VISION 2030 JAMAICA:
NATIONAL DEVELOPMENT PLAN

INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SECTOR PLAN (1ST DRAFT)

Prepared by the ICT Task Force
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1. Introduction

1.1 Vision 2030 Jamaica – National Development Plan

1.1.1 Background to Planning Process

In 2006, the Government of Jamaica (GOJ) mandated the Planning Institute of Jamaica (PIOJ) to lead the preparation of a comprehensive long-term National Development Plan (NDP) which will seek to place Jamaica in a position to achieve developed country status by 2030. Development of the Plan began in January 2007 and twenty-seven Task Forces (TFs) including the Information and Communications Technology (ICT) Task Force were established thereafter. The TFs represent sectors and areas critical to the achievement of the national goals and have been charged with responsibility for developing the relevant long-term sector plans.

The ICT Task Force commenced the plan preparation exercise in April 2007, leading to the completion and submission of a 1st draft report for the long-term development of the ICT sector in Jamaica.

This Sector Plan for ICT is one of the strategic priority areas of the ***Vision 2030: Jamaica's National Development Plan***. It is one of a number of chapters that will form the foundation for the development of Vision 2030 – a 20-year plan based on a fundamental vision to make *'Jamaica the place of choice to raise families, live, work and do business,'* and on guiding principles which put the Jamaican people at the centre of the nation's transformation. Twelve strategic priorities, which include International Competitiveness, Infrastructure and Science, Technology and Innovation, have been identified as critical elements in fulfilling the objectives of the plan.

The preparation of the Plan will be supported by a quantitative systems dynamics computer model – Threshold 21 (T21) – which supports comprehensive, integrated planning that would enable the consideration of a broad range of interconnected economic, social and environmental factors. The T21 model will be used to project future consequences of different strategies across a wide range of indicators. In addition, it will enable planners to trace causes of changes in any variable or indicator back to the relevant assumptions and policy choices.

The first draft of this sector plan was developed using the following processes:

- Participation of Task Force Members[1] through Task Force Meetings[2] that were used to solicit ideas and views on ICT issues and challenges facing Jamaica as well as identifying a vision for ICT in Jamaica, and determining key goals,

[1] See Appendix 1 for List of Members of the ICT Task Force

[2] See Appendix 2 for Listing of Task Force Meetings

objectives and strategies for the sector
- Task Force working groups on various dimensions of the ICT sector
- Research on international best practices in ICT that could be adopted in the Jamaican context
- Review of relevant documentation on the ICT sector.

This 1st Draft Sector Plan for ICT is structured in the following sections as follows:
- Situational Analysis
- SWOT Analysis
- Proposed Vision Statement
- Strategic Framework – Goals, Objectives and Strategies

1.1.2 Overview of the ICT Sector Plan

The ICT Sector Plan considers ICT under two (2) main aspects:
i) ICT as a sector in its own right; and
ii) ICT as an enabler of all other sectors, including economic, social, environmental and governance sectors. This enabling role of ICT encompasses the concept of ICT for development (ICT4D), reflecting the contribution that ICTs can make to national development in all sectors. The ICT Sector Plan in particular includes linkages with a number of other sectors including education, governance, science, technology and innovation and the cultural/creative industries.

During the period 2006 to 2007 extensive research and consultations were done, by the Ministry with responsible for the ICT portfolio and the Central Information Technology Office, to develop a revised policy and strategic framework for the sector. The Vision 2030 Jamaica ICT Sector Plan seeks to build on the existing policy and development framework for the sector to ensure compatibility and continuity of the long-term planning for the sector. In particular the Vision 2030 Jamaica ICT Sector Plan is based on the eight (8) dimensions employed by the National ICT Strategy as set out below:

1. e-Inclusion
2. Education and Training
3. Network Readiness and Infrastructure Development
4. e-Business and Industry Structure
5. e-Government
6. Cultural Content and Creativity
7. Research and Innovation
8. Policy and Legal Framework

The SWOT Analysis and the Strategic Framework (with Goals, Objectives and Strategies) are also structured along these eight dimensions.

1.1.3 Vision 2030 Jamaica and ICT

There can be no doubt that the development of the ICT sector has transformed life in Jamaica in many ways over the past two decades, a period which has seen the introduction and spread in use of mobile phones, personal computers and the Internet, dramatic expansion in the number and range of telecommunications and broadcast media providers, and growth of applications of ICTs in businesses, schools and households. The Vision 2030 Jamaica National Development Plan sees the ICT sector as playing a central role in the transformation of Jamaica over the next two decades on the path toward making the transition to becoming a developed country.

Information and Communications Technologies have become engines for social and economic growth globally. The appropriate utilization of ICT can improve the lives of all Jamaicans and the vision is for Jamaica is to utilize Information and Communications Technology (ICT) to attain developed country status by 2030. This will involve growth of the ICT sector and the application of ICT in all sectors and at all levels to achieve rapid and sustained development. The vision for ICT includes the following:

1. The attainment of the Millennium Development Goals

2. The integration of ICT at levels and all processes in the education system, thereby producing a knowledge-based and educated society. This will include the early childhood, primary, secondary, tertiary and life long learning institutions as well as teacher training colleges. The average Jamaican will be ICT literate.

3. Attainment of affordable universal broadband access for all citizens, private sector, government and civil society, thereby eliminating the digital divide. Universal access will extend beyond voice to include internet, computing devices, information literacy and access to telecommunications services.

4. The establishment of internationally renowned Technology Parks and Research centres to foster innovation in society.

5. Attraction of international companies to establish software development companies or manufacturing plants in Jamaica.

6. Continued enhancement of the legal and regulatory framework to promote industry development, transparency, true competition, consumer protection and quality standards, based on the dynamic nature of the sector. The enhanced support for competition will attract local and international investors.

7. The establishment of a networked society and economy in which all citizens utilize ICT in all aspects of their lives, including school, work, home and church. The private sector, public sector and civil society will utilize ICT to conduct business and to interact with each other. There will be pervasive availability and use of electronic

commerce, electronic government, electronic procurement and other internet related services.

8. ICT will contribute to the fostering of niche markets in which Jamaica has competitive advantage and the opportunity to be a world leader. These niches will be located within a range of sectors including:

    Services
    - Financial Services (Offshore Banking, Insurance)
    - Hospitality Industry (Travel & Vacation Sectors)
    - Business Process Outsourcing
    - Offshore Education
    - Logistics / Transshipment Points
    - Creative Industries (Music, Movies, Fashion, Internet Content)

    Manufacturing
    - Agro processing
    - Light Manufacturing

    Mining and Energy
    - Limestone and limestone derivatives (cement, lime, GCC & PCC)
    - Renewable energy

    Agriculture
    - Orchard tree crops
    - Herbals /nutraceuticals
    - Food Processing
    - Pharmaceuticals/Wellness industries

    Tourism
    - High end boutique resorts
    - Mixed use developments

    Infrastructure
    - Housing for the tourism sector
    - Sewage and water
    - High end shopping centres

9. The establishment of i) digital broadcasting networks; and ii) video and audio content delivery on an end-user demand basis.

10. Jamaica will be a main contributor to internet content given our rich heritage and culture. The content will focus on our much strength such as folklore, art, craft, music, history, culture, fashion and success in sport. Jamaican content will be widely

available through all distribution media including the Internet, broadband access devices and cable.

11. There will be wide availability of electronic (e-) services for all the major sectors. This will include the e-health, e-education, e-tourism, e-security, e-agriculture and e-commerce services. Investors and consumers will be able to access information and services readily over the internet. Example: Jamaica's Tourism Industry will utilize ICTs to improve competitiveness through promotion over the Internet and the integration of local tourism providers into Destination Management Systems.

12. ICTs will have transformed the Trade and Export Sector through computerizing trade logistics and customs systems, making them more efficient and transparent, and increasing trade flows.

It is important to note that given the dynamic nature of the ICT sector, the Vision 2030 Jamaica plan provides for the periodic review of the ICT Sector Plan and renewal of the vision based on the evolution of the sector and progress in the implementation of the plan.

1.2 ICT and National Development

Information and Communications Technology (ICT) has emerged over the past decades as one of the most visible representations of modern development, profoundly influencing production processes and social life. Information and Communication Technologies (ICTs) form the basis for the transition to the Information Society that represents the model for developed economies in the 21st century. As such it may be said that "development can no longer be understood without full consideration of the widespread effects of ICTs"[3]. The speed and depth of the changes resulting from ICTs have been termed the second Industrial Revolution. As examples the growth of ICTs have led to revolutionary developments in personal computing, automated manufacturing industries, telecommunication and mobile telephony, the rapid expansion of the Internet and its defining applications such as Yahoo, Amazon, e-Bay, Google and YouTube, and the increasingly ubiquitous presence of ICTs in commercial and household appliances.

1.2.1 Growth of Global ICT

There are many indicators of the growth of ICT and its impact on national development. Between 1995 and 2004, computer and information services exports grew six times faster than total services exports. Total ICT sector employment grew by over 8% annually between 1995 and 2003 in developed countries, and represented 5.5% of total business employment in these countries by 2003. In 2003 the total value of ICT-enabled services exports was valued at US$836 billion, representing 45% of total services exports in 2003,

[3] UNCTAD (2006)

up from 37% in 1995.[4] ICT based interactions, such as e-mail, have increased 32 times from 20 million electronic mail users worldwide in 1994 to 651 million in 2005.[5] Total global ICT spending is estimated at over US$3 trillion in 2006, growing by an annual average of 8.9% from 2001 to 2005 and representing an average of 6.8 percent of global Gross Domestic Product over the same period.[6]

The application of ICTs has led to reduction in transaction costs between businesses and consumers, and is credited with contributing to increased productivity in recent years. Research suggests a strong linkage between the levels of ICT advancement of a country and growth in per capita GDP for both developed and developing countries.[7] Studies also indicate that firms that use ICTs grow faster, invest more, and are more productive and profitable than those that do not.[8] ICTs also have profound implications for poverty reduction and social well-being.[9] ICTs can foster the development of business and social networks which enhance competitiveness and individual freedoms. E-inclusion becomes an important aspect of the information revolution as "harnessing the full potential of the benefits of the global information society is possible only if all nations and the peoples of the world share this opportunity equally".[10] Access to information technologies is one of the targets listed in the Millennium Development Goals (MDGs) and is considered important by itself as well as for the achievement of all the MDGs.

While the developed countries continue to dominate global ICT industries (accounting for 83% world ICT-enabled service exports in 2003), developing countries such as India and China have emerged in recent years as major players at the global level. It is also relevant to recognize that developing countries that have targeted ICT as a strategic priority such as Malaysia, South Korea and the Philippines have actually achieved higher levels of ICT value-added in their business sectors than the levels achieved by developed countries.[11] Jamaica has the potential to achieve similar gains from strategic focus on the long-term development of its own ICT sector.

1.2.2 International Context

The development of the ICT sector in Jamaica has been influenced by the World Summit on the Information Society (WSIS) Declaration of Principles (2003), in which countries

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[4] Ibid.

[5] UNDESA (2005)

[6] WITSA (2006)

[7] UNCTAD (2006)

[8] World Bank (2006)

[9] For example, research from a 'Village Pay Phone' project in Bangladesh indicated that the introduction of telephones to the village allowed the villagers to eat well all year round compared to only 9.9 months when there were no phones (UNDESA 2005).

[10] UNDESA (2005)

[11] UNCTAD (2006)

involved in the WSIS, including Jamaica, affirmed a commitment to building a: "people-centred, inclusive and development oriented Information Society". The Geneva Phase of WSIS established a number of targets to be achieved by 2015, including to connect villages with ICTs and establish community access points, and to connect a range of facilities with ICTs including universities, colleges, secondary and primary schools, scientific research centers, public libraries, cultural centres, museums, post offices, archives, health centers and hospitals. The WSIS Declaration of Principles and Plan of Action include to connect all local and central government departments and establish websites and email addresses; to adapt all primary and secondary school curricula and meet the challenges of the Information Society; to ensure that all of the world's population have access to television and radio services; to encourage the development of content and put in place the technical conditions in order to facilitate the presence and use of all world languages on the internet; and to ensure that more than half of the world's inhabitants have access to ICTs within their reach. The primary objectives of the Tunis Phase of WSIS were to evaluate and assess the progress made towards bridging the digital divide, and to develop action plans for financial mechanisms and internet governance.

2. Situational Analysis – Jamaica's ICT Sector

2.1 Overview of ICT Sector

2.1.1 Definition of ICT Sector

The information and communications technology (ICT) sector in Jamaica may be considered to include the information technology industries (computer hardware and software, systems and training), telecommunications industries (telephone, cable and internet), and the broadcast media (television and radio)[12]. The postal service also forms part of the overall sector. The main components of the ICT sector have seen considerable dynamism in their development over the past decade. However there is limited data to measure the aggregate economic performance of the sector. In 2005, Communication represented approximately 7.1% of Jamaica's Gross Domestic Product (GDP)[13]. However the full economic contribution of ICT also is reflected as part of the contribution to GDP by other economic sectors.

[12] For OECD definition of the ICT sector see Appendix 5

[13] Statistical Institute of Jamaica

2.1.2 Performance of the ICT Sector

The ICT sector continues to experience growth with respect to investment within the various industries, including Information Technology, business processing outsourcing (BPO) and telecommunications. One indicator of the performance of the sector in recent years comes from the data for investment and earnings in the sector. Foreign direct investment inflows to the ICT sector has averaged US$69 million per annum over the period 2001-2005, representing 11% of total foreign direct investment inflows over the period and primarily reflecting the levels of new investment since the liberalization of the telecommunications industry in 1999. Annual inflows of earnings from communication services and computer and information services have averaged US$199.2 million over the period 2001-2005 while annual outflows from these services have averaged US$76.5 million, indicating that the sector has generated average net foreign exchange earnings of US$122.7 million annually over the five (5) year period 2001-2005 from ICT services including ICT-related professional services and net international call settlements.[14] It is estimated by Jamaica Trade and Invest (JTI) that the ICT projects facilitated by JTI in the telecommunications and call centre industries employ over 14,000 persons, many of whom are engaged in the exportation of services, and represent capital investments in excess of $4 billion. Jamaica also has developed as an outsourcing destination for service providers looking to the Caribbean for a near shore outsourcing location, largely due to the large English speaking, trainable labor pool, proximity to the largest outsourcing market in the world, the U.S., and competitive cost.[15] There are currently 18 contact centers in the sector with 2 being local companies and 16 multinationals.

Net imports of office machines, automatic data processing equipment and telecommunications equipment to Jamaica increased from J$7.0 billion in 2000 to J$15.4 billion in 2004, indicating increased use of ICTs in the domestic economy.[16]

Telecommunications

The telecommunications industry has experienced among the highest levels of expansion and investment in the Jamaican economy, particularly since the year 1999 which saw the lifting of the monopoly on telephone services previously enjoyed by Cable and Wireless Jamaica Limited (C&W) and by Telecommunications of Jamaica prior to 1998. This period has seen the highly successful entry of Mossel Jamaica Limited (Digicel) into the local and regional mobile telephone market in 2001, followed by Centennial Jamaica in the same year (subsequently acquired by Oceanic Digital Jamaica and now branded as MiPhone). In April 2004 the government also granted a cellular licence to AT&T Wireless, however it was later revoked because the company failed to operate within the time established in the licence.

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[14] Bank of Jamaica

[15] In a recent survey Jamaica ranked 7th in competitive cost for call centres - the lower cost locations included the Dominican Republic, Romania and Malaysia with India and the Philippines as the lowest cost locations. China was not included in the survey (see Location Consultants 2006).

[16] Statistical Institute of Jamaica

The joint publication of the International Telecommunications Union and the United Nations World Information Society 2007 Report cites Jamaica as an example to the Caribbean in the development of its mobile telephony. According to the report, "Jamaica's mobile penetration is significantly above where it should be, given its average per capita income. Jamaica has achieved this success thanks to a market liberalization process that began in 1999…Jamaica's success is significant, as it disproved a long-established theory that small island economies were too small to sustain competition."[17] Based on the information available from the Office of Utilities Regulation (OUR), the phone penetration rate in Jamaica has reached 106% of the population by 2006 based on both fixed and mobile phones.

The global trend of increasing mobile penetration coupled by decreasing fixed line penetration has also been evident in Jamaica. C&W has seen a decline in its fixed line customers from a high of 503,890 in 2001 to 342,500 in 2006. Mobile penetration has surpassed fixed-line penetration primarily due to a number of factors, such as innovative pricing strategies (namely, prepaid subscriptions), lower deployment costs for mobile networks and competition in the provision of mobile services.

Since the liberalization of the telecommunications regime in 1999 there has been an explosion in the number of telecommunications licences granted in Jamaica, increasing from a total of 2 licences in 2000 to 426 licences by 2006. Similarly the number of internet service provider (ISP) licences in Jamaica has increased from 45 in 2001 to 80 by 2006. The formalization of the cable industry in 1998 eventually has seen a total of 55 cable companies operating by 2007 for provision of subscriber television (STV) services islandwide. The development of the cable industry also has seen some degree of consolidation among cable operators over the years, and the recent entry of Columbus Communications Inc. (Flow) has signaled the beginning of a new phase in the evolution of the industry. Flow has commenced the roll-out of a fiber optic cable network, offering combined cable, internet and telephone service, services which had already been introduced by some local cable companies on a smaller scale. Flow was awarded an island-wide cable licence in August 2007.

The liberalization has brought significant capital investment in the sector. Total spectrum fees collected since the beginning of the liberalization process in April 2000 up to the end of March 2007 is estimated at $4.74 billion (cellular licences – $4.364 billion and other mobile spectrum licences – $380 million). Total GCT collected since liberalization is approximately $40 billion. It is estimated that the total revenue realized by the Government from the sale of cellular licenses to Digicel, Oceanic Digital (Miphone) and ATT Wireless is US$98.5 million.

[17] ITU and UNCTAD (2007) p. 31

Information Technology (IT)

The provision of hardware and software product and services started approximately forty five years ago in the 1960's. The early developers of the local IT industry included such multinational companies as Burroughs, IBM, ICL and NCR who all had established offices in Jamaica. Since that time the local industry has evolved rapidly with the global acceleration of developments in hardware, software, communications technology and services. Just about all the major international information technology brands are represented or are present in Jamaica. These include Apple, Dell, Cisco, HP, Fujitsu, IBM, Lenovo, Microsoft, Oracle and Sun. International organizations such as Fujitsu, IBM and Microsoft have established branches in Jamaica and the Caribbean. Several local organizations are operating in the sector, these include Advanced Digital Systems, Commnett, Comtech, Digital Transtec, Illuminat, Innovative Corporate Solutions, Innovative Systems Limited, Management Control Systems, SSP Aptec and Syncon. Companies that offer consulting services include Price Waterhouse Coopers, KPMG and Adjoined. The various organizations provide a truly diverse set of products and services and operate in a highly competitive environment.

The industry provides a wide range of hardware, software, networking and services to the private and public sectors. The banking, telecommunications, insurance and general financial services industries lead the way in the use and integration of technology in business. Within the public sector the Ministry of Finance and its related agencies are the heaviest users of technology in government. Other sectors that rely heavily on their information technology systems include the utilities, mining and medium to large manufacturing and distribution companies.

Wide area networks have become the norm for multi-location entities and voice over internet protocol (VoIP) implementations are increasing as old telephony infrastructure is being changed out. The latest technology in storage, blade technology, virtualization and databases is being installed in the larger and more advanced entities.

Typically software solution offerings are from the broad array of pre-packaged software that apply to industry specific areas or cross industry solutions, such as enterprise resource planning (ERP). These applications are typically customized and adapted to the local business environment. While there exists a software developers' association in Jamaica, software development is still a small part of the sector with only a few companies doing significant software development for sale on the open market.

Challenges in the industry include the ability to measure the benefits of IT investments and the impact on productivity. At the same time the sector also has a responsibility to help the users of technology effectively assess, select and manage their technology investment.

Current trends in the use of IT locally include an increased interest in outsourced operations and hosted or managed services; more companies are embarking on establishing e-commerce capabilities for their customers; the education sector is

embarking on a multimillion dollar e-learning initiative; the public sector is accelerating it's e-Government programs; a progression to third or fourth generation industry applications in the banking, telecommunications, insurance and distribution sectors; innovation in music and digital media for entertainment.

Postal Services

The Post and Telecommunications Department of Government is responsible for the operation of post offices island-wide, whose range of services offered have been expanded beyond the receipt and delivery of ordinary, registered and parcel mail, sale of stamps and encashment of postal and money orders, to include payment of pensions on behalf of the Ministry of Labour and Social Security, registration of births and deaths on behalf of the Registrar General, and bill payment services. In addition a number of post offices have been included in the on-line Tax Portal System which facilitates the payment of taxes electronically. However the increasing development of alternative communications media in Jamaica has constrained growth in the total volume of mail being handled by the post office system, which fell by 21% from 83.9 million letters, parcels and other mail in 2000 to 66.6 million in 2005 before rebounding to 83.7 million in 2006. The rebound is attributed to increased parcels from e-commerce activities and the commercial services, such as courier services, implemented by the Department.

2.1.3 Indicators on Current Status of Jamaica's ICT Sector

Within the liberalization of the telecommunication system, ICTs are seen as tools to achieve national goals. Under the e-Readiness ranking produced by the Economist Intelligence Unit (EIU), which provides an assessment of a country's status in terms of connectivity and its ICT environment in relation to other countries, Jamaica's 2007 rank is 43 with a score of 5.05.

The following table provides a summary comparison of the current status of Jamaica's ICT sector, based on a range of international indices. These indicate that Jamaica has generally achieved a position midway among the nations of the world in the development of its ICT sector, and has the potential to increase the contribution of its ICT sector to national development through the successful implementation of its plans for the sector.

Table 1: Status of Jamaica's ICT Sector

International Index	Status/Ranking	Score/Index	Year	Indicators
Economics Intelligence Unit (EIU) e-Readiness	46th of 69 countries	Score 5.05	2007	Connectivity Business environment Consumer and business adoption Legal and policy environment Social and cultural environment Supporting e-services
World Economic Forum Network Readiness Index	45th of 122 countries	Score 4.05	2006-2007	ICT environment Readiness Usage of ICT
Orbicom Digital Divide Index	60th of 139 countries	Infostate 88.1	2003	Number of users Knowledge levels Skills and infrastructure
Human Development Report Technology Achievement Index (TAI)	49th of 72 countries	Score 0.26	2001	Creation of technology Diffusion of technology Human skills
International Telecommunications Union (ITU) Digital Access Index (DAI)	54th of 178 countries	Score .53	2007	Infrastructure Affordability Knowledge Quality and actual usage of ICTs
UNCTAD Index of ICT Diffusion	57th of 180 countries	Access index .598	2005	Access Connectivity
UN Global E-Government Readiness Report	59th of 191 countries	Score .506	2005	Web measure Telecom index Human capital index

A detailed assessment of Jamaica's status on a wide range of ICT indicators is also included as Appendix 7 of this plan, including ICT indicators relating to access, quality, affordability, institutional efficiency and sustainability, and ICT applications. This table also includes a comparison of the relative standing of Jamaica's ICT sector on these indicators with the Latin American and Caribbean region for 2005. As the table shows, Jamaica compared favourably on a number of indicators relating to access, including numbers of mobile subscribers and Internet subscribers per 1,000 persons, but was behind the region in telephone main lines and personal computers per 1,000 persons and

percentage of households with television. Jamaica also compared favourably on indicators relating to affordability, institutional efficiency and sustainability, and ICT applications, but trailed in level of broadband subscribers at 3.4 per 1,000 persons compared to 16.5 per 1,000 persons for the region.

2.1.4 Policy, Regulatory and Institutional Framework for ICT Sector

The Ministry with portfolio responsibility for the ICT Sector, currently the Ministry of Energy, Mining and Telecommunications**,** has responsibility for providing the overall policy framework to guide the development of the ICT sector in Jamaica**.** The Ministry was responsible for the Telecommunications Act 2000 which governed the liberalization of the sector and also the National ICT Strategy 2001. The Ministry recently led the development of the revised draft Telecommunications Policy 2007 to provide an updated policy framework for the sector. The goals of the new policy are the improved productivity of the national economy, attraction of local and international investments, and support for all sectors (including health, education, tourism, security and agriculture). The policy has declared as its mandate the establishment of an island-wide modern telecommunications network, universal service for all Jamaicans, and wide deployment of broadband services. The Policy Principles include the recognition of telecommunications as a development instrument, establishment of universal service and access, respect for technology neutrality, and fostering competition. The development framework for the ICT sector also includes the National ICT Strategy 2012 prepared under the leadership of the Ministry and the Central Information Technology Office (CITO). The Vision 2030 Jamaica ICT Sector Plan seeks to build on the existing policy and development framework for the sector to ensure compatibility and continuity of the long-term planning for the sector.

The government has realized the importance of ICT to all sectors, therefore a number of Ministries are currently developing ICT plans. These include the Ministry of Education and the Ministry of National Security. It is anticipated other Ministries will develop ICT Plans in the near future. Several agencies, projects and initiatives have been established by the government arising from the elements in the policy and strategic plans. These include the E-learning Project, the Information and Communications Technology Project, the Universal Access Company Limited and the Jamaica Intellectual Property Office (JIPO).

The principal telecommunications regulator under the Telecommunications Act, 2000 is the Office of Utilities Regulation (OUR). The Spectrum Management Authority regulates the radio frequency spectrum on behalf of the Minister, while the broadcasting and subscriber television industry is regulated by the Broadcasting Commission. As of 2006 there were a total of 20 broadcast licenses for radio and television. Indeed the licences already granted have occupied most of the FM frequencies available for broadcast services in Jamaica. It is planned that amendments to the Broadcasting and Radio Rediffusion Act will permit further liberalization of the industry to encourage the

development of differentiated services and the local content industry. (Switch to digital network)

The Electronic Transactions Act 2006 was enacted in April 2007 to promote confidence and security in electronic transactions. The government is also developing other companion legislations to further enhance the development of the sector, including the Data Protection Bill and the Cyber Crime Bill.

In May 2002, the Government established the Central Information Technology Office (CITO). The main purpose of CITO is to monitor the implementation of the ICT strategy, including coordinating ICT plans by the different ministries and developing domestic and international partnerships to promote ICT. CITO's main mandate is strategic planning, while the different ministries and agencies carry out the implementation of projects and programs. CITO in conjunction with the Ministry led the development of the National ICT Strategic Plan 2007-2012.

Jamaica Trade and Invest (JAMPRO) is an autonomous agency under the Ministry with portfolio responsibility for Investment. The main purpose of JAMPRO is to attract foreign direct investment to Jamaica, including investment in the ICT sector, and to facilitate trade. JAMPRO has attracted several call centre and telecommunications operators in the sector as highlighted above. Another agency under the same Ministry is the Trade Board Limited (TBL). The TBL is the certifying authority for the importation and exportation of goods under various trade agreements. In 2006, a Trade Board Information System was implemented to offer on-line import and export services. The TBL is also the Certifying Authority under the Electronic Transactions Act 2006.

The Ministry of Finance (MOF) has been the leading user of ICT in the public sector. Fiscal Services Limited (FSL), a limited liability company under MOF, has been successful in automating the business processes of several of the fiscal agencies. These include the trade facilitation system for the Customs Department, JAMPRO and Trade Board Limited, the implementation of a Customs Brokers System and the development of an On-line Tax portal for the Customs Department and the Inland Revenue Department respectively.

2.1.5 Human Resource Development to Support ICT

Human resource development for the ICT sector includes the contributions from the formal educational system at the secondary and tertiary levels, the role of a range of private training institutions, and the training undertaken by HEART-NTA.

Secondary Level

The E-learning Project is a joint project between the Ministry of Education and the Ministry with responsibility for ICT. The objective is to utilize current state-of-the-art ICTs in Jamaica's high schools, grades 7-11, to improve the quality of education, enhance

the learning experience and improve the level of passes in the CXC CSEC exam in 180 institutions. These institutions include: 166 Public high schools, 6 Public Special Schools and 8 Colleges that train teachers for the high schools. The E-learning Project was designed in 2003 to address five (5) specific constraints which impact adversely on the quality of education in the high schools. These constraints are:

(i) lack of a comprehensive set of standard instructional materials for both teachers (especially young and experienced teachers) and students;
(ii) inadequate equipment in schools to enhance teaching and learning using modern technologies; lack of a proper Educational Management Information system in the MOEYC to facilitate effective administration of the education sector;
(iii) low level of skills among some teachers in the use of certain technologies such as interactive software in the teaching of "hard to grasp" topics and to stimulate interest among students, especially boys;
(iv) inadequate remedial programme at Grade 7 to enable weak students who have been promoted to high school to cope with high school work especially among the newly upgraded high schools; and
(v) lack of a standard system of assessing performance at each grade for students, teachers and schools

The project was launched in February 2006 and will be implemented over three years, with the first year being a pilot phase involving twenty (20) schools. The other schools would be addressed in years two and three. Learning from the pilot phase will inform the second phase.

Tertiary Level

The providers of ICT related education at the tertiary level include the main tertiary educational institutions including the University of the West Indies (UWI), the University of Technology (UTECH), and Northern Caribbean University (NCU), and the Community Colleges. Three major universities provide Computer Science degrees: the University of the West Indies (UWI), Northern Caribbean University and the University of Technology (UTECH). UWI offers both bachelors and master degrees, while UTECH offers courses only at the undergraduate level. Both face resource limitations (space and trained teaching staff) that prevent them from taking in more qualified students applying to the program. Mona School of Business has also implemented a Telecommunications Policy and Management Programme.

The potential of the technical skills of Jamaica's human resources in ICT also has been demonstrated by the successes of the students from the Department of Computer and Information Sciences at Northern Caribbean University (NCU) in the Imagine Cup, an annual global competition sponsored by Microsoft to provide students with a platform to showcase their software development and technical skills. The NCU team has reached the regional finals in Software Design in the past three years, winning in 2005 and 2007 while placing second in 2006. The 2007 team also placed third at the global level, in a year when the finalists were chosen from a pool of more than 100,000 students from over

100 countries. Utech also has competed in the Computer Olympics where students from various schools compete against one another with computer games that challenge their math and reading skills. Other initiatives include the Minister's Award for Innovation, and grants to UWI and UTech for business plans for technology parks and research, support from private sector, and the UWI contract with Boeing.

Heart Trust/National Technical and Vocational Training Agency

HEART/NTA is a statutory organization of the Government of Jamaica whose mission is to support technical and vocational training in both the public and the private sectors. It is funded largely by contributions of 3% of the total payroll. It has developed an expertise in training management, including selection, contracting and evaluation of courses; financial management of training related activities; and recruitment and selection of course participants. While it owns a network of Academies and Vocational Training Centers, it uses private sector training institutions for ICT training. HEART's mandate is to train and certify at least half of the Jamaican workforce by 2008. In the fiscal year 2005-6, ICT accounted for 18% of the 87,812 persons enrolled for that period, and represented the 3rd largest sector, after Hospitality and Commercial Skills. Training programmes range from basic ICT skills to web-design, programming, computer repairs and maintenance and networking.

Other ICT Training Institutions

The Caribbean Institute of Technology (CIT) also plays an important role in the development of higher-level ICT skills in Jamaica. CIT offers a twelve-month course for the preparation of proficient entry-level computer programmers and software designers. It was initially started in February 1999, as a result of a partnership among the University of West Indies, Fuhrman University (Greenville, South Carolina), HEART/NTA, MICT, the Montego Bay Free Zone, the International Development Consortium (affiliated with the University of Hertsfordshire in London), and a software company, Indusa (Atlanta, Georgia). Training has been funded by the Government of Jamaica, through the Information Technology Employment Creation Project of the Ministry, and has been administered by HEART/NTA. Graduates have been very successful in obtaining employment after completing the program. Scholarships have been funded by the GOJ using some of the fiscal resources that were generated from the sale of spectrum through auction to two cellular providers.

The CISCO Networking Academy program (10-month course) prepares students to design, build, and maintain computer networks. This program is a result of an agreement between the GOJ, UNDP and CISCO. CISCO has partnered with HEART to establish a Regional Academy at Stony Hill as well as 10 Local Academies. UNDP has equipped one computer laboratory in the Regional Academy at Stony Hill, in Kingston, and will equip one more. CISCO has provided the training of four trainers, and software and equipment necessary to use its technology. The GOJ, through HEART/NTA manages the program and provided the initial physical space and some equipment. The program delivers web-based content, online assessment, student performance tracking, hands-on

labs, instructor training and support and preparation for industry-standard certification. It is expected that the CISCO Academy will attract foreign students, mainly from other Caribbean countries.

There are numerous privately owned ICT training centers in Jamaica. These offer high quality training in the main computer applications, and are frequently contracted by HEART/NTA to provide training in the context of governmental programs. Their offer includes programs for computer operators, data entry clerks, application programmers, and programmers/analysts. Many of these training centers have been certified to offer training by the different software companies such as Microsoft and others.

The Jamaica Computer Society (JCS) was established 25 years ago and its purpose is to promote the effective and efficient use of ICT in Jamaica. The JCS holds an annual conference and periodic seminars and produces a quarterly publication to describe current and future trends in the industry. The Jamaica Computer Society Education Foundation (JCSEF) was established in 1990 by the Jamaica Computer Society to place computer labs in secondary and tertiary schools, in an effort to facilitate students taking examinations in Computer Science. Subsequently, the mission was expanded to incorporate 'the use of information technology to improve the quality of education and its contribution to national development'. The JCSEF has acquired experience and expertise in a wide range of services related to the implementation and appropriate use of technology in education and training, as well as considerable know-how in managing large grants from multi-lateral donor agencies. The JCSEF also provides basic ICT Skills training for organizations, tailoring the courseware for their specific requirements.

The projects designed, implemented and/or managed by the Foundation since 1991 include the following:

- Jamaica 2000 which provided 141 secondary and tertiary institutions with computer labs of varying sizes, teacher and lab administrator training
- Business Partners for Education Programme which encouraged a partnership involving the private, public and education sectors, with wider community and international donor organizations
- Teacher Training in computer science and technology at primary, secondary and tertiary institutions
- Adult Computer Education Pilot Programme which sought to equip adults with skills more applicable to the requirements of business and industries and to enhance their employability
- Implementation of computer labs in primary schools
- Global Teenagers Network (GTP) Project to enable Jamaican students to participate in a network of students from schools located in developing and developed countries

2.2 ICT for Development (ICT4D)

2.2.1 ICT4D Initiatives

An integral part of the role of the ICT sector in national development is to contribute to the growth of other sectors as an enabler of growth through ICT for development (ICT4D). This role has been fostered in Jamaica through a number of initiatives involving the public sector, private sector and non-governmental organizations.

One of these NGOs is the ICT4D Jamaica, a non-profit network organization established to define, promote and facilitate the use of Information and Communications Technology in the development process. A recent initiative to foster research and innovation in the ICT sector is the ICT4D Jamaica Think Tank, e-Novation, formed in April 2007 as a vehicle to devise, revise, influence and promote policies and initiatives centred on ICT4D that will affect the life of the Jamaican citizenry and serve as good practice models for other small island developing states. The specific beneficiaries will be stakeholders in five different ICT4D Jamaica sector areas, namely e-governance and community development, tourism and hospitality, music and entertainment, agriculture and agri-business, education and training, including communities, academia, the public sector and the private sector, and domestic and international NGO policy promotion entities.

Another recent initiative is the Jamaica Digital Arts Festival (JDAF) launched in April 2007 by the Media Technology Institute/CPTC in partnership with ICT4D Jamaica, HEART, International Institute for Communications and Development and other partners. The JDAF is intended to be a bi-annual event designed to unearth creative talent and innovation in the use of ICTs, including web-design, digital photography, film, animation and new media, applied to key economic and social sectors for development purposes. The potential contribution of ICTs to Jamaica's creative industries is particularly important given the convergence of digital technologies and content and the comparative advantage that Jamaica has demonstrated internationally in the creative industries including music and the performing arts.

ICT4D Jamaica also has carried out surveys on the Entertainment and Music sector and Agriculture and Agri-business sector to determine the levels of application of ICT in these sectors. The results indicated that while only 39% of respondents in the entertainment and music sector have formal computer skills at the certificate level, basic computer skills, defined as computer literacy and user manipulation are being utilized at a level of 87%. In the agriculture and agri-business sector less than 10% of respondents use online marketing or utilize tools such as computer graphics and/or digital photography while only 14% use inventory management and databases as tools of enhancing productivity within their respective enterprises. However computers and internet connectivity are perceived by the respondents as the two most important information and communication technologies that will have the greatest impact for the future.

2.2.2 ICT4D by Sector

The following outlines the progress of ICT4D in a number of sectors:

- **Education**
  - The Ministry of Education has recently completed an ICT in Education strategic plan which has seven pillars to be addressed over a five year period.
    1. Generate shared vision of ICT in Education.
    2. Design and implement ICT integrated curriculum and content.
    3. Design and implement an EMIS (Education Management Information System) for schools, teacher training colleges and community colleges.
    4. Implement capacity building initiatives and training programmes for all levels of teachers, administrators, parents and the wider community.
    5. Ensure widely available access to ICT infrastructure – computing and multimedia technology, and network connectivity (both local and wide area and Internet).
    6. Design and implement monitoring and evaluation systems
    7. Develop initiatives to foster sustainability

- **Health**
  - The Ministry of Health is leading an inclusive process, incorporating public and private sector and civil society partners, to develop a dynamic and comprehensive national Health Information System.

- **Security**
  - The Ministry of National Security along with its sector-wide partner agencies has recently begun the development of an ICT strategy for the sector aimed at effectively solving sector-wide communication and information sharing challenges in order to radically improve security related analysis and decision making.

- **Agriculture**
  - The Agri-Business Information System (ABIS) has been developed to support the ICT-enabled linkages of farmers to their target markets. More needs to be done in terms of deployment of the system and training of potential users.

- **Tourism**
  - The *E-Powering Jamaica 2012* National ICT Strategy defines a priority initiative, the use of ICTs to gather and access relevant information on tourists requirements and needs, in aid of improving the tourism product, which is a notion at the heart of the sustainable tourism master plan.

- **Labour**
    - The Ministry of Labour is keen to work to expand the capability, reach and usage of the Labour Management Information System (LMIS) portal

2.2.3 Potential of ICT4D

In the Jamaican context the use of ICTs have the potential to contribute significantly to development of a number of sectors. For example Jamaica has been ranked #1 e-government nation in the Caribbean for the last 3 years by the UN Global E-Government Rankings and has introduced electronic portals for accessing a range of government services and for payment of taxes. Electronic government will be a driving force in the implementation of national e-strategies, including online services offered by government and e-business and e-payment operations undertaken through the public procurement process, with the potential to broaden access to government services, increase transparency and efficiency, and reduce costs. ICTs also can significantly improve the operations of the law enforcement and justice systems of government, and also have a role to play in the development of the island's health system, by linking providers at all points of care electronically, and supporting the development of telehealth services domestically and for export. The future of the educational system will increasingly be driven by the application of ICTs, including through personal devices, intelligent environments, computing infrastructure and advanced pedagogical interfaces.[18] ICTs also can contribute to improving the efficiency of trade and export systems, improving competitiveness in tourism and other services sectors, and increased productivity in the other productive sectors including manufacturing, construction, mining and transport.

2.3 Issues and Challenges

1. Spectrum Management:

With the rapid emergence of new technologies, there is a general challenge to the traditional ways of managing the radiofrequency spectrum. Globally, there is a move from a command and control model of spectrum management towards more modern, market based approaches aimed at encouraging more efficient use of this resource. This move also requires a change in the regulatory and legislative framework which governs spectrum management. Locally, the Spectrum Management Authority since 2001 has adopted the market based approach to licensing specific bands of the radio frequency spectrum.

There has been an exponential growth in the demand for spectrum. In some areas such as broadcasting and mobile broadband, this increased demand has resulted in the limited availability of FM frequencies for analog broadcast and the need to review current allocations to ensure that the spectrum is being utilized for its best purpose. Challenges in spectrum management includes being able to anticipate the needs of users, to manage the

[18] See for example Daanen and Facer (2007)

various demands for spectrum to avoid conflict among potential users and to provide the appropriate regulatory framework for the development of wireless communication systems in Jamaica. The planning for the sector also must address the long-term possibilities for wireless ICT, including aeronautical broadband capabilities, mobile remote learning, mobile town monitoring systems, mobile medical examination systems including remote diagnosis, ultrawideband (UWB), radio frequency identification (RFID), licence-exempt frequency bands, class licences and authorizations, spectrum trading, harmonized approach to spectrum management on a regional basis.

Whilst it is difficult to predict very far into the future re wireless technologies and spectrum requirements, two areas which require immediate attention are:

- Digitization: Jamaica requires a transition plan to convert its broadcasting systems to digital audio and television. This would result in the more efficient use of broadcast spectrum and facilitate an expansion in the number of broadcasters.
- Mobile Broadband: Using 3G and 4G technologies, the world is moving towards the use of quadruple play technologies, (fixed, mobile, cable and internet). The ability to facilitate these technologies, through the availability of the required spectrum within a conducive regulatory environment will be important.

2. Regulatory and Legislative Framework:

It is likely that there will be changes in the regulatory framework for the communications sector. As noted above there are currently three (3) main regulatory agencies, the OUR, Spectrum Management Authority and Broadcasting Commission, with different roles. However the government has expressed an interest in creating a single telecommunications regulator to remove the fragmentation and overlapping jurisdictions in the telecommunications sector, caused by the existence of the multiple regulators, and to implement a simplified and efficient institutional framework for the regulation of the trading of goods and services within the sectors. The creation of a single telecommunications regulator; this would involve the fusion of the telecommunications regulatory functions of the OUR, the radio spectrum technical functions of the BCJ and the spectrum management functions of the SMA. Content matters would remain within its portfolio Ministry. In the long run the government may consider merging carriage and content regulation under a single regulator for the sector. The Fair Trading Commission (FTC) also is responsible for ensuring equitable competition among players in the sector. The evolution to the legislative framework for the sector also includes the current revision of the Telecommunications Act, 2000. The development of a regulatory regime that is technology-neutral in respect of allowing the emergence and convergence of ICT technologies, and sector-agnostic in the sense of allowing for the evolution of business models will support the long-term development of the ICT sector.

3. International Telecommunications Industry:

The telecommunications industry demonstrates the impact of globalization, where sustained technological advances have led, more than in any other industry, to the "death of distance" and the creation of international infrastructure and networks allowing almost instantaneous communication and transfer of voice, data, video and

other information around the world. This global integration of the telecommunications industry has implications for small open economies such as Jamaica which represent challenges for long-term planning and development, including the following:

- The potential impact that ongoing negotiations and adjustments to international accounting settlement rates may have on countries such as Jamaica that receive more international telephone calls than they originate
- Continued evolution of technology will increase difficulties in ensuring regulatory compliance and minimizing by-pass and other evasive techniques
- Confronting the increasing threats of data interference, identity theft and other forms of cyber-crime
- Increased openness to the impact of foreign cultural values and practices

4. Role of Government:

In addition to its role in providing the regulatory and legislative framework the government can play a catalytic role in the development of the sector through the demonstration effect of its adoption of information technology[19] and the impetus it can provide through promotion of e-government for online access and provision of government services.

In planning for the future development of the island's ICT sector the government also should build on the achievements and lessons learnt from previous ICT planning initiatives, both within Jamaica and in other relevant countries. In this regard it will be important to identify clear strategic priorities and an effective implementation framework including strengthening the capacity of lead agencies and securing the participation of key stakeholders.

5. Competition and Technology:

The level of competition in the communications sector has increased significantly since the liberalization of the telecommunications and broadcast media regimes, and has led to a large increase in the number of providers, a decrease in the cost of international telephone calls and a quantum increase in Jamaica's teledensity. However convergence has impacted on the level of competition in the sector. This convergence includes the convergence of services over a single access device (e.g. Blackberry and other mobile telephones) and traditional operators offering bundled services (e.g. triple play of fixed phone, cable and internet). This has led to economies of scale (e.g. islandwide wireless licences), and concentration of ownership (e.g. media consolidation and conglomerates). It will be important to balance the long-term development of technology and business models with the maintenance of adequate levels of competition in the sector.

6. Human Resource Development:

[19] An example of this role has been provided by the implementation of effective ICT systems in the process of clearing goods at customs

The rapid pace of change and technological advance will require ongoing human resource development to ensure that adequate trained personnel are available to companies and organizations in the sector, including regulatory agencies. This will require a number of modalities, including formal academic programmes, vocational and skills training, in-house training by companies and access to international skills as required.

However while Jamaica has expanded and deregulated its ICT sector, there is still a lack of adequate of ICT education at the primary, secondary and tertiary levels. ICT deployment and usage is still curtailed by a combination of human resource factors including, high illiteracy rates, loss of ICT skills due to migration, low skill levels and high technology anxiety among the elderly, and high unemployment rates among the general labour force, particularly affecting women and youth. The development of Jamaica's capacity for research and innovation in ICT is also limited by the relatively low levels of overall expenditure on research and development.[20]

7. Infrastructure:

Jamaica currently has three main mobile providers; Cable and Wireless Jamaica Limited (trading as bMobile), Mossel Jamaica Limited (trading as Digicel) and Oceanic Digital Jamaica Limited (trading as MiPhone). Each mobile provider has established their own network which interconnects the other mobile networks as well as with the fixed line networks (PSTN operated by Cable and Wireless Jamaica and the Fibre Optic network operated by Fibralink in partnership with Flow). The Government awarded spectrum licences to Digicel and Cable & Wireless to offer broadband services in the 3.5 GHz band. It is expected that companies with spectrum in the 3.5 GHz band will offer WiMax services.

Jamaica's advanced telecommunications infrastructure includes a 100% digital telecommunications network, submarine fiber optic transmission ring around the island and international submarine cable links through the Cayman-Jamaica fiber system and the recently installed Columbus Communications' Fibralink system to the Dominican Republic. The main issues in the long-term development of the communications infrastructure will include:

- Achievement of affordable universal access including services to marginalized communities, remote areas, the disabled and the elderly. This is particularly important as Jamaica's ICT indicators also show that access to ICTs are more limited among rural and low-income households, which has implications for ensuring greater levels of e-inclusion.
- Domestic and international connectivity including to the existing fixed line telecommunications operators
- Reductions in cost of internet outbound connectivity

[20] Jamaica spends approximately 0.3% of GDP in R&D which is well below the levels of the rest of the world with an average of 1.7%) and Latin America and the Caribbean with an average of 0.6% of GDP (see Kelly 2005).

- Equitable access to telecommunications infrastructure systems by other service providers that rely on these infrastructure systems as the basis to provide their services
- Equitable management and allocation of telephone numbers which represent a scarce resource similar to spectrum
- Access to computers and other devices for internet connectivity on affordable basis to help bridge Jamaica's internal "digital divide"
- The island's telecommunications infrastructure needs to be adapted on an ongoing basis to address vulnerabilities and build increasing levels of resilience including establishment of an ICT disaster management programme.

8. Research and Innovation and Protection of Intellectual Property:

The long-term development of the sector also will require enhancement of the island's capacity in research and innovation in communications technology and new ICT products and services. In the short- and medium term Jamaica should use an adaptive approach to identifying appropriate research and technology from international sources in developed and developing countries and customizing them for Jamaican conditions and requirements. The framework for protection of intellectual property rights in Jamaica requires strengthening including increasing public awareness of the importance of intellectual property rights.

9. Inadequate Data on ICT sector

The ICT sector also suffers from the absence of quantitative measure both at the micro and macro levels. There is also inadequate information on the status of ICT4D and the application of ICT in other sectors. Financial support and attention will need to be placed on obtaining the necessary data to better inform the decisions that must guide the planning and development of the sector in accordance with the vision and goals.

10. Strengthening of Industry Structure and Capacity

The industry structure and capacity of the ICT sector also must be strengthened including the following aspects:

- While there has been significant progress to date, the continued development of the outsourcing industry will require addressing a number of problems, including inadequate office space, poor English standards of students leaving the various levels of the education system and the low take-up of the opportunities presented by outsourcing by local investors
- National capacity needs to be developed in the manufacturing of hardware components and the creation of software that has both domestic and international market potential. In so doing existing creativity and innovation in the ICT sector will not only expand but also thrive. This national capacity will require among other things the strengthening of tertiary level institutions in related disciples such as mathematics, engineering and the sciences so as to create the necessary profile and critical mass to support an advanced and integrated ICT sector
- In Jamaica e-commerce is still in its infancy, and e-commerce activity is concentrated in product and service delivery to consumers (B2C), with limited

attention paid to business-to-business (B2B) operations, brokerage/intermediary services, online shopping malls, virtual communities, and content and service provision. Furthermore the ICT sector in Jamaica currently exhibits little presence of electronic document management systems, knowledge management technologies and processes, groupware, business intelligence through data warehousing and data mining, content management systems, or environmental scanning for emerging ICT technologies.

11. Development of ICT sector

The country must overcome specific issues and challenges to ensure the long-term development of the sector. These include:

- Gaps in the levels of required skills and capabilities for ICT among the work force
- Existing focus of local ICT companies on low value-added services for export
- Limited access to capital for new ventures in the ICT sector
- Relatively low levels of computer usage and affordable internet access among households and schools with limited access to affordable hardware
- Inadequate public awareness toward the importance of technology
- Importance of information literacy for all Jamaicans
- Development of environmentally sustainable methods of disposing of increasing levels of waste generated by the ICT sector

3. SWOT Analysis

ICT is an essential component in the industrialization and sustainable development of nations. A standard tool of strategic analysis is SWOT analysis, which seeks to identify the main strengths, weaknesses, opportunities and threats for a given entity, ranging from a nation to a sector to an individual enterprise. For the ICT Sector in Jamaica the identification of strengths and weaknesses represents the internal assessment of the sector while the consideration of opportunities and threats represents the analysis of the external environment for the sector.

The SWOT analysis, along with the Situational Analysis presented above, forms the basis for identifying goals, objectives and strategies that may be employed to apply the strengths and address the weaknesses of the sector, and capitalize on the opportunities and mitigate the threats to the long-term development of the sector.

The SWOT analysis for Jamaica's ICT sector is presented in Table 2 below. The SWOT analysis is presented for each of the following eight (8) dimensions identified in Section 1.2 above:

1. e-Inclusion
2. Education and Training
3. Network Readiness and Infrastructure Development
4. e-Business and Industry Structure
5. e-Government
6. Cultural Content and Creativity

7. Research and Innovation
8. Policy and Legal Framework

Table 2: SWOT Analysis – ICT Sector

Internal Analysis	
Strengths	**Weaknesses**
e-Inclusion • ICT recognised as a driver for economic growth • Jamaican populace not averse to technology. (Mobile phone penetration) • Local products and services exist that can be marketed overseas • 'Demand' for faster turnaround by the public from businesses and government	• Low PC/Internet penetration • High cost of computers and Internet services • Trust of online transactions is limited • Electricity not available island-wide • Absence of an island-wide network that can offer ubiquitous Internet service
Education and Training • Foundation provided by establishment of computer labs in many schools • E-learning project as well as other initiatives in place • Tertiary and training institutions offering ICT training/degrees/diplomas • Availability of local online courses • CIT – specialized ICT training institution • Number of good private training institutions • English-speaking • Focus on change and willingness to transform the education system as indicated by Education Transformation Task Force Report • Growing recognition of the need to integrate TVET into the secondary system • 38% of computers in schools funded through private sources/private sector (MOEY study, 2006)	• Students exiting the educational system without functional literacy • Low levels of CSEC passes especially in English, Mathematics and the Sciences • Curricula not well aligned with the needs of industry, especially regarding ICT • Curricula in high schools for grades 7 to 9 vary from school to school • Private sector support is uncoordinated and sometimes results in duplication of effort and/or varying standards • Insufficient trained and specialist teachers in the system • Overcrowding of schools • Teachers have no access to computers in 53% of schools, 39% of teachers cannot use a computer and only 14% use computers in the classroom (survey conducted by MOEY, 2006) • High costs of equipment maintenance • Very limited ICT technical support within schools • Underdeveloped software engineering sector

• Increased number of students sitting and passing CSEC IT between 2002 – 2005 • Teachers colleges across the country have been connected via a dedicated wireless network	• Little research and development funding from private or public sector • Dominance of Computer Science versus Information Technology and Information Systems courses of studies • Few innovative projects being developed in education
Network Readiness and Infrastructure Development • A multiplicity of ICT networks with some providing over 90% population coverage • Strong competition driving further network development • Interconnectivity of most ICT networks • Availability of diverse high capacity fibre cable networks • General regulatory and policy acceptance that deregulation promotes competition and choice creating an incentive for private sector development • Developing experience in locating ICT in private and public institutions e.g. schools, libraries, post offices and other public institutions	• Legacy networks are largely voice centric • Existing levels of consumer demand for ICT militates against further infrastructure development • Infrastructure has not reached critical mass in number of network nodes • Higher levels of taxation than regional competitors discourages private sector investment in ICT • Import friction increases cost of infrastructure development in ICT • Shortage of high-skilled IP engineers limits growth of ICT sector • Low PC penetration limits opportunities for wide scale broadband deployment • High interest rate structure discourages investment in ICT
e-Government • Jamaica has been ranked #1 e-government nation in the Caribbean for the last 3 years by the UN Global E-Government Rankings • Competition between government ministries, departments and agencies (MDAs) for implementation of e-services • Trainable human resources • Good technical expertise in place	• Lack of cohesion at the governance level, with lack of a properly defined e-governance framework • Lack of integration of services across government entities; e.g. hindrances to TRN linkages • Limited number of local sources of e-government solutions with high level of external dependency • Lack of adequate ICT-related training and professional development in government

• Available infrastructure in some areas • Ability to identify inefficiencies in current operations • Good National ICT Strategic Plan as base on which to build Govnet	• Current local environment does not adequately support the development of innovations • Inadequate infrastructure with geographical limitations • Limited internet penetration • Limited PC/access device penetration • Burden on citizens to transact business with multiple agencies • Competition between MDAs may lead to inadequate coordination and fragmentation of resources • Lack of policy on e-governance to support integration and buy-in from policy makers • Information technology is not positioned in a strategic position in corporate structures within government • Poor implementation of e-related projects, with need to revamp business processes • CITO is under resourced and lacks teeth, indicating limited level of commitment to e-government • Lack of data protection and privacy laws to protect citizens against abuse of state power • Lack of alignment between IT strategies and business strategies • Limited financial resources for implementation of e-governance initiatives
e-Business and Industry Structure • Strong interest by Government in promoting economic growth including role of ICT • Major ICT brands represented on island • Good fibre connectivity driving down Internet costs • Duty free regime for computer imports • Good interconnectivity for business markets • Training for ICT is available at all levels • Dynamic growth of Services sectors	• Low share of high-technology products output • Modest efficiency and relatively low share of business and financial services in GDP. • No ICT manufacturing • Non consolidated ICT sector • Lack of ICT experts with managerial experience and skills

• Solid level of ICT investment by consumers and service providers • Improved competitiveness of telecommunications and computer services • Services driven growth of ICT sector and ICT market size	

Research and Innovation
• Existing incentives for research & innovation in ICT e.g.:
  • The National Award for Science & Technology,
  • National Quality Awards for Science & Technology
  • Technology Investment Fund and Tax Incentives Scheme
  • MITEC gave grants to UWI and UTECH to promote research
• Evidence of innovation in ICT – National Awards 2003 and 2005
• Continued expansion of ICT infrastructure
• Growth of SMEs in ICT which drives Research and Innovation
• Liberalised ICT sector
• International ranking – telephone penetration, progress in the sector, e-readiness
• Proximity to major ICT markets
	• No explicit understanding of or established role for ICT in national vision and development objectives
	• No structured national ICT R&D programme geared towards national priority needs and yield high impact output
	• Low levels of funding and investment - e.g. budget expenditure
	• Low level of ICT innovation in the public sector, private sector and tertiary level
	• Inadequate creativity and capacity to manufacture software and hardware due to ready access to off the shelf products
	• Inadequate Private/Public/University support for ICT research
	• The culture does not promote/reward innovation and research
	• Significant gap between ICT education and skills capacity necessary to advance ICT
	• Weak problem solving skills in ICT hinged on low performance in Mathematics and Information Technology

Cultural Content and Creativity • Well developed linkage industries such as tourism and sports • Developing awareness of the role of culture by academic institutions	• Excessive sexually charged lyrics and depictions as well as lyrical and visual content advocating violence • Not enough industry knowledge and activity in e-commerce and online marketing

• Inclusion of elements of Jamaican and Caribbean culture in the curriculum at both tertiary level institutions and high schools • Local media acting as a conduit for cultural content • International success of local artists acting as ambassadors for national culture • Increased thrust towards the international marketing of Brand Jamaica through the adoption of ICT tools. • Jamaica's cultural diversity • Jamaican culture has benefited from other closely connected products such as beer, spices and coffee • Jamaica has consolidated its place in culturally diverse and heritage based festivals such as CARIFESTA, PANAFEST and Sumfest • More than 60 recording studios most with state of the art digital audio technology • A strong Jamaican diaspora as a first base market for our cultural products • Large and diverse range of cultural content available • Focus on culture enhanced by direct Ministerial portfolio	• Lack of widespread access to ICTs and broadband by Jamaica's creative youth and other potential contributors • Particular aspects of the cultural expression elicit conflictual response among social groups • Perception and reality of crime and violence • Loss of cultural content and continuity over time • Recording on obsolete media and lack of archiving and heritage retention • Quality challenges • Lack of interest and awareness by creators of their IP rights • Limited pre-tertiary educational programmes to develop careers in creative industries
Policy and Legal Framework • Appreciation at the policy level of the important role to be played by law and policy, for example the development of a new Telecommunications Policy (draft) • Electronic Transactions Act was enacted in April 2007 • Local expertise exists to help shape and guide the development of the legislative and policy framework • Laws of Jamaica are available in digital format	• Over-emphasis from a policy & legislative perspective on digital transactions with little attention to use of ICTs to ensure the speedy delivery of justice • Laws of Jamaica online are not regularly updated • Lack of a cohesive public policy to govern the convergence in the ICT sector which undermines the sector and poses increased risks for private investments • Neither the decisions of the Jamaican courts nor the Jamaican Gazette are

	available online • Failure to use common databases within the Government to track down criminal offenders and enforce judgments • Lack of overarching ICT Policy • Absence of legislation to protect personal information and privacy • Limited capacity of judiciary in ICT-related matters
External Analysis	
Opportunities	**Threats**
e-Inclusion • Three major ICT players in a competitive market • Extensive cable TV network which can be utilized to offer Internet service at a reduced cost • Interest from overseas governments & cooperation to establish island wide networks • Geographically close to large overseas markets • Foreign Direct Investment is on the increase	• No legal means to compel ICT players to provide service in 'unprofitable' areas • Government of Jamaica may have to pay service fees for access to network • The topology of Jamaica mitigates the roll out of wireless networks which are cheaper and quicker to implement • Other Caribbean or South American countries maybe able to take advantage of opportunities based on their advanced technologies, skill sets and cheaper labour costs
Education and Training • Private sector partnerships, including the Diaspora – start up of new Public Private Partnership (JCUTE) for Universal Technology Education • International support for ICT in education interventions • Growing body of knowledge in respect to ICTs in Education • Greater competition in the ICT sector which is decreasing connectivity costs • Growing variety of connectivity options and 'connecting' devices	• Migration of skilled teachers/professionals • Rapid obsolescence of ICTs • Low literacy rates in general population • Techno phobia among specific population groups • Economic feasibility to accomplish goals • Graduates not having the necessary skills to innovate or create value in organizations • Infrastructure limitations and cost of providing universal access

• Funding sources such as Universal Access Fund to support connectivity costs	
Network Readiness and Infrastructure Development • Availability of upgrade paths to broadband for most networks • USP as an enabler towards a state of the art ICT broadband network • Low broadband penetration creates investment opportunities • Common networking standards and /or the availability of integration software will enable ubiquity • Development of low cost access devices could enhance infrastructure affordability	• The pace and cost of technology development could hinder ability to be truly competitive from an infrastructural standpoint • Most competing regional nations are also aggressively promoting ICT investment • Located in the hurricane belt, components of Jamaica's ICT infrastructure are subject to periodic catastrophic failures
e-Government • Current dissatisfaction of the public with current services will drive e-government adoption • Other countries are available for reference and lessons learnt in implementation of e-governance	• Other regional countries are now building e-government services on a cohesive platform, which will result in greater regional competition • Brain drain, leading to affordability challenge to retain the best persons in Jamaica • Increased cyber crimes • Increased capital and maintenance costs for systems • Potential for abuse of power arising from better integrated databases across government • Invasion of privacy • Resistance to change among public sector workers
e-Business and Industry Structure • FDI inflow to the ICT sector may boost supply of advanced ICT solutions • Competitive business environment	• Inadequate supply of knowledge intensive business services • Slow development of domestic consumer market

• Export demand for telecommunications skill and computer services	
Research and Innovation • Global growth in ICTs to support development of knowledge economies/societies • Collaboration among local and regional experts and regional institutions • Knowledge sharing from the Diaspora to stimulate research and innovation • Expansion in areas for marketable science and application to solve real problems • Potential latecomer advantage for adoption, adaptation and creation of ICT • Increasing competition among industries propelling innovation in and use of ICTs • Interest by private sector in promoting Private/Public/University partnerships to foster innovation for critical sectors including SME and manufacturing	• Funding for research and innovation in ICT do not target high impact output • Results from R&I may have short shelf life • Weak intellectual property rights system • Recruitment abroad of highly qualified Jamaican ICT professionals • Limited appreciation of the value of ICT as the cornerstone in building knowledge economy • Funding provided by overseas entities who then own the IP
Cultural Content and Creativity • World wide recognition of Jamaican music and culture • Existence of a policy framework to guide ICT development in Jamaica • More capabilities for cultural content and creativity through the acquisition of easily accessible ICTs • The CSM provides an avenue for the spread of Jamaican culture throughout the region by virtue of the free movement of artistic professionals • Jamaican missions abroad can act as key points in the	• Limited resources available to protect the intellectual property rights of artists and cultural practitioners • Increased use of the Internet on social networking sites to download and share music/movies files thereby violating intellectual property rights • Disproportionate infiltration of foreign culture through local media programming • Widespread duplication and imitation of Jamaican culture in economies with cutting edge technology • A major segment among cultural practitioners are unable to speak another

dissemination of cultural content globally • A very large and geographically diverse Jamaican Diaspora, capable of contributing to the overall development of Jamaican culture through ICTs. • Clear Governmental support for cultural expression through the development and support of cultural institutions such as Edna Manley College, the CPTC, JAMPRO, TPDCO, Jamaica National Heritage Trust • Access international markets • Application of new tools and technologies to produce new cultural forms • Opportunity to create strengthened support mechanisms to get artistes into formal system • Potential for expansion of tourism and leisure industries in support of cultural industries	language • Local cultural institutions lack adequate resources to be more engaged in Caribbean film and video production geared at showcasing regional and Jamaican culture nationally and globally. • Poor artiste management and business skills particularly in the music industry • Poor communication skills among Jamaican cultural, sporting and music sector managers and artistes • Unwillingness or inability to appreciate the culture and lifestyle practices in other countries
<u>Policy and Legal Framework</u> • Foundation established for CARICOM-wide ICT policy-making with the Georgetown Declaration	• CARICOM ICT policy-making has not moved forward since 2004 • Moving at a glacial pace while global events, treaties and countries bold enough to embrace legal, regulatory and policy changes, overtake Jamaica

4. Vision Statement for ICT Sector

The long-term process of planning for the ICT Sector is guided by a Vision that describes a future for the sector that is desirable for its stakeholders and that can be achieved through their own efforts within a realistic time frame. The Sector Plan contains an overall Vision for the ICT sector, which is based on the National ICT Policy and also reflects the contributions of the stakeholders represented on the ICT Task Force during the Vision 2030 Jamaica planning process.

4.1 Vision Statement

The Vision Statement for the ICT Sector for Vision 2030 Jamaica is:

> ***"A globally competitive ICT sector that is widely accessible and makes the greatest possible contribution to the social and economic development of Jamaica"***

4.2 Strategic Vision

The long-term strategic vision for the ICT sector in Jamaica is built on a number of fundamental elements, including the following:

i) An ICT sector that achieves sustained global competitiveness in industry and market segments where Jamaica has competitive advantages;

ii) An ICT sector that is driven by private sector investment within a policy and regulatory framework that fosters competition and transparency;

iii) An ICT sector that is accessible to all Jamaicans and contributes to greater ICT literacy;

iv) An ICT sector that enhances the productivity and competitiveness of Jamaica's productive sectors;

v) An ICT sector that is environmentally sustainable with minimal harmful environmental impacts;

vi) An ICT sector that supports improved governance at all levels;

vii) An ICT sector that contributes to the science, research and innovation capabilities of the country.

This strategic vision is expressed in the strategic framework for the ICT Sector for Vision 2030 Jamaica presented below.

5. Strategic Framework for the ICT Sector - Goals, Objectives and Strategies

The strategic framework for the ICT Sector presents the Goals, Objectives and Strategies for the ICT Sector in Jamaica over the timeframe covered by the Vision 2030 Jamaica National Development Plan.

Goals	Objectives	Strategies
e-Inclusion		
1. Universal and Open Access to ICTs and Participation in a Knowledge Based Society	1.1 Widely dispersed ICT infrastructure established and broadband penetration deepened including into rural Jamaica and inner cities	1.1.1 Encourage public and private sector partnerships to establish Internet connectivity in publicly accessible spaces, including government buildings and housing developments, libraries, post offices, schools, and cybercentres
		1.1.2 Expand the deployment of Community Access Points (CAPs) within publicly accessible spaces; for example libraries, post offices, community centres, schools, and revenue centres
	1.2 Greater use of Free and Open source Software (FOSS) in all sectors of the society	1.2.1 Promote deployment of FOSS in the public and private sectors through pilot projects
		1.2.2 Develop standard FOSS packages for distribution to private home users
	1.3 Improved penetration of computing devices throughout homes and businesses	1.3.1 Facilitate greater computing device ownership among Jamaicans by encouraging the commercial sector to provide more affordable and flexible purchase arrangements, from established businesses
		1.3.2 Expand Government programs to facilitate availability of affordable computing devices
		1.3.3 Promote the establishment of cybercentres by private entities to facilitate business development and job dispersion across the country

Goals	Objectives	Strategies
e-Inclusion		
	1.4 Greater public awareness of the capability of ICTs and their potential impact on economic and social life	1.4.1 Develop a nation-wide public education campaign to galvanize all sectors of the population in the use of ICTs for personal, community, corporate and national development
		1.4.2 Develop a plan to encourage private businesses to offer services online

Goals	Objectives	Strategies
Education and Training		
2. An Educated and Trained Workforce and Citizenry, Possessing the Required Attitudes, Knowledge and Skill Sets to Function Optimally in the Knowledge Society	2.1 Human and technical resources for ICT-enabled lifelong learning	2.1.1 Develop and institutionalize a teacher education system that provides a technology integrated learning environment and graduates who are equipped to prepare students island-wide with the requisite skill sets mandated by global workforce requirements
		2.1.2 Establish full integration of ICT into the teaching and learning processes at the pre-primary, primary, secondary and tertiary level and UTE for all students
		2.1.3 Establish basic ICT and information literacy programmes as core components of secondary education
		2.1.4 Provide opportunities to achieve 100% literacy of all citizens, including unattached and youth at risk and the disabled population
		2.1.5 Encourage increased development of science and technology education in schools to provide a more useful platform for future national and global success
		2.1.6 Foster the development of public private partnerships at a national level to ensure alignment of education/training outcomes with requirements of the private sector as well as collaboration for financial sustainability of ICT initiatives
		2.1.7 Encourage the development of digital educational content as well as new media channels to support the teaching of all subject areas and the availability of on-line or on-tap educational opportunities
		2.1.8 Ensure equitable access of all educational and training institutions (from pre-primary to tertiary to community access points) to low cost, reliable high-speed internet

Goals	Objectives	Strategies
		2.1.9 Foster the establishment of community-based cybercafés/telecentres and access points to connect communities and to create actual and virtual spaces for learning and earning
	2.2 Quality education and training opportunities to facilitate major expansion in the number of highly educated and competent Jamaicans available for the ICT sector	2.2.1 Establish local, regional and global strategic alliances with internationally acclaimed high-end ICT training providers and accrediting bodies to build local instructor capacity, provide access to cutting edge technology and materials as well as international recognition
		2.2.2 Provide incentives to attract and retain the necessary ICT specialists locally, from the Jamaican Diaspora or wherever the skills exist
		2.2.3 Encourage the development of knowledge networks and communities of practice to foster continuous learning and improvement amongst practitioners
		2.2.4 Encourage the development of research at the post-secondary level in the area of ICT and related disciplines such as engineering and the physical sciences
		2.2.5 Expand opportunities internationally for faculty and post-graduate student exchanges, conferences, seminars and workshops in the area of ICT

Goals	Objectives	Strategies
Network Readiness and Infrastructure Development		
3. Widely available, affordable and accessible ICT Networks which meet the dynamic requirements of businesses, institutions, individuals	3.1 To create a regulatory environment conducive to investments in ITC and governed by independent regulatory institutions such that; i. There is open	3.1.1 Establish effective anti-competitive safeguards
		3.1.2 Ensure applications and award process for spectrum, permits and licenses per regulator defined standards and guidelines is fully transparent and open to public scrutiny
		3.1.3 Establish efficient and effective competition adjudication processes
		3.1.4 Encourage service providers to upgrade legacy networks to be data centric
		3.1.5 Provide encouragement to private sector for expansion and diversification of wired and wireless ICT networks with specific emphasis on last mile connectivity, at affordable rates
		3.1.6 Establish industry consultative body to gain consensus on common interests

Goals	Objectives	Strategies
Network Readiness and Infrastructure Development		
and communities	and equal access to essential assets. ii. There is a transparent licensing process iii. It is supportive of infrastructure investment and new service deployment iv. It supports an efficient and robust network, interconnection & competitive regime	3.1.7 Ensure high capacity four-quadrant geographic diversity of international submarine fiber optic connectivity to increase redundancy and mitigate against disaster threats
		3.1.8 Ensure high capacity terrestrial and near-shore (festoon) fiber optic grid for efficient ICT transport
		3.1.9 Establish public-private body to study and recommend infrastructure policy
		3.1.10 Include ICT risk as a portfolio consideration for the ODPEM and incorporate ICT support for recovery from natural disasters into ODPEM plans
		3.1.11 Promote national awareness of threats to information security from malware, cyber-crimes, and disasters and their impact on business continuity
		3.1.12 Invest in reliable and consistent electrical power supply from renewable and non renewable sources
		3.1.13 Accelerate cross-platform competition in the provision of converged (multi-media) services between PSTN-xDSL, CableTV and Wireless
		3.1.14 Develop domestic and regional traffic exchange points
		3.1.15 Develop efficient resource (DNS, NXX, etc) address allocation administrative system. Improve .jm domain administration to propagate use of Jamaica's unique identifier
	3.2 Create a national business and user environment supportive of ICT development and utilization such that; Public and Private sector entities, e.g., customs operations, seaports, airports, and corporate	3.2.1 Develop and implement policy to drive PC penetration
		3.2.2 Develop alternate and affordable means of access to ICTs including cell phones and PDAs
		3.2.3 Stream line processes at docks and ports of entry to mitigate corruption and facilitate efficient operations
		3.2.4 Review and improve tax and duty policies for ICT
		3.2.5 Introduce Government policy to encourage increased teleworking as a viable work life option
		3.2.6 Provide incentives for rapid adoption and use of new generation networks

Goals	Objectives	Strategies
Network Readiness and Infrastructure Development		
	entities, develop and implement policies & practices that are: i. Supportive of their own use of efficient ICTs and ii. Facilitate its development, deployment and utilization in the wider community	

Goals	Objectives	Strategies
e-Business and Industry Structure		
4. Create an environment and reputation where the use and development of ICT substantially enhances national	4.1 Jamaica is established as a regional investment centre for ICT companies and ICT reliant service industries	4.1.1 Attract major ICT corporations to invest in Jamaica
		4.1.2 Execute a planned campaign to seek and attract global ICT players to establish major operations in country
		4.1.3 Expand ICT focused Business Parks for major service providers
		4.1.4 Develop appropriate financial and non-financial incentives and resource pools for Jamaica FDI
		4.1.5 Develop investment and support framework to support ICT sector
		4.1.6 Create incentives and a framework for substantial external investment in Jamaica by global ICT players

Goals	Objectives	Strategies
e-Business and Industry Structure		
productivity, efficiency and wealth		4.1.7 The Prime Minister and national leadership become active champions of industry growth through the development of an acute awareness of the full potential of ICT
	4.2 Government becomes an exemplar user of ICT applications	4.2.1 Create incentives and a framework for the innovative use and application of ICT by the Jamaican government
		4.2.2 Establish a national IT Governance training and development program for senior executives
		4.2.3 Revise and improve the procurement process for ICT
		4.2.4 Establish an evaluation and measurement system that recognizes the value of intangible ICT services and products in the government procurement process
	4.3 Pervasive use of ICT in private enterprise	4.3.1 Facilitate adoption of ICT by MSMEs including addressing constraints of technical capacity and capitalization
		4.3.2 Promote expansion of e-commerce
		4.3.3 Create incentives and a framework for the innovative use and application of ICT by Jamaican private enterprise
		4.3.4 Establish a national IT Governance training and development program for senior executives
	4.4 The ICT industry becomes one of Jamaica's top contributors to GDP	4.4.1 Create measurement system that recognizes the ICT sector as a separate sector
		4.4.2 Identify and deliberately promote key areas of ICT industry development that will fully exploit the indigenous capabilities and potential of the country
		4.4.3 Identify key ICT sub-sectors, which Jamaica needs for sustainable growth of knowledge-based economy
		4.4.4 Use ICT to leverage the value of knowledge on Jamaica's customer and target market segments in key sectors, including creating a Customer Relationship Management (CRM) system for visitors to the island and the Jamaican Diaspora
		4.4.5 Establish a formal ICT component in Jamaica's top productive sectors
		4.4.6 Implement mechanisms to help Jamaica transition from offering lower to higher value services and products
		4.4.7 Identify key ICT sectors within which Jamaica can export products and services to Global market

Goals	Objectives	Strategies
e-Business and Industry Structure		
		4.4.8 Create a national partnership with a high services demand nation and/or a mentoring nation that has a highly developed ICT services/software industry

Goals	Objectives	Strategies
e-Government		
5. Greater Adoption of E-Government Services by the Government and Those Whom it Serves	5.1 ICTs used as a catalyst for delivering easily accessible, integrated, interoperable, responsive and secure government services to individuals and businesses from a whole of government perspective, resulting in improved internal efficiency	5.1.1 Rationalize the utilization of deployed ICT infrastructure across the public sector
		5.1.2 Use ICTs to reduce inefficiency in bureaucratic processes
		5.1.3 Establish in all key government agencies local area networks (LANs) to meet the information processing needs of the entity and connect to a Government-wide network
		5.1.4 Develop cross-ministry and interoperable communication networks to reduce silo approaches and foster joined-up government
		5.1.5 Develop and promote ICT competencies training programme targeted towards government executives
	5.2 Focused, singular and committed ICT thrust by Government to provide one stop shop for its clients	5.2.1 Proliferate the delivery of first-class, easily accessible and secure e-government services
		5.2.2 Actively leverage ICTs in the reform of the public service in order to achieve greater efficiency, effectiveness, and accountablity, in service delivery; as envisioned by the Public Sector Reform Unit's (PSRU) Vision 2012 Paper 56
		5.2.3 All Government entities must include in their respective corporate plans, e-government service development plans aligned with the relevant National Policy and Strategies

Goals	Objectives	Strategies
e-Government		
		5.2.4 Develop more efficient electronic systems for engagement in government-to-government (G2G), government-to-business (G2B) and government-to-citizens (G2C) transactions
		5.2.5 Improve ICT competencies across the public sector to enhance the delivery of ICT-enabled services
		5.2.6 Ensure that e-government services and website standards address the specific needs of persons with disabilities and senior citizens
		5.2.7 Develop strategies, public awareness programmes and facilities to increase confidence in and motivate the adoption of e-government services

Goals	Objectives	Strategies
Research and Innovation		
6. Environment of Research and Innovation for the Generation of Sustainable Value from ICT Knowledge, Products and Services	6.1 Establishment of policy and legal framework to support research and innovation in ICT geared towards national priorities	6.1.1 Promote an increase in patent registration for ICT innovations
		6.1.2 Establish incentives for the development of ICT research and innovation to support the national priority areas
		6.1.3 Promote public/private/civil society collaboration at the local, regional and international levels with a keen focus on engaging the Diaspora
	6.2 Increase the opportunities for ICT research and innovation capability to generate scientific and technical	6.2.1 Increase commercial funding and/or grants for ICT research and innovation
		6.2.2 Increase number of competitions and awards for ICT research and innovation
		6.2.3 Facilitate the participation of local specialists in regional and global networks for research and development
		6.2.4 Encourage collaboration among local and regional experts and research institutions through the provision of grants for major research and development activities

Goals	Objectives	Strategies
Research and Innovation		
	knowledge for sustainable development, in order to positively impact the quality of life in Jamaica	6.2.5 Establish a database of ICT research projects and innovations produced by such projects
		6.2.6 Develop national programmes to support ICT research, innovation and incubators (This is a strategy that has been successfully implemented by Singapore)
		6.2.7 Facilitate exchange programmes to other countries
		6.2.8 Develop public education programmes to promote ICT research and innovation
	6.3 The development of education and skills capacity to support research and innovation in ICT	6.3.1 Systematically develop advanced research and innovation capacity through investment in research institutes and centres of excellence with private sector linkages
		6.3.2 Increase the development of science and technology education in schools to provide a more useful platform for future research and development
		6.3.3 Develop and reward innovative thinking and research skills at all level of the educational system and in the general society

Goals	Objectives	Strategies
Cultural Content and Creativity		
7. Greater Favourable Global Recognition of and Increased	7.1 Brand Jamaica strategically built by using ICTs to propagate global knowledge of and	7.1.1 Implement a plan which will leverage ICTs for the efficient creation, promotion and distribution of cultural products
		7.1.2 Through accurate product source attribution and international marketing of products using ICT tools develop Brand Jamaica as a quality brand

Goals	Objectives	Strategies
Cultural Content and Creativity		
Rewards from Jamaica's Cultural Content and Creativity	access to Jamaican cultural products, and leveraging the increased exposure to maximize rewards	
	7.2 Production, improvement, extension, and ownership of indigenous Jamaican digital content	7.2.1 Promote the electronic documentation of Jamaican culture
		7.2.2 Continue to provide ICT support for the development of media production facilities island wide
		7.2.3 Protect national content, local innovations and cultural products by promoting awareness of, updating and enforcing existing Copyright and Intellectual Property laws
		7.2.4 Establish a strong online component for showcasing Jamaica creativity in such areas as fashion, film, music, cooking, and writing
	7.3 Preservation, dissemination and marketing of national information including historic records and valuable archives, in digital format, for current and future use by all	7.3.1 Expand the digitization and electronic access to the national information catalogue and other heritage and cultural artifacts
		7.3.2 Ensure systematic marketing and distribution of Jamaica's cultural content to our Diaspora community using ICTs
		7.3.3 Draw on existing sources to create a digitized encyclopedia of 'Jamaicana' for local and global references
		7.3.4 Convert national symbols and cultural and historical information from legacy storage media to digital format

Goals	Objectives	Strategies
Cultural Content and Creativity		
	7.4 ICT capabilities developed to support the availability and expansion of cultural content and creativity	7.4.1 Provide more opportunities for training in the use of ICTs including video production and web design and hosting
		7.4.2 Develop a strong and sustainable public broadcasting system by linking all public broadcasting initiatives
		7.4.3 Facilitate and encourage digital broadcasting for greater efficiency in public and private broadcasting
		7.4.4 Develop high-technology Cultural Performing Centres with webcam facilities for live streaming of concerts and online delivery of cultural programmes

Goal	Objectives	Strategies
Policy and Legal Framework		
8. A National ICT Policy and Legal Framework which Encourages Investment in the ICT Sector and Promotes the use of ICTs for the Benefit of the Entire Society	8.1 A legal and regulatory framework which protects ICT users and creators of ICT-related products and services and encourages ICT-related business	8.1.1 Maintain an up-to-date, ICT policy developed through public and industry consultation
		8.1.2 Maintain a transparent, effective and efficient ICT regulatory framework that reflects public and industry participation in policy-making
		8.1.3 Establish and fully implement policy for tele-working
		8.1.4 Fulfil all obligations under the Paris Convention
		8.1.5 Join the Patent Co-operation Treaty
		8.1.6 Pass a modern Patent Act
		8.1.7 Pass data protection/ security legislation
		8.1.8 Pass legislation providing incentives for domestic and foreign investment in ICT
		8.1.9 Review and update existing legislation for ICT-appropriateness
		8.1.10 Ensure criminalization of computer hacking, phishing and other cyber and ICT related offences
		8.1.11 Develop specialised competence within the procurement process to ensure appropriate valuation of ICT-related products and services

Goal	Objectives	Strategies
Policy and Legal Framework		
	8.2 A legal and regulatory framework which encourages growth and investment in ICT-related business	8.2.1 Pass legislation providing incentives for domestic and foreign investment in the ICT sector
		8.2.2 Remove regulatory bottlenecks end encumbrances which impede network deployment
		8.2.3 Create an advisory body which identifies regulatory bottlenecks and makes recommendations on the facilitation of investment in the ICT Sector
	8.3 Integration of ICT in the administration of justice and law enforcement	8.3.1 Create a specialized court to handle complex ICT-related litigation expeditiously
		8.3.2 Create a specialist Police department dealing with ICT related crimes
		8.3.3 Enhance the use of ICT as part of expanded application of forensic science in Police investigations
		8.3.4 Establish an electronic court filing system
		8.3.5 Establish fully digital courtrooms including judges using computers for recording judgments and legal research
		8.3.6 Provide public access opportunities to offer accurate real-time information about cases
		8.3.7 Make all judgments of courts of record and primary laws available on-line
	8.4 ICT fully incorporated into national policy development and strategic planning	8.4.1 Establish a national ICT policy, through consultation with private sector and civil society emphasising universal access, affordability & e-inclusion
		8.4.2 Ensure all operational plans developed annually by ministries and government agencies include ICT-supportive strategies especially development of e-government services
		8.4.3 Establish courses at MIND on ensuring incorporation of ICT-related goals and strategies into policy-making and strategic-planning
	8.5 Effective and full participation in regional and international ICT policy-making	8.5.1 Provide Jamaican leadership to resuscitate the Georgetown Declaration and the CARICOM Committee of Information Ministers
		8.5.2 Ensure appropriate representation on consensually-formed national positions at regional and international ICT-policy and treaty-making fora

6. The Way Forward

The 1st draft of the Sector Plan for ICT will be presented to the Planning Institute of Jamaica upon completion, and reviewed by the PIOJ and External Reviewers. Comments from the PIOJ and External Reviewers will be reviewed and discussed by the Task Force and incorporated into the draft sector plan.

Some key steps in the plan development process after completion of the 1st draft of the Sector Plan include:

1. Undertake consultations of the first draft with key stakeholders to be identified by the PIOJ, the Chair and the PAG
2. Development of an Action Plan – moving beyond initial strategies to the identification of actions, timelines, indicators and targets and responsibility centres
3. Application of T21 - run scenarios with individual/combined policy variable changes with T21; identify consistencies, and commence preparation of Second Draft Sector Plans including long-term and short-term action plans; identify inconsistencies, which may be caused by: resource constraints and/or unexpected interactions between variables
4. Submission of second draft of the sector plan incorporating the results of the action planning

7. Appendices

7.1 Appendix 1 – List of Task Force Members

Dr. Jean Dixon (Chairperson)	Permanent Secretary, Ministry of Energy, Mining and , Telecommunications
Miss Karlene Francis (Vice-Chair)	Director General, Ministry of Energy, Mining and Telecommunications
Mrs. Debbie Livingston	Administrative Assistant to the Permanent Secretary, Ministry of Energy, Mining and Telecommunications
Mr. Rick Pardy	Chief Executive Officer, Flow
Ms. Sonia Gill	Assistant Director, Broadcasting Commission
Mr. Courtney Jackson	Deputy Director General, Office of Utilities Regulation (OUR)
Mr. Ernest Smith	Managing Director, Spectrum Management Authority
Mr. Hugh Cross	Managing Director, Universal Access Fund
Mrs. Elizabeth Terry	Director, Projects and Partnerships, HEART Trust/NTA Chair, ICT4D Jamaica
Dr. Hopeton Dunn	Director, Telecommunications Policy and Management Programme, Mona School of Business
Mr. Michael Gentles	Postmaster General/CEO, Postal Corporation of Jamaica
Ms. Nicole Foga	Partner, Foga Daley & Co.
Ms. Karlene Black	Acting Head- School of Computing & Information Technology, University of Technology
Mr. Chris McNair	Manager- Information and Communications Technology, Jamaica Trade and Invest (JAMPRO)
Mr. Dainsworth Richards	CEO (Acting), Central Information Technology Office (CITO)
Mr. Chris Hayman	Chairman, PSOJ Technology Committee
Mr. John Riordan	Director, IT, Digicel
Mr. Lawrence McNaughton	Senior Regional VP for Career Service Department, Cable and Wireless Jamaica Ltd.
Mr. Carlton Samuels	Chief Information Officer and University Director of IT, University of the West Indies (UWI)
Mr. Errol Anderson	President, Xsomo International Limited
Mr. Don Gittens	Senior Consultant, Business Development Department, Jamaica Trade & Invest
Mrs. Michele Thomas	Director, Policy and Strategic Planning, Spectrum Management Authority
Ms. Michele English	General Manager/Vice-President, Flow
Ms. Sharma Taylor	Legal Officer, Flow
Mr. Stephen Meghoo	CEO, IBM World Trade Corp. Jamaica
Mrs. Marie Wint-Mckenzie	Strategic Planning Officer, Central Information Technology Office (CITO)

Mr. Mervin Eyre	CEO, Fujitsu Transaction Solutions (Jamaica) Ltd.
Dr. Paul Golding	Acting Head, School of Computing and Information Technology, University of Technology
Mrs. Caroline Parkes	Lecturer, School of Computing and Information Technology, University of Technology
Ms. Shawn Ashman	Acting Director, IT, Postal Cooperation of Jamaica

7.2 Appendix 2 – Listing of Task Force Meetings

- April 3rd, 2007
- April 17th, 2007
- May 1st, 2007
- May 22nd, 2007
- May 29th, 2007
- June 5th, 2007
- June 12th, 2007
- June 19th, 2007
- June 26th, 2007
- July 10th, 2007
- July 17th, 2007
- July 24th, 2007
- August 28th, 2007
- September 11th, 2007
- October 23rd, 2007
- November 6th, 2007

7.3 Appendix 3 – List of Acronyms

ESSJ	Economic and Social Survey Jamaica
GDP	Gross Domestic Product
GOJ	Government of Jamaica
MITEC	Ministry of Industry, Technology, Energy and Commerce
OUR	Office of Utilities Regulation
PIOJ	Planning Institute of Jamaica

7.4 Appendix 4 – Millennium Development Goals (MDGs)

The Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that respond to the world's main development challenges. The MDGs are drawn from the actions and targets contained in the **Millennium Declaration** that was adopted by 189 nations-and signed by 147 heads of state and governments during the **UN Millennium Summit** in September 2000.

Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve universal primary education
Goal 3: Promote gender equality and empower women
Goal 4: Reduce child mortality
Goal 5: Improve maternal health
Goal 6: Combat HIV/AIDS, malaria and other diseases
Goal 7: Ensure environmental sustainability
Goal 8: Develop a Global Partnership for Development

The MDGs:

- synthesise, in a single package, many of the most important commitments made separately at the international conferences and summits of the 1990s;
- recognise explicitly the interdependence between growth, poverty reduction and sustainable development;
- acknowledge that development rests on the foundations of democratic governance, the rule of law, respect for human rights and peace and security;
- are based on time-bound and measurable targets accompanied by indicators for monitoring progress; and
- bring together, in the eighth Goal, the responsibilities of developing countries with those of developed countries, founded on a global partnership endorsed at the International Conference on Financing for Development in Monterrey, Mexico in March 2002, and again at the Johannesburg World Summit on Sustainable Development in August 2002.

7.5 Appendix 5 – Definition of ICT Sector (OECD)

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD). (2002). MEASURING THE INFORMATION ECONOMY.
ANNEX 1. THE OECD DEFINITION OF THE ICT SECTOR

In 1998, OECD member countries agreed to define the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically. This definition, based on an international standard classification of activities (ISIC Rev. 3), was considered to be a first step towards obtaining some initial measurements of ICT sector core indicators.

The principles underlying the definition are the following:
For *manufacturing* industries, the products of a candidate industry:
• Must be intended to fulfil the function of information processing and communication including transmission and display.
• Must use electronic processing to detect, measure and/or record physical phenomena or control a physical process.
For *services* industries, the products of a candidate industry:
• Must be intended to enable the function of information processing and communication by electronic means.

The ISIC Rev. 3 classes included in the definition are:

Manufacturing: 3000 – Office, accounting and computing machinery; 3130 – Insulated wire and cable; 3210 – Electronic valves and tubes and other electronic components; 3220 – Television and radio transmitters and apparatus for line telephony and line telegraphy; 3230 – Television and radio receivers, sound or video recording or reproducing apparatus and associated goods; 3312 – Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment; 3313 – Industrial process equipment.

Services: 5150 – Wholesaling of machinery, equipment and supplies (if possible only the wholesaling of ICT goods should be included); 7123 – Renting of office machinery and equipment (including computers); 6420 – Telecommunications; 72 – Computer and related activities.

7.6 Appendix 6 – References

Atkinson, Robert D. and Andrew S. McKay. (2007). *Digital Prosperity – Understanding the Economic Benefits of the Information Technology Revolution*. The Information Technology and Innovation Foundation. Washington D.C.

Bank of Jamaica. *Annual Balance of Payments*. 2003 – 2005. Kingston.

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7.7 Appendix 7 – ICT Indicators for Jamaica

World Bank • ICT at a Glance

Jamaica

	Jamaica		Lower-middle-income group	Latin America & Caribbean Region
	2000	2005	2005	2005
Economic and social context				
Population, total (millions)	3	3	2,475	551
Urban population (% of total population)	52	53	50	77
Poverty (% of population below US$1 per day)	<2	<2	..	*8.6*
GNI per capita, Atlas method (current US$)	2,930	3,390	1,923	4,045
GDP growth, 1995–2000 and 2000–5 (%)	-0.1	1.8	6.3	2.3
Adult literacy rate (% ages 15 and over)	..	80	89	90
Primary, secondary, tertiary school enrollment (% gross)	74	77	*71*	*80*
ICT sector structure				
Separate telecommunications regulator	Yes	Yes		
Status of main fixed-line operator	*Private*	Mixed		
Level of competition: international long distance	*M*	C		
Level of competition: mobile	*C*	C		
Level of competition: Internet service provider	*C*	C		
Government prioritization of ICT (scale 1-7)	..	4.9	4.0	3.7
ICT sector performance				
Access				
Telephone main lines (per 1,000 people)	191	129	205	*177*
International voice traffic (minutes per person)[a]	155	*233*	*14*	..
Mobile subscribers (per 1,000 people)	142	1,017	306	439
Population covered by mobile telephony (%)	*80*	95	..	*90*
Internet users (per 1,000 people)	31	*404*	95	156
Personal computers (per 1,000 people)	46	*63*	*45*	*88*
Households with television (%)	69	*70*	*84*	*87*
Quality				
Telephone faults (per 100 main lines per year)	48.0	*31.0*	*25.0*	..
Broadband subscribers (per 1,000 people)	..	*3.4*	23.1	16.5
International Internet bandwidth (bits per person)	*28*	..	116	*161*
Affordability				
Price basket for fixed line (US$ per month, residential)	5.0	9.1	8.5	10.0
Price basket for mobile (US$ per month, 2006)	..	7.5	10.2	9.4
Price basket for Internet (US$ per month)	..	34.3	16.8	25.8
Price of call to United States (US$ per 3 minutes)	..	*0.87*	*2.08*	*1.80*
Institutional efficiency and sustainability				
Total telecommunications revenue (% of GDP)	5.9	*4.1*	*1.9*	*4.3*
Total telephone subscribers per employee	268	*686*	*444*	*390*
Total telecommunications investment (% of revenue)	32.5	*23.8*	*19.2*	..
ICT applications				
ICT expenditure (% of GDP)	10.3	10.6	5.5	5.9
E-government readiness index (scale 0-1)	..	*0.51*	*0.38*	*0.48*
Secure Internet servers (per 1 million people, 2006)	*1.9*	17.6	2.3	12.0
Schools connected to the Internet (%)	..	*10*	..	..