3 Most of the problems of our educational system are caused by inadequate funding and the inefficient use of available resources. Information technology offers a wide range of low–cost solutions. For example,

distance education systems which are economic, flexible, and adaptable may be utilised to pursue conventional and unconventional educational ends. Information technology can be employed to establish linkages between the University of Guyana and the University of the West Indies and indeed, with universities further afield, in order to exchange ideas, facilitate research, and to supplement the fragile knowledge base of our country. In addition, new technologies can be utilised to teach classes in a range of schools from one central position, thus requiring a significantly reduced amount of teachers. This can be of particular importance in the country's thrust to expand the scope of its training and its coverage of technology.

6.II.6.4 The wide potential of information technology in education can be illustrated by the operations of the African Virtual University (AVU). This is a satellite-based distance-education project that was initiated by the World Bank in 1995. Its objectives are to educate and train world-class scientists, technicians, engineers, business managers, health care providers, and the other professionals that are needed to support economic development in Sub-Saharan Africa. Such a scheme might, with imagination, be adapted to Guyana's conditions. It might help, for example, to solve the persistent problems of low budgets, too few lecturers and professors, obsolescent and obsolete equipment, and limited facilities at the University of Guyana.

6.II.7 Health

6.II.7.1 From what has already been written in respect to the importance of information technology to other sectors, it should be evident that, given the relatively parlous state of our health sector, the new technology can also assist Guyana in several ways. For example, it could help in the establishment of a decentralised decision support system, which seems a necessity in the remote parts of our country; it could provide information on health profiles; it could enhance our health administration and management through the establishment of medical information systems; and, of the greatest importance to Guyana, it could link our health centres and delivery systems, and help to co-ordinate the medical transportation of patients, especially those who are referred from a lower echelon of the health structure to a higher, in our interior and rural areas.

6.II.7.2 Moreover, with moderate investments in software and hardware, hospitals can create on-call tele-radiology systems or consult on remote cases over the Internet. There is little doubt, also, that the use of the Internet could also considerably improve the quality of training that is available to our medical students.

6.II.8 The Environment

6.II.8.1 Internet technology could be used in the formulation of environmental strategies by providing data for co-ordinated environmental management in monitoring the implementation of environmental decisions, and by disseminating environmental information. It should become an integral part of the mechanisms that are utilised by the Environmental Protection Agency.

6.II.9 Costs

6.II.9.1 Apart from the inadequacy of our telecommunications services, the high cost of computers and software is perhaps the most serious obstacle to our easy access to the world of information technology. Indeed, the cost of a computer can be higher than Guyana's annual per capita income.

6.II.9.2 One way of reducing costs, though not perhaps significantly, could be through the waiving of duty on computer software, in addition to that already waived on its hardware.

6.II.9.3 Another way, could be to purchase in bulk. It may well be that suppliers would be willing drastically to reduce prices if there is a commitment to purchase relatively large amounts over time. Using a planning framework, which details the quantities and qualities of the required computers, and spells out how many will

be required and at what times, the government might be able to bargain with wholesalers to purchase the necessary amounts at wholesale prices over the time horizon of the plan or strategy.

6.II.9.4 It has also been suggested that, because the design capacity of computers and software is invariably not utilised by the majority of their users, buyers pay for features and qualities which they do not really require. Indeed, it has been put forward that a computer that is perfectly serviceable for Internet connections, word-processing and graphics can be built for less than one-fifth of the cost of the 'average' computer. It has also been argued that a modest colour display, with a 13-inch window into the Internet, is better than no window at all. Our researchers have indicated, however, that it is more than probable that Guyana, on its own, can do little to create a market for this type of product. Nor is it likely, it is claimed, that our country on its own would be in a position to persuade suppliers to produce such "minimalist" types. It is therefore recommended that Guyana should discuss this matter with manufacturers, potential donors, the Caribbean Community, and with other developing countries that are even farther afield, in order, possibly, to arrive at an arrangement which might significantly assist in our development.

6.II.10 Institutions

6.II.10.1 It is important to appreciate that no strategy for the development of information technology in Guyana can be realised unless there is established an appropriate institutional, legislative, and regulatory framework which clearly describes, as a minimum, the role of private enterprise, the role of the market in telecommunications development, and the degree and extent of public regulation to which the sector would be subjected.

6.II.11 Constraints

6.II.11.1 Some of the constraints to the efficient operation of the information technology sector are again emphasized below:–

- – the apparent existing prohibitions on the creation of private telecommunications networks (whether based on user-owned or leased facilities) and the difficulty in obtaining the required interconnections with the public networks;
- – the difficulty in obtaining licences to access international communication carriers;
- – the absence of an appropriate legal framework for the creation of enterprises or associations which provide value-added services;
- – the difficulty in obtaining capital for the start-up and expansion of information technology businesses;
- – the high cost of leased lines;
- – the underdeveloped nature of our laws on intellectual property rights, particularly in regard to software;
- – the high cost of software;
- – the lack of human resources to develop, manage and maintain information technology infrastructure, and services;
- – the lack of awareness of the true potential of information technology at the policy-making level in both the private and public sectors;
- – the contract between the government and GT&T which, if unaltered, could stifle the long-term development of information technology in Guyana;
- – the existence of a regulatory body that does not appear to possess the functional capacity effectively to regulate the telecommunications provider;
- – the fact that electricity, the main *supporting* information technology infrastructure, is too costly and unreliable. Computer equipment is sensitive to blackouts, voltage fluctuations, brownouts and spikes. Unfortunately, the Guyana Power and Light Company is by no means free of these problems. As a result, information technology equipment is either frequently damaged or the cost of its use is increased because of the necessity of installing anti-current fluctuation mechanisms; and
- – the inadequacy of the training of many local information technology "professionals".

6.III OBJECTIVES

6.III.1 The overall objective of the sector is to assist in the modernisation of Guyana through the application of information technology to all aspects of the country's development, including especially macro-economic and public sector management, the production and export of agricultural and industrial goods, and the provision of the basic social services of education and health. In all these areas the utilisation of information technology would enhance the country's knowledge base, and improve its efficiency in the formulation and implementation of public and private sectoral policies, plans and strategies.

6.III.2 The specific objectives are:–

- (i) to rationalise the telecommunications sector by clearly defining the role of competition in its operations, and by establishing a legal and operational framework for its regulation;
- (ii) to develop an information infrastructure which would comprise *inter alia* adequate data bases and other management services, as well as a comprehensive, integrated, management system;
- (iii) to assist in the reform of the public service by utilising a technology-oriented approach which would include a much greater degree of automation;
- (iv) to provide universal access by the Guyanese population and its private and public institutions to the Internet at affordable rates, through the encouragement of the development of systems that allow for the widest dissemination;
- (v) to foster a new generation of citizens, with the capability to utilise information technologies with facility in order to help in Guyana's and their own development;
- (vi) to establish a strong, reliable local information technology industry, able to service the needs of the country, to introduce new technologies, and to compete regionally; and
- (vii) to establish adequate standards for information technology goods and services, including hardware, software, and training.

6.IV THE STRATEGY

6.IV.1 Telecommunications

6.IV.1.1 The telecommunications agreement between the government will be revisited with a view to liberalising the sector, enhancing its internal competitiveness, conforming with the relevant regulations of the World Trade Organisation and, in general, bringing it into line with the prevailing telecommunications contractual arrangements which now obtain in many CARICOM and other developing countries.

6.IV.1.2 In order to implement this basic plank in our strategy, negotiations will begin immediately with ATN to ascertain whether there is the possibility of a meeting of minds on this matter. If new terms and conditions cannot be realised through negotiations, the government will take the matter to the Courts for their decision.

6.IV.1.3 It cannot be too strongly emphasised that both the licence issued to the incumbent telecommunications provider and the existing agreement will be honoured, unless there is mutual agreement to alter the provisions, or unless the Courts decide that they can indeed be altered.

6.IV.1.4 While these processes are being followed, the government will encourage the provision of those goods and services, not covered by the agreement with GT&T, by other private national or international investors. To this end, relevant enabling legislation will be enacted and adequate incentives provided. The opportunity will also be taken to review existing telecommunications laws and regulations. These are now outdated and need to be recast in order to assist in the creation of a modern telecommunications sector.

6.IV.1.5 The legislation under which the Public Utilities Commission currently functions will also be re-examined. The objective of such a re-examination, and of the amending legislation which will almost inevitably flow from it, would be the establishment of a strong, independent authority that is capable of regulating the operations of the telecommunications sector, including activities pertaining to those services

provided by companies other than GT&T. The new regulatory body will be required especially to safeguard the goal of "universal service".

6.IV.1.6 Among the other objectives of the PUC will be the protection of user interests, the resolution of user complaints, ensuring that competitive entrants become established in specified segments of the telecommunications services industry; the establishment of a 'non-discriminatory policy', to stimulate innovation; the encouragement of investments in the public network; and, of very great importance in the context of Guyana's current arrangements with GT&T, the creation of a favourable environment for the interconnection of more network operators and new kinds of customers, with the existing system.

6.IV.2 The Public Service

6.IV.2.1 The Public Service will be completely computerised by the year 2004.

6.IV.2.2 A comprehensive plan will be formulated in 2000 to attain this objective. The plan will contain, *inter alia*, information on the existing supplies of computers and other information technology hardware and software within the service, their state of repair, and their current disposition. It will also include an estimate of the current and future demand for computerisation equipment, indications of where the equipment will be required, and proposals for the steps to be taken to meet the demand.

6.IV.2.3 Pending the completion of this detailed plan, priority in the computerisation process will be afforded to financial matters and the educational and health sectors.

6.IV.2.4 Resources for the computerisation of the Public Service will be obtained either from the annual government budget or from externally-funded projects that are designed to assist particular sectors. In other words, care will be taken to ascertain whether the equipment component of any externally funded project can legitimately contain provisions for the purchase of computers. For example, the now HIPIC programme for the alleviation of poverty should contain provisions for the purchase of computers to aid in the development of the health and education sectors and to assist in the enhancement of access to the services of both sectors.

6.IV.3 Financial Matters

6.IV.3.1 Because revenue collection and expenditure, financial management, investment, and trade promotion are of such vital importance to the development of our economy, attention will be first paid to equipping fully the Revenue Authority; the Budget Office; the Accountant General's Department; the Debt Management Division; the Tender Board Division; State Planning Secretariat; and the Bureau of Statistics of the Ministry of Finance; the Export Promotion Section and Go-invest of the Office of the President, the Aid-Co-ordination Unit in the Ministry of Foreign Affairs; and the Auditor-General's Office.

6.IV.3.2 In addition, the accounting services in each Ministry and Government Department will be completely computerised.

6.IV.3.3 A modern system will also be installed to enable interconnections to be made between and among the various financial and accounting arms and branches of the government.

6.IV.3.4 It cannot be over-emphasised how important it is that the Internet be used, as early as possible, to "sell Guyana" to investors and to promote Guyana's exports. A comprehensive plan that is designed to implement these two important objectives will be formulated immediately.

6.IV.4 Education

6.IV.4.1 At least one computer will be installed in each primary school throughout Guyana by the year 2004. These computers will not necessarily be tied-in to the Internet. It will therefore not be essential that there be reliable telephonic connections in these schools. The purpose of these computers in primary schools will be to expose students to the mechanisms and to train them in the rudiments of their use.

6.IV.4.2 At least one Computer Centre will be established in each secondary school by 2004. Each of these Computer Centres will be provided with three computers. Telephone linkages will be provided wherever it is technically possible to do so. These centres will train students not only in the rudiments of computer use but, more important at this stage, in all aspects of the utilisation of the Internet.

6.IV.4.3 Facilities similar to those prescribed for secondary schools will also be placed in all the technical schools and institutes which it has been decided to establish in the Chapter on Education. The target date for such minimum facilities is also 2004.

6.IV.4.4 Each department in the University of Guyana will, also by 2004, have had installed at least three computers, with capabilities for accessing the Internet in general, and a range of universities and relevant research organisations, throughout the world, in particular. Moreover, the central computer pool which now exists at the University of Guyana will be considerably strengthened and expanded. In addition to providing hardware and software for students who cannot be expeditiously accommodated at their Department Computer Centres, this central pool will offer lessons in techniques and in the usage of computers and the Internet.

6.IV.4.5 A comprehensive Computer/Internet system will be put in place in order that the country's distance education programme might be strengthened and expanded. Indeed, the use of the Internet will increasingly play a greater and more important role in this exercise. Relevant, distance-teaching material will be prepared and/or adapted from other sources, focal areas for its dissemination identified, and suitable arrangements made for the installation of the relevant raw material.

6.IV.4.6 The PUC will negotiate with GT&T for the establishment of the necessary telecommunications systems so that the hierarchy of educational institutions, and its distance-learning components, might be adequately serviced. This might entail, for example, the establishment of satellites, as has already taken place in the Rupununi. It might also necessitate the granting of competitive rights to other private firms to participate in this very important aspect of our national development strategy.

6.IV.4.7 Internet linkages will be established by the Department of Forestry at the University of Guyana with the Iwokrama Project; with the Agency which will be established in Guyana to formulate, implement and monitor plans for the undertaking of carbon sequestration exercises in Guyana's tropical forests, and with a select number of Departments of Forestry in other Universities abroad which specialise in teaching, and research in, tropical forestry and tropical forest products. This will be important in the context of the decision that has been expressed in other parts of the NDS to promote forestry as one of the University of Guyana's "areas of specialisation", one of its "fields of excellence".

6.IV.4.8 It will be a requirement that for any teacher to graduate from Cyril Potter Teachers' Training College, he or she must have passed in computer sciences.

6.IV.4.9 All teachers who possess qualifications in "computer science", or display a facility with the computer and a capacity to impart these skills to students will be provided with special allowances.

6.IV.5 Incentives

6.IV.5.1 Incentives will be offered to the private sector to establish training institutions in computer science.

6.IV.5.2 All computer hardware will continue to be imported free of import duty. In addition, all computer software will be exempted from import duty.

6.IV.5.3 The government will enter into negotiations with GT&T with a view to persuading the Company to establish a series of Internet Centres in all the major towns, and in strategic rural and interior locations in Guyana. These Centres will be operated along the lines of those now established in Georgetown which facilitate the Guyanese citizens with no private access to telephones to make overseas calls. Through these new Internet Centres, Guyanese with no private access to the Internet will be able to utilise at a price, a publicly provided resource. If GT&T, for one reason or another, is unable to establish such facilities, other members of the private sector will be encouraged to do so. If the private sector fails to take advantage of these opportunities, the government itself will establish the necessary Centres.

6.IV.6 Health

6.IV.6.1 The priority that will be given to the computerisation of the health sector is equal to that afforded to the management of our finances, and to the education and training of our people. The improvement of access to health facilities and health services is one of the most important facets of the NDS's attack on poverty. Accordingly, computer systems will be devised (i) to identify specific needs for pharmaceuticals and other medicaments; to ascertain where it would be most cost-effective to buy them; to undertake and monitor their purchase, distribution and use; and to make timely orders for their replacement; (ii) to coordinate the system through which patients are referred from one health centre to another, to follow-up the progress and treatment of such patients; and to provide transportation as necessary to move patients from the hinterland to the coast; and (iii) to rationalise the relationships between the central government and the various agencies of the regional administrative health system, by providing relevant information, and by establishing linkages among them.

6.IV.6.2 All these targets will be met also by 2004.

6.IV.7 Other Sectors

6.IV.7.1 Once the problems of the telecommunications system and the operations of the PUC have been sorted out; once the basic strategy of computerising the financial arms of the Public Service and the educational and health systems has been implemented, once computerisation has become part and parcel of our every day lives and the objective of laying the foundations for a completely computer literate society has been attained; the stage will have been set for the computerisation of those activities in the agriculture, industry, and service sectors which have been adumbrated in the earlier parts of this Chapter. So much so that it is envisaged that, by the end of 2010, the utilisation of all facets of information technology would have become a significant aspect of our culture.