smarTT

NATIONAL ICT PLAN 2014 – 2018

Credits and Copyright

Government of Trinidad and Tobago

Acknowledgements

Development of the 2014 – 2018 National ICT Plan tapped into the collective wisdom of the people of Trinidad and Tobago. The process involved a diverse group of individuals representing their communities, organizations, industries and Government.

The Plan benefitted richly from the contribution of individuals acting in advisory roles, as members of focus groups and review panels and as interested citizens participating in online consultations.

Special mention must be made of the Ministry of Science and Technology (MST), the e-Business Roundtable, the Project Working Committee comprising officers of the Ministry of Science and Technology, the National ICT Company Limited (iGovTT), IDA International and the Chairpersons and members of the Specialized Working Groups, all of whom provided direction and support for this exercise.

We are also grateful for the generous support of public sector leaders and technology sector experts who set aside time to share their perspectives on the key imperatives and critical success factors of the Plan.

Table of Contents

List of Diagrams

List of Tables

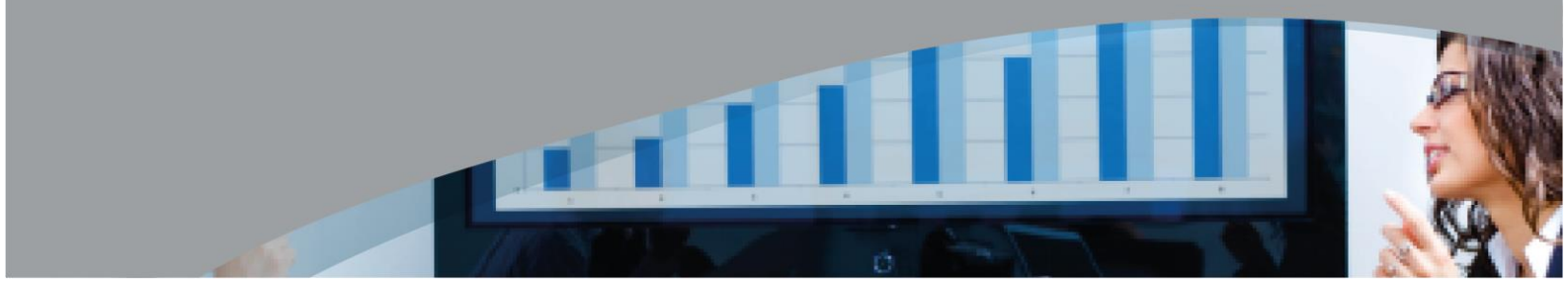
List of Acronyms

ACMA	Atlantic Cable Maintenance Agreement
ADSL	Asymmetric Digital Subscriber Line
ASYCUDA	Automated System for Customs Data
ATM	Automated Teller Machines
B2B	Business-to-Business
B2C	Business-to-Consumer
BDC	Business Development Company
CARICOM	Caribbean Community and Common Market
CBBIs	Community-Based Business Incubators
CBIs	Commercial Business Incubators
CBO	Community Based Organisations
CCI	Council for Competitiveness and Innovation
ccTLD	Country code Top Level Domain
CD/DVDs	Compact Disc/Digital Video Disc
CERT	Computer Emergency Readiness Team
CICTE	Inter-American Committee Against Terrorism
CIO	Chief Information Officer
CITREP	Critical Infocomm Technology Resource Programme
CKLN	Caribbean Knowledge Learning Network
CSIRT	Computer Security and Incident Response Team
CSO	Central Statistical Office
DAI	Digital Access Index
DNS	Domain Name Server
DOI	Digital Opportunity Index
e-Government	Electronic Government
EA	Enterprise Architecture
EBD	Economic Development Board
e-BRT	e-Business Roundtable
EC	European Commission
eCAL	eConnect and Learn Programme
EDPM	Electronic Document Preparation and Management
e-Forms	Electronic Forms
EIU	Economist Intelligence Unit
e-GIF	e-Government Interoperability Framework
eL-tt	Information Society Legislation-tt/e-Legislative programme
e-Marketplaces	Electronic Marketplaces
e-payments	Electronic Payments
e-Service	Electronic Service
eTeck	Evolving TecKnologies and Enterprise Development Company Limited
FAQs	Frequently Asked Questions
FLOSS	Free/Libre/Open Source Software
FY	Fiscal Year
G2B	Government-to-Businesses

G2C	Government-to-Citizens
G2E	Government- to- Employees
G-Cloud	Government Cloud
GCR	Global Competitiveness Report
GDC	Government Data Centre
GIS	Geographic Information Systems
GITR	Global Information Technology Report
GoRTT	The Government of the Republic of Trinidad and Tobago
GovNeTT	Government Network
HIPCAR	Harmonisation of ICT Policies, Legislation and Regulatory Procedures
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
HR	Human Resources
IBIS	Integrated Business Incubator System
ICT	Information and Communication Technology
IM	Instant Messaging
IMC	Inter-Ministerial Committee
IP	Intellectual Property
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISO	International Standards Organisation
ITU	International Telecommunications Union
IXP	Internet eXchange Point
KPIs	Key Performance Indicators
LAN	Local Area Networks
LTE	Long Term Evolution
Mbps	Megabit per second
M-Learning	Mobile Learning
MMS	Multimedia Message Service
MORI	Market and Opinion Research International
MPA	Ministry of Public Administration
MSC	Ministerial Steering Committee
MSEs	Micro and Small Enterprises
MSMEs	Micro, Small and Medium Enterprises
NALIS	The National Library and Information System Authority
NCDF	National Carnival Development Fund
NFC	Near Field Communications
NGN	Next Generation Network
NGOs	Non-Governmental Organisations
NIST	National Institute of Standards and Technology
OAS	Organisation of American States
ODPM	Office of Disaster Preparedness and Management
OJT	On-the-Job Training
PBS	Public Broadcasting Service
PC	Personal Computer
PDAs	Personal Digital Assistant
PPP	Public Private Partnership

PSIP	Public Sector Investment Program
QoS	Quality of Service
R&D	Research and Development
SEW	Single Electronic Window
SMEs	Small and Medium Enterprises
SMS	Short Message Service
SSO	Single Sign-On
STTE	Ministry of Science Technology and Tertiary Education
T&T	Trinidad and Tobago
TATT	Telecommunications Authority of Trinidad & Tobago
TTBS	Trinidad and Tobago Bureau of Standards
TTEC	Trinidad and Tobago Electricity Commission
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Program
UWI	The University of the West Indies
VoIP	Voice over Internet Protocol
WAN	Wide Area Network
WEF	World Economic Forum
WiFi	Wireless Internet
Wimax	Worldwide Interoperability for Microwave Access
WSIS	World Summit on Information Society

Executive Summary



Against the backdrop of boosting national development, bridging deficiencies in access to and usage of Information and Communication Technology (ICT), as well as improving Trinidad and Tobago's ranking on critical ICT performance indicators, the National ICT Vision of Trinidad and Tobago is to create:

> *"A dynamic knowledge-based society, driven by the innovative use of ICTs to enhance the social, economic and cultural development of the people of Trinidad and Tobago"*

The National ICT Plan 2014 – 2018 is grounded in this Vision. The Plan has been named **smarTT** to draw urgent attention to the need to make more intelligent use of the country's financial, human, and other resources towards the creation of lasting prosperity. The Plan was developed using a 5-stage approach, *Plan–Discover–Design–Report–Consult*, which is outlined in Section One (1). The Plan's formulation builds on the programmes initiated under ***fastforward*** - the National ICT Plan 2003-2008, and the projects and initiatives implemented post ***fastforward***.

smarTT is the first instalment of a larger ICT roadmap which is described in Section Three (3) of this document. The roadmap consists of two additional five-year periods (2018-2022 and 2022-2026). The end goal is for the ICT sector to become a major contributor to GDP.

The core of the Plan features five thematic areas as follows:

- Section Four (4) – Innovation and Human Capital Development;
- Section Five (5) – Access and Digital Inclusion;
- Section Six (6) – e-Business and ICT Sector Development;
- Section Seven (7) – Infrastructure Development, and
- Section Eight (8) – e-Government.

Each theme includes Key Imperatives which represent the action oriented areas leading to the outcomes outlined for each theme. The Key Imperatives comprise Programmes geared at achieving the stated outcomes. The Programmes, which are outlined in Appendix 1, are the heartbeat of the Plan. They outline fifty-six (56) national level initiatives and responsible agencies required to facilitate the implementation of smarTT. Key high-level activities are included with the programme descriptions. Although the activities listed are not exhaustive, they highlight major areas of focus for each programme.

Theme One – Innovation and Human Capital Development focuses on fostering a creative e-Ready society as a catalyst for ICT advancement. This thematic area is main driver of smarTT and emphasises the inculcation of ICT skills and competencies among citizens. This reflects a progression from the previous National ICT Plan, which focused primarily on infrastructure development and connectivity. The Key Imperatives identified under this thematic area include: Building an e-Ready

Society through ICT Enriched Learning; Creating and Promoting Local Digital Content; and Establishing a Culture of Research and Development.

Theme Two – Access and Digital Inclusion focuses on bridging the digital divide both within and between the islands of Trinidad and Tobago. This thematic area brings to the fore efforts to increase ICT availability among underserved communities and the digitally excluded. The Key Imperatives associated with this thematic area include: Providing ICT Services for Digital Inclusion; Increasing the Accessibility and Affordability of Technologies; Increasing ICT Learning and Awareness; and Facilitating Research and Development (R&D) Focused on Bridging the Digital Divide.

Theme Three – e-Business and ICT Sector Development focuses on building a pro e-Enterprise environment within Trinidad and Tobago and highlights the importance of increasing e-Business and e-Commerce adoption both in the Business-to-Business as well as Business-to-Consumer realms. The Key Imperatives under this thematic area include: Stimulating ICT Demand to encourage e-Commerce Adoption; Developing e-Business Capacity; Enabling the Production, Distribution and Promotion of Local ICT Products and Services; Enabling Other Sectors through ICT; and Facilitating Leadership and Coordination of Efforts among Key Stakeholders.

Theme Four – Infrastructure Development focuses on enhancing accessibility, usage and governance by addressing gaps in the underlying national hardware and software infrastructure, particularly with respect to telecommunications and broadband infrastructure. The Key Imperatives include: Enhancing Infrastructure, Access, ICT Policies and Regulatory Oversight to Facilitate Sustainability; Instituting Appropriate Governance Structures for ICT Planning and Development, and Building Information Society Capacity to Ensure Availability of Internet Resources and Viability of the Internet Economy.

Theme Five – e-Government focuses on working as an integrated Government and seeks to improve the Government's operational efficiency and customer service delivery. The Key Imperatives associated with this thematic area include: Migrating to Transactional e-services and Collaborating to Implement Shared ICT Systems and Processes.

These thematic areas have been strategically developed to align to six of the seven Interconnected Pillars for Sustainable Development: (i) People Centred Development; (ii) Poverty Eradication and Social Justice; (iii) National and Personal Security; (iv) Information and Communication Technologies; (v) A More Diversified, Knowledge Intensive Economy and (vi) Good Governance. Although the Plan does not directly address Foreign Policy, the expectation is that ICT is an enabler of all sectors and therefore, will positively impact this area as well.

Further, consistent with the country's Medium Term Policy Framework (MTPF), smarTT comprises programmes that reinforce the strategic priorities of the MTPF; with the aim of spurring the outcomes set out therein. Examples of these targeted programmes are:

Crime and Law and Order:

- Programme 5.4.1 – National Cyber-Security Strategy

Agriculture and Food Security:

- Programme 3.4.2 –e-Commerce Strategy for the Agriculture Sector

Health Care Services and Hospitals:

- Programme 5.2.2 – Smart Card Development

Economic Growth, Job Creation, Competitiveness and Innovation:

- Programme 1.3.6 –Incubator for Technology/Solution Transfer and Commercialisation

Poverty Reduction and Human Capital Development:

- Programme 2.2.1 – Computers and Connectivity for Digital Inclusion

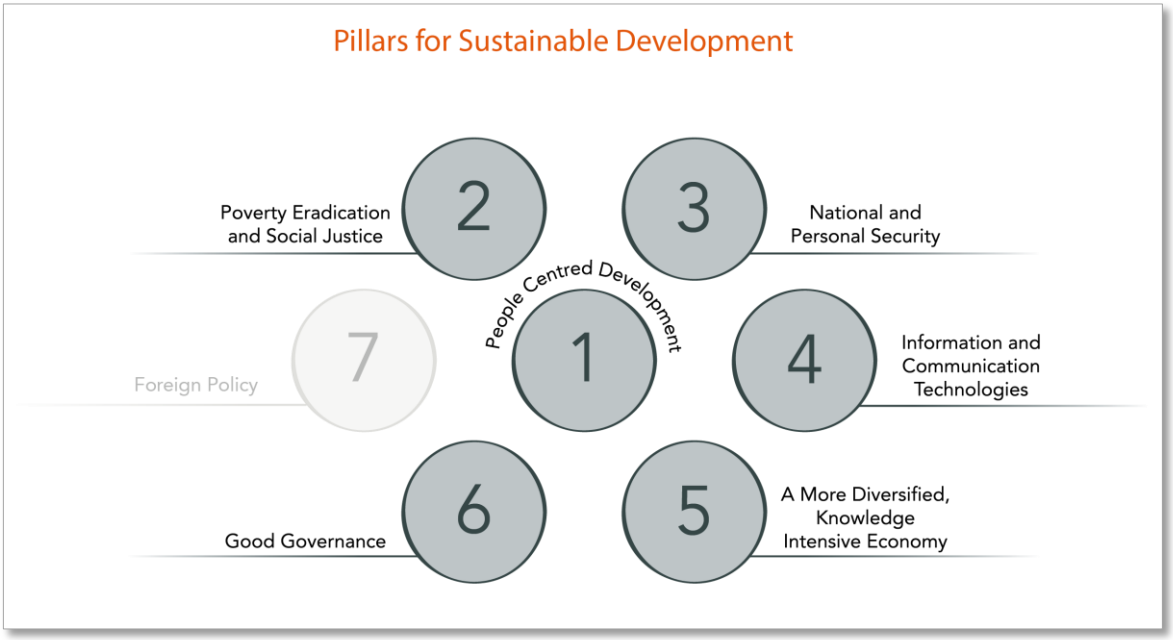


Diagram 1: Pillars for Sustainable Development

Acknowledging that the island of Tobago is at a different stage of ICT readiness in terms of infrastructure, training, and access, smarTT's focus for Tobago will be placed on people-centred development, connectivity, and the extension of government services, each driven by innovation and use of relevant ICTs. Section Nine (9) is therefore specifically devoted to examining the tailored ICT initiatives for Tobago.

In addition, several supporting mechanisms important for the optimisation of smarTT's outcomes have been identified. These include: Open Government Data; Free/Libre/Open Source Software (FLOSS); Green Computing and Sustainable ICT; Agency ICT Planning; and ICT Cluster Development.

Defining a national ICT Governance Model is vital for the successful implementation of the Plan. Section Eleven (11) outlines the Governance Model that will guide decision-making. A National ICT Steering Committee will drive the development and adoption of major ICT projects within Government, ICT projects requiring cross-ministry participation, and ICT projects with nation-wide impact.

A smarTT Secretariat will be established, which will coordinate and integrate efforts across the various programmes of the Plan, and ensure alignment with other national development efforts.

Two types of funding arrangements for smarTT are proposed in Section Twelve (12); a central fund for cross-agency ICT projects, and a Public Private Partnership (PPP) fund. This section also presents the five-year implementation roadmap for smarTT, along with the Performance Management and Reporting Framework, inclusive of annual outputs and outcomes. Additional details on the programme outputs and outcomes are outlined in Appendix 2.

The steadfast pursuit of the imperatives identified in smarTT will be underpinned by coordinated effort and a commitment to results. While the Plan contains several ambitious projects that will require significant resources in terms of funding, people and time, there are also a number of valuable quick win initiatives that can be leveraged to build momentum in the early stages of implementation. Among them are:

- Community Access Centres launched and subsidised ICT courses offered
- e-Procurement reform
- e-Services designed to ensure utilisation of all ICT platforms (web, mobile, SMS)
- e-CAL and similar initiatives tailored and streamlined for Tobago
- Government Interoperability Framework developed for Tobago
- Subsidies for broadband internet connection offered to underserved populations
- Expansion of the Single Electronic Window (SEW) and the Automated System for Customs Data (ASYCUDA)
- Upgrade and expansion of ICT infrastructure for school networks and learning portals
- Shared storage and shared infrastructure – Middleware implemented
- Enhancements to GovNeTT and more effective use of GovNeTT assets
- Full proclamation of the Electronic Transaction Act and Regulations; the Exchequer and Audit Amendment Act; the Telecommunications Amendment Act, and the Cybercrime and Cyber Security Bill
- Data Classification; Information Security, Geographic Information System (GIS); Government-to-Citizen and Government-to-Business; e-Government Interoperability Framework (e-GIF) and e-Government Omnibus Technical Standards (e-GOTs) policies

There is no doubt that Trinidad and Tobago is well positioned to seize the opportunities stemming from global technology advancements. This National ICT Plan 2014 – 2018 lays the foundation to achieve this end.

1 Journey to 2012

Information and Communications Technology (ICT) affects every facet of modern life, from simple social interactions to sophisticated business processes. As Trinidad and Tobago moves towards Developed Nation status, ICT will play a pivotal role in the thrust for economic growth and diversification.

The Government of the Republic of Trinidad and Tobago (GoRTT) is committed to diversifying the economy towards more service-driven, knowledge-based industries through the development and integration of ICT. This journey commenced with the country's first National ICT Plan 2003 - 2008, dubbed ***fastforward***, which focused on "connectivity" – providing broadband access to the nation's communities, schools and Government. Having laid the foundation for a connected society as well as embarking upon efforts to increase "uptake and usage", the current National ICT Plan now focuses on creating opportunities in the ICT Sector and improving the quality of life of the nation's citizens.

1.1 *fastforward*: 2003-2008

In 2003, the Government of the Republic of Trinidad and Tobago (GoRTT) defined a National ICT Plan.

fastforward, which entailed an ambitious work-plan of fourteen (14) programmes, covered critical spheres of interest:

Programme 1: ICT Governance

Programme 2: Promotion and Awareness

Programme 3: Community Connections

Programme 4: Knowledge, Innovation and Development (KID)

Programme 5: National Archives and Library Net

Programme 6: ICT Human Capital Development

Programme 7: ICT Sector Development

Programme 8: Growing the e-Marketplace

Programme 9: Public sector ICT Reform

Programme 10: e-Government

Programme 11: e-Health

Programme 12: e-Justice

Programme 13: Broadband Strategy

Programme 14: Legislative Review and Reform

The implementation of ***fastforward*** positively impacted national development goals in the areas outlined below.

I. Goal 1: Developing Innovative People and Nurturing a Caring Society

- Through implementation of the SchoolNet initiative over 100 public schools in Trinidad and Tobago were connected via high-speed Internet service. The *SchoolNet* project was part of the *Knowledge, Innovation and Development (KID)* programme.
- Implementation of the LibraryNet initiative through which all libraries were equipped with computers and free high-speed Internet access, and all librarians were trained on ICT usage.

II. Goal 2: Enabling Competitive Business

- Establishment of the e-Business Roundtable to drive ICT transformation in the private sector and electronic interaction within Government.
- Establishment and operation of smeXchange, an online marketplace to facilitate transactions amongst Small and Medium Enterprises.

III. Goal 3: Investing in Sound Infrastructure and the Telecommunications Environment

- Liberalization of the telecommunications sector as a key precursor to the Broadband Strategy
- Establishment of the Telecommunications Authority (TATT).

IV. Goal 4: Promoting Effective Government

- Delivery of the award winning **ttconnect**, the vehicle for multi-channel Government services delivery.
- A more connected government to enable inter- and intra-ministerial communications and information sharing.

1.2 Post *fastforward*: 2009-2012

National ICT Business and Innovation Symposium

The biennial National ICT Business and Innovation Symposium was established in 2008 by the Ministry of Public Administration and Information in collaboration with the e-Business Roundtable. The first event attracted over 400 participants from 14 countries around the world. The Symposium creates a forum for discussion and debate among local, regional and international businesses and acts as a catalyst for greater use of ICTs. The event is now regarded as one of the premiere ICT showcases in the Caribbean.

ttconnect

As part of an integrated channel strategy for the provision of government services, physical **ttconnect** service centres were established in 2007.

In 2009, the government developed a single on-line government portal - "**ttconnect** online". The portal currently offers information on government services and downloadable/printable, electronic application forms.

ttconnect 's suite of services now include:

- **ttconnect** online: Internet application
- **ttconnect** mobile: Mobile web application
- **ttconnect** self-service kiosks: ATM-like machines
- **ttconnect** Express: Mobile service centres (services to rural areas)
- **ttconnect** Service Centres: Physical locations
- **ttconnect** Hotline: Free phone number to access information

The National Information and Communications Technology Company of Trinidad and Tobago (iGovTT)

iGovTT is a state enterprise incorporated in 2009 with a mandate to provide ICT consulting and support services to Government ministries, divisions and agencies. It is also tasked with ensuring effective alignment, co-ordination and cost effectiveness across Government for ICT related projects and initiatives.

iGovTT serves as a model for other regional Governments seeking to revolutionise the way in which the public sector manages and takes advantage of technology. iGovTT plays a vital role in Government's strategy for using ICT as a key driver for socio-economic development in Trinidad and Tobago.

Legislation

In 2011, the milestone Electronic Transaction and Data Protection Acts were partially proclaimed. The Electronic Transactions Act is a key enabling framework necessary to support the legal equivalent of the transmittal of documents by paper and electronic means in order to support the development of e-Commerce in Trinidad and Tobago. The Act also provides the administrative framework for service providers to facilitate use of qualified electronic signatures. The Data Protection Act establishes affirmative responsibility, on both the public and private sector, with respect to the security of personal information, which is collected, stored and processed in the course of business operations. It also establishes the administrative framework through which these obligations are assured.

The successful implementation of smarTT hinges on the following critical legislation:

- Proclamation of the Electronic Transaction Act;
- Exchequer and Audit Amendment Act;
- Electronic Transfer of Funds Crime Amendment Act;
- Cybercrime Bill;
- Cyber Security Agency Bill;
- Electronic Evidence Act;
- Proclamation of the Data Protection Act; and
- Telecommunications Amendment Act

These comprise a subset of a larger e-legislative portfolio.

TTBizLink

In 2011, Government-to-Business (G2B) services received a major boost with the introduction of TTBizLink. This service facilitates online interaction between the businesses and Government agencies responsible for trade. TTBizLink allows companies and individuals to apply for various permits and licenses, register businesses, and conduct other trade related activities via a single online channel. Applications and submissions are automatically routed to the relevant Government Agencies. TTBizLink is the first phase of the Single Electronic Window (SEW) initiative for lodging documents at one entry point for import, export and transit-related regulatory requirements.

e-Connect and Learn (eCal)

The eCAL Programme, or Student Laptop Initiative, is an initial step in realizing a comprehensive programme of educational transformation. Through the programme, approximately sixteen thousand laptops are provisioned each year to students entering secondary school. These laptops are used to deliver curriculum and enhance the learning process. The devices contain security and monitoring features and pre-installed software, educational content and resources, as well as links to e-resources for secondary school projects as recommended by the National Library and Information System Authority (NALIS).

1.3 Planning Process and Methodology

smarTT maps out an accelerated yet comprehensive ICT development agenda for Trinidad and Tobago and facilitates a coordinated approach to increasing the levels of ICT adoption in the society. In the attempt to realise the desired outcomes in a timely manner, appropriate consideration has been given to resource allocation, bridging resource deficits and gaps, as well as building capacity throughout the timespan of the Plan.

A five-stage, highly consultative process was adopted for the master-planning exercise. Guided by the tenets of good and effective governance, the "voice of the people" was taken into account through active participation, inclusiveness, transparency and consensus building. Draft versions of the Plan were released for small group consultations, panel reviews, and online public consultation. Participants included civil society, members of the business community, sector leaders, government officials and the general citizenry. The comments and recommendations received were subsequently incorporated into revisions of the Plan.

The 5-Stage Master-Planning Methodology is summarized in the diagram below.

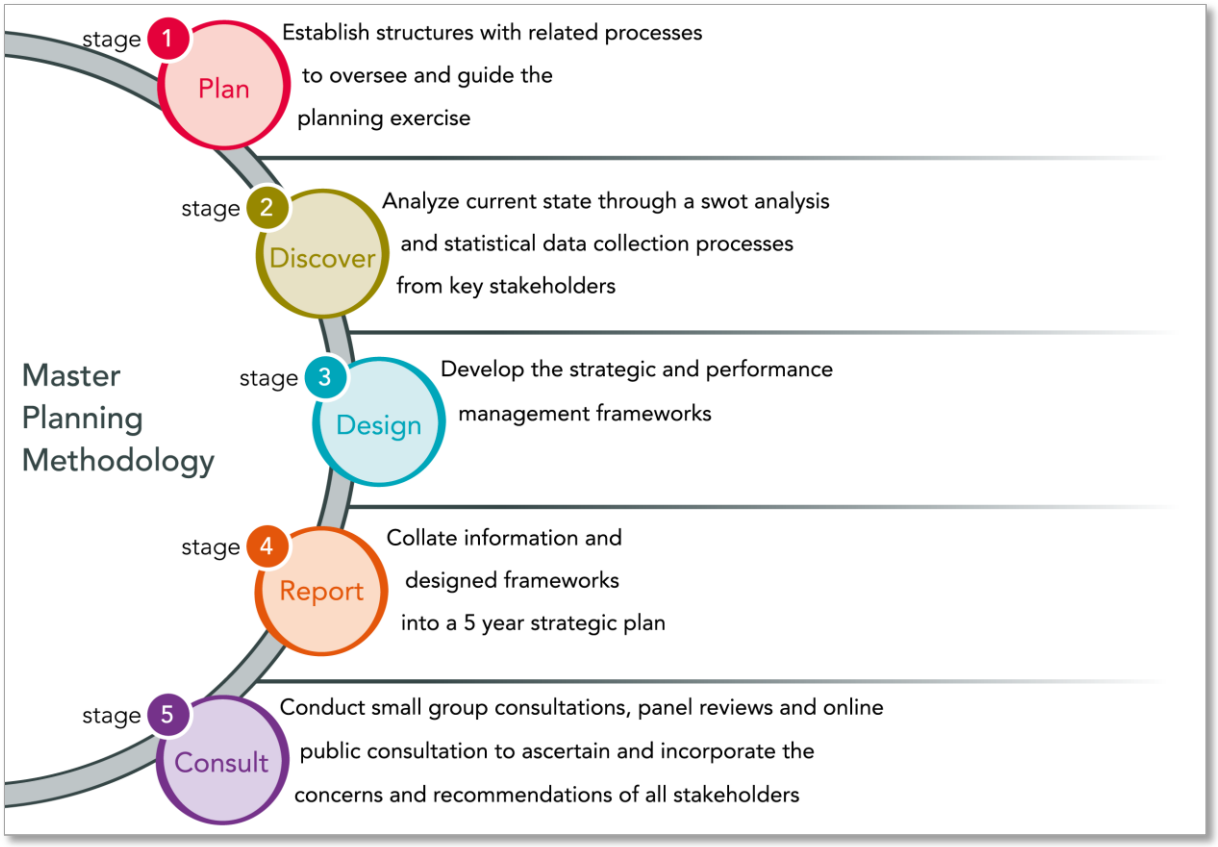


Diagram 2: Five (5) Stage Master-Planning Methodology

The Master-Planning Process included an analysis of the state of ICT development in Trinidad and Tobago for the period 2003 (the initiation of **fastforward**) to March 2012. Significant highlights of this review are listed in the sections that follow.

2 Overall State of ICT in Trinidad and Tobago

2.1 International Benchmarking

Multi-national corporations often utilise international benchmarks to gauge the feasibility and ease of doing business before investing in a country. Reports used to analyse a country's existing ICT landscape include: the UN e-Government Survey, the World Economic Forum (WEF) – Global Information Technology Report (GITR), the World Economic Forum (WEF) Global Competitiveness Report (GCR), Economist Intelligence Unit e-Readiness Report, the World Bank's Doing Business Report, the ITU Global ICT Price Basket and the United Nations Measuring the Information Society Report. Although these reports have different metrics, they all provide a picture of the degree of ICT pervasiveness and readiness of a country. Chart 2 below highlights Trinidad and Tobago's ranking in the most frequently referenced reports.

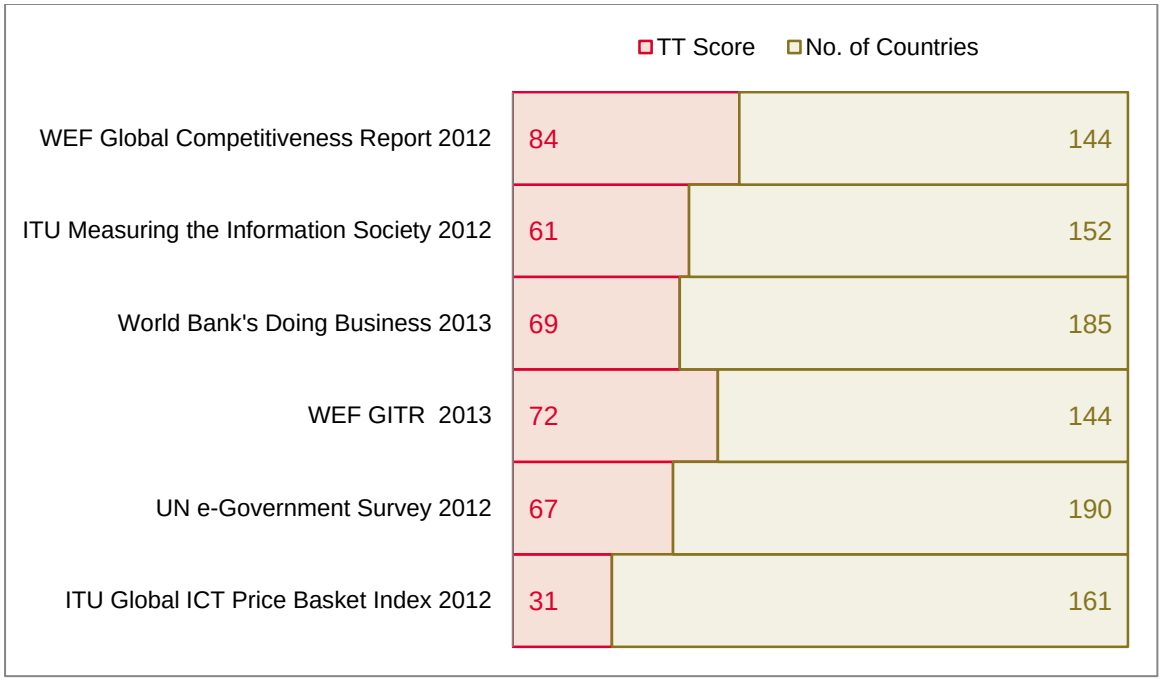


Diagram 3: International Benchmarking of Trinidad and Tobago's ICT Landscape

One of the key performance indicators used to gauge a country's current state of ICT competitiveness, relative to other countries, is ICT Readiness (also referred to as Networked Readiness in the WEF Global IT Report). This indicator assesses the following:

I. The extent of ICT availability, adoption rate, usage and impact by the three major stakeholder groups, namely individuals, businesses and government;

II. The availability of an enabling environment for ICT i.e. ICT companies and manpower capabilities, and policies and legislation that support further ICT development; and

III. The ability of countries to provide high levels of prosperity to their citizens which in turn depends on how productively a country uses available resources.

As can be observed in Chart 1 below, the GITR Report 2012 – 2013 ranked Trinidad and Tobago 72nd out of 144 countries, a decline of 12 places from the previous year where the nation was ranked at 60. Charts 1 and 2 highlight Trinidad and Tobago's performance in the GITR and related sub-indices from 2010-2013 and 2006-2013 respectively.

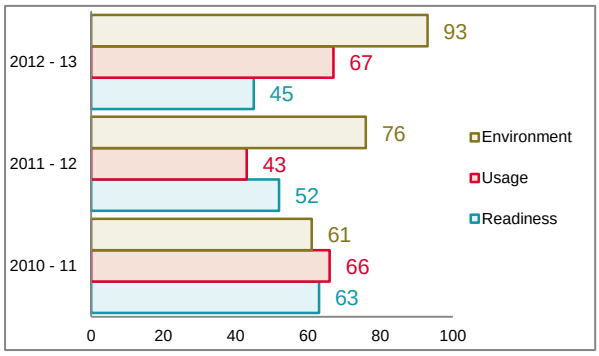


Chart 1: Trinidad and Tobago's Sub-Indices Rankings 2010 to 2013

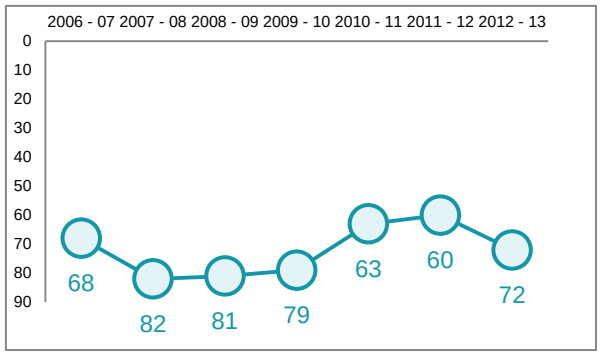


Chart 2: Trinidad and Tobago's WEF GITR Rankings 2006 to 2013

2.2 ICT Availability

Based on the Telecommunications Authority of Trinidad and Tobago's Market Report for the fourth quarter 2012:

- Penetration for Mobile Voice subscriptions – 142%;
- Number of fixed Internet subscriptions – 221,000; and
- Penetration for fixed Internet (household) – 52.1%.

These figures highlight the need to leverage the high mobile penetration rates to promote ICT usage.

The *World Economic Forum's (WEF) – Global Information Technology Report (GITR) 2013 Executive Opinion Survey*, ranks Trinidad and Tobago 63 out of 144 countries in Availability of Latest Technologies while Firm Level Technology Absorption ranks lower at 82 out of 144 countries. This is a clear indication that while the technologies are available, the uptake by businesses is not pervasive. The need to create programmes to address business ICT usage with an aim to enhance productivity and innovation is crucial.

2.3 e-Government

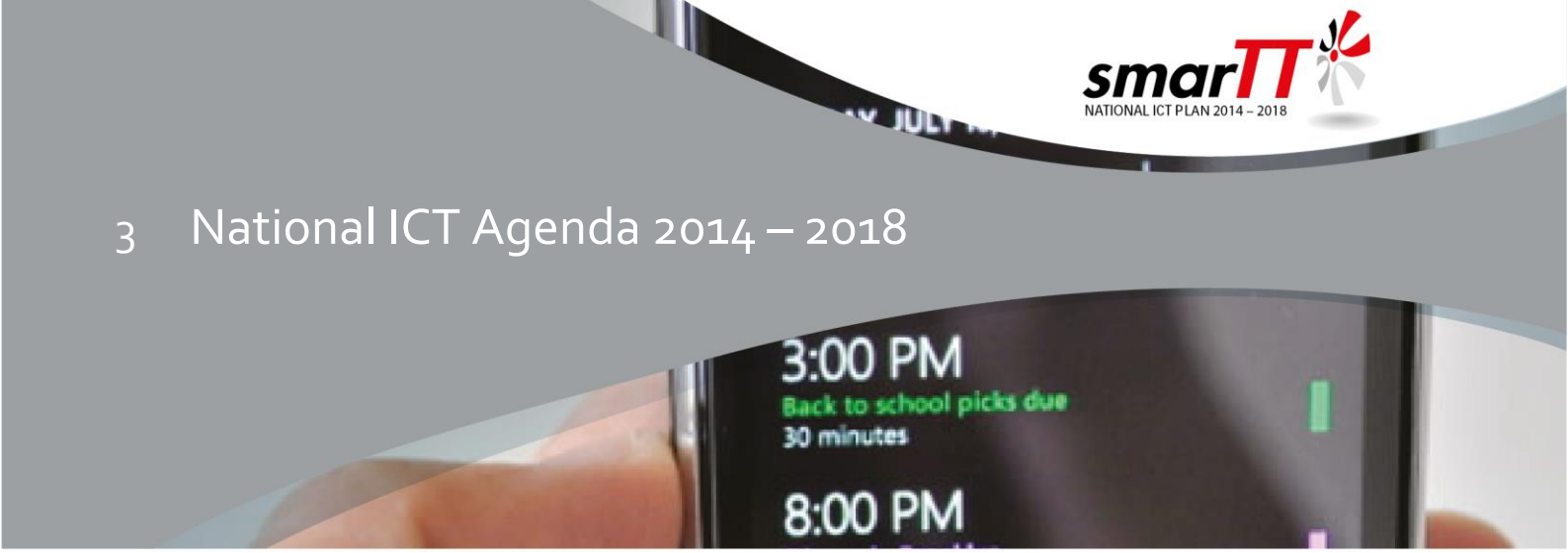
Achievements since 2003 have resulted in a more connected Government. Currently, there are approximately 400 government ministries and agencies connected to GovNeTT, Trinidad and Tobago's government ICT backbone. Additionally, **ttconnect** provides information on over 400 services which are offered by government Ministries and Agencies.

2.4 Environmental Conduciveness

ICT development requires an enabling environment in the form of a vibrant ICT sector, available and capable resources and supporting legislation and policies. The continued lack of legal and regulatory frameworks has impeded the growth of e-Commerce among the business community, and hindered the full implementation of other Government ICT initiatives. This is evident in the WEF GITR 2013 indicator which ranked Trinidad and Tobago 112 out of 144 countries in Laws Relating to ICT. However, with the proclamation of the Electronic Transaction Act and the Data Protection Bill[1], Trinidad and Tobago's ranking should improve.

1 The **Electronic Transactions Bill 2011** is designed to promote the development of e-Commerce in Trinidad and Tobago by enabling the use of electronic transactions and providing clear guidelines and protection for electronic signatures. It further promotes the development of legal and business infrastructure to support secure e-Commerce. The **Data Protection Bill 2011** is designed to provide protection for personal information which is entered in electronic format.

3 National ICT Agenda 2014 – 2018



"To create a dynamic knowledge-based society, driven by the innovative use of ICTs to enhance the social, economic and cultural development of the people of Trinidad and Tobago"

National ICT Vision of the Republic of Trinidad and Tobago

smarTT focuses on social and economic transformation through creating opportunities and enhancing the quality of life of the nation's citizens. The Plan places emphasis on supporting ICT-based innovation and developing human capital for the ICT sector. It should be noted that although smarTT addresses the multi-dimensional requirements of the national ecosystem, special attention has been given to those programmes with greatest human impact in order to maximise the value-added contribution of national ICT initiatives.

3.1 ICT Roadmap for Trinidad and Tobago (2003 – 2028)

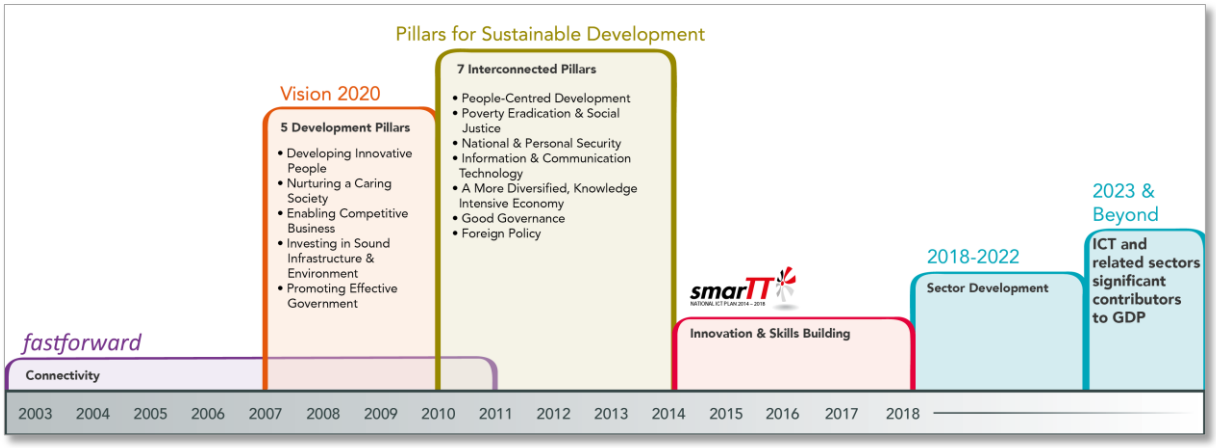


Diagram 4: ICT Roadmap for Trinidad and Tobago (2013-2028)

smarTT is the first phase of the ICT Roadmap for Trinidad and Tobago. The end goal is for ICT to become a significant contributor to GDP which, at present lags at only 3.5 percent.

Over the period 2014 to 2018, the Plan will focus on Government's thrust to increase ICT utilisation and uptake within the public and private sector, and amongst citizens. The Plan seeks to foster opportunities in education and trade through new technology-based service delivery mechanisms. Government aims to take a leadership role in creating the service delivery and policy conditions to encourage businesses and citizens to adopt ICT.

For the period 2018 to 2022, emphasis will be placed on developing strategic advantages in specific industries to enhance Trinidad and Tobago's value proposition in regional and international markets.

As national development goals evolve, this roadmap can be adjusted to reflect any changes in priority areas. Beyond 2023, ICTs and relevant subsectors should be significant contributors to GDP.

4 Theme 1: Innovation and Human Capital Development

The Government of the Republic of Trinidad and Tobago (GoRTT) recognizes that in order for the gains from ICT to be fully realised, targeted efforts must be made to build skills that promote creativity and innovation.

Trinidad and Tobago's Medium Term Policy Framework underscores that human capital development is critically important for the successful transformation of the society and the economy. The Framework also acknowledges that natural resources, raw manpower and industrial activity have been replaced, in large part, by ideas, creativity, imagination, talent and entrepreneurship.

Within Trinidad and Tobago, there is recognition that innovation and production are inextricably linked. However, despite a high literacy rate of 98.7 percent, and high enrolment rates at the primary, secondary and tertiary education levels at 92.8 percent, 88 percent and 46.4 percent[2] respectively, innovation remains quite low.

The Innovation and Human Capital Development Thematic Area is therefore placed at the centre of smarTT to ensure a focus on building ICT skills and enhancing innovation across the nation. The Plan examines the components which are important to the successful development of human capital, and through examination of various indices, identifies where deficiencies exist in related areas. Imperatives and programmes are then proposed to ensure that each area is appropriately addressed in the period 2014 – 2018.

Innovation

Innovation is the ability to solve both old and new challenges using novel solutions. In order to create the knowledge based economy, human capital must be developed with the specific aim of creating the entrepreneurial and innovative citizens needed to drive national development.

While GoRTT recognises the importance of innovation and places it as an integral component of diversifying the economy, the nation continues to struggle with innovation, making it one of the most poorly performing countries globally in this area. As a result, smarTT puts forward a bold and robust series of programmes to aggressively target this area.

2 The figure 46.4 percent refers to students admitted to tertiary institutions directly from secondary school. For academic year (2009/2010) approximately seven thousand, four hundred and eighteen students (7,418) out of a total of fifteen thousand, nine hundred and sixty-seven (15,967) students were admitted to a tertiary education institution directly from secondary school.

Human Capital Development

Human Capital Development refers to the training and skills building of a nation's citizens. The Medium Term Policy Framework proposes the establishment of a Human Capital Development Committee comprising key stakeholders such as the Labour Movement, the Ministry of Planning and Sustainable Development, the Ministry of Labour, Small and Micro Enterprise Development, the Economic Development Board, the Ministry of Education, the then Ministry of Science and Technology, the Ministry of Tertiary Education and Skills Training, the Ministry of Trade and Industry as well as employers, institutions and business organisations. smarTT closely supports and complements this Human Capital focus of the Medium Term Policy Framework by proposing programmes which will be led and implemented by these key stakeholders.

National Innovation Policy

In order to promote innovation as an integral ingredient for global competitiveness and economic stability, the Ministry of Planning and Sustainable Development, in collaboration with the Economic Development Board and the Council for Innovation and Competitiveness[3] will champion the development of a National Innovation Policy. The aim of the Policy is to create an Innovation System that includes the elements necessary to support financing, intellectual property protection and linkages between research and development, and commercialisation. smarTT is closely aligned to this strategy in order to ensure that synergies are created and sustained to encourage multi-sector collaborations in the emerging innovation arena.

4.1 Alignment to Pillars for Sustainable Development

Innovation and Human Capital Development is aligned to four (4) of the seven (7) Pillars for Sustainable Development: People Centred Development, Poverty Eradication and Social Justice, Information and Communication Technologies and A More Diversified, Knowledge Based Economy. A discussion of the relationship between this thematic area and each of the related Pillars is presented below. However, given that this is the National ICT Plan, the link between the thematic area and the Pillar "Information and Communication Technologies" is self-explanatory, and is therefore not included in the discussion.

3 The Economic Development Board (EDB) and the Council for Competitiveness and Innovation (CCI) were established in 2011 by the Government of the Republic of Trinidad and Tobago to develop and implement comprehensive strategies to accelerate sustainable economic growth and prosperity for the nation. Both Boards work under the direction of the Minister of Planning and Sustainable Development.

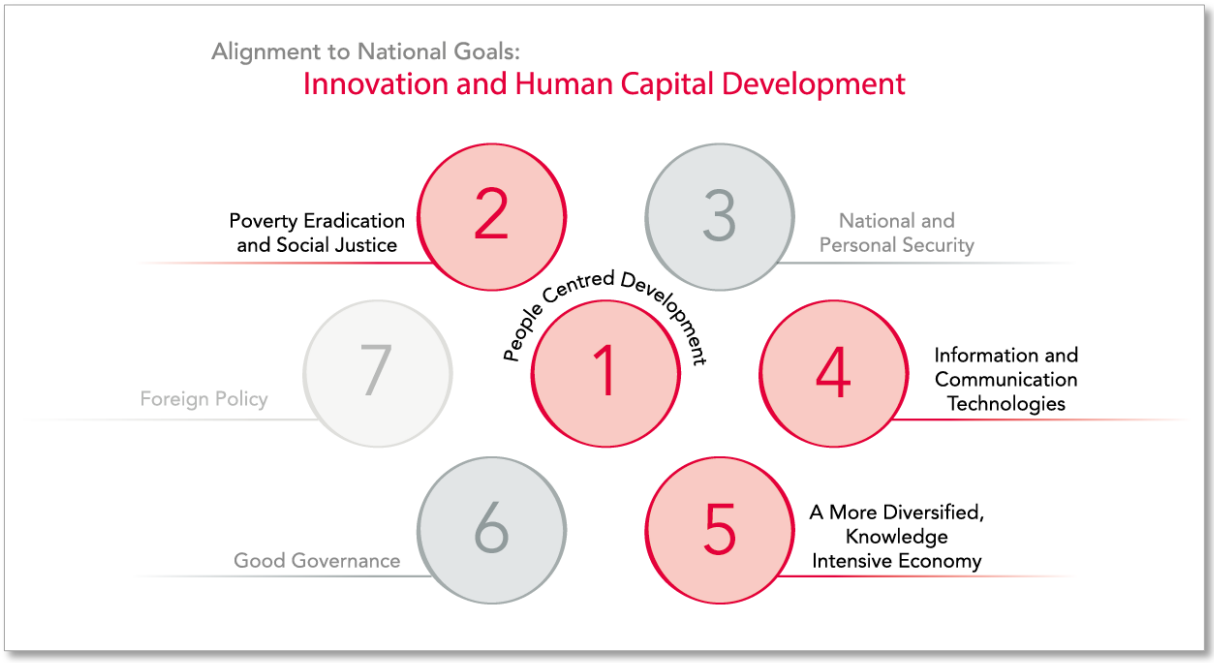


Diagram 5: Innovation & Human Capital Development Alignment to Pillars for Sustainable Development

4.1.1 People-Centred Development

The placement of Innovation and Human Capital Development at the centre of smarTT highlights the government's commitment to transforming Trinidad and Tobago into a nation where people are the most valuable resource. Citizens will play an integral role in the diversification of the economy where their creative skills and ideas become the main drivers of economic growth and diversification.

This Thematic Area emphasises changing traditional ways of learning in order to foster creative and innovative thinking. This will be done through the expansion and integration of ICTs into learning processes across all levels of education and by fostering an environment that addresses varying learning styles. The aim is to encourage a society that is both comfortable and adept at ICT usage and application.

4.1.2 Poverty Eradication and Social Justice

Innovation and Human Capital Development will lead to improvements in the lives of citizens, including the financially disadvantaged, the differently abled, under-served groups, Micro, Small and Medium Enterprises (MSMEs), and persons living in fringe communities. In this regard, this thematic area has a direct impact on social justice, as the initiatives and programmes have been specifically developed to ensure that no one is left out of essential training and skills-building.

4.1.3 A More Diversified, Knowledge Intensive Economy

This thematic area is focused on ensuring that citizens have the skills and knowledge to allow them to make full use of the benefits of ICTs. Programmes focused on ICT training, job creation, and return of diaspora professionals will ensure that the ICT sector and sub-sectors become substantial contributors to GDP in the medium to long-term. This thematic area also focuses on the public

sector. Through building the skills of public sector officers, Government will become more efficient, as an increasing number of employees use ICTs to improve productivity and operational effectiveness. In addition, innovative solutions built specifically for Government will aid with the interaction and communication between the Government and its citizens.

4.2 Key Imperatives

Each Key Imperative listed below has accompanying Programmes, which are detailed in Appendix 1.

4.2.1 **Key Imperative 1.1**: Building an e-Ready Society through ICT Enriched Learning

The acquisition of ICT skills is a crucial first step for employment in the new digital economy. Training is a key requirement to address the growing demand for an ICT savvy workforce. A formalised training programme that caters to the different levels of ICT competencies across both the public and private sectors is necessary to build an e-Ready workforce. In addition to introducing a formalised ICT training programme, ICT courses must be internationally accredited to ensure that ICT training and certification is globally recognised. Further, interest in ICT must be cultivated from an early age and sustained on an on-going basis, given that the ICT landscape is dynamic, and citizens must keep abreast of changes.

Collectively, the following steps will cultivate an e-Ready society and workforce that are equipped with relevant ICT competency skills:

- Upgrading ICT facilities in learning institutions and ICT capabilities of school administrators and educators in order to better integrate ICT school administration and teaching methods;
- Establishment of ICT as a mainstream subject at the primary and secondary school levels;
- Setting up computer clubs at various levels of education to raise media and technical awareness;
- Hosting innovation technology competitions to energise the creative classroom and develop new technologies; and
- Engaging in Public Sector Resource Development to ensure a dynamic public sector workforce that is able to utilize ICTs to improve government efficiency.

4.2.2 **Key Imperative 1.2**: Creating and Promoting Local Digital Content

As Trinidad and Tobago shifts focus from “connectivity” to “usage and creation”, its citizens and organisations will need to evolve from being users to creators of electronic content. This will entail inculcating an “upload” culture that celebrates development and sharing. ICTs must be utilized to promote the collaborative creation of local talent, foster expression, and promote the spirit of Research and Development (R&D).

“Content owners” will be galvanised to create digital content through targeted interventions. Through the development of online collaborative networks for the flow and exchange of ideas, the “walls” and “silos” that curtail creativity and access to information will be broken down.

Local content creation through collaborative networks will be realised through:

- Granting incentives and awards for local content creation and expression using ICT;
- Promoting e-Heritage - the preservation of cultural heritage through digital media;
- Creating community based content development groups;
- Building capacity to develop skills for peer production;
- Increasing participation of otherwise socially excluded groups such as the poor, the elderly and the differently-abled;
- Forming partnerships with academia and businesses to increase opportunities for creation of digital content and development of commercial applications.

4.2.3 **Key Imperative 1.3**: Establish a Culture of Research and Development

Within Trinidad and Tobago there is recognition among Government, business and citizens that R&D forms an important component of competitiveness and economic advancement. However, the quality of the nation's scientific research institutions, as well as company spending on R&D is lacking (rank 98 and 100 respectively in the Global Competitiveness Report 2012-2013).

smarTT therefore focuses on establishing a culture of research and development to address the above-mentioned deficiencies through the following:

- Offering scholarships in areas strategically aligned to ICTs and national development;
- Staffing of the Strategy and Research Division under the Ministry of Science and Technology;
- Placing emphasis on Intellectual property (IP) legislation enforcement and public information campaigns;
- Promoting and supporting partnerships between business, academia, government, civil society, diaspora, etc.; and
- Attracting and retaining ICT professionals including persons in the diaspora.

4.3 Programmes

The programmes under this theme, which are listed in the following diagram, are further detailed in Appendix 1.

Programmes: Innovation and Human Capital Development

Key Imperative	Programmes
1.1 Building an e-Ready Society through ICT Enriched Learning	1.1.1 – Computers and Connectivity for All 1.1.2 – Create a system/culture to challenge traditional ways of thinking 1.1.3 – M-Learning 1.1.4 – Develop an ICT Training Framework 1.1.5 – Integrate Human Capital Development / Education / Training with Industry Needs
1.2 Creating and Promoting Local Digital Content	1.2.1 – Digitize Heritage, Indigenous and Social Content 1.2.2 – Create Digital Content for Use at All Levels of Education 1.2.3 – Web Production Incentives 1.2.4 – Leverage the Diaspora and Wider Caribbean to Fund/Promote Digital Content
1.3 Establish a Culture of Research and Development	1.3.1 – Offer Scholarships in Identified Areas of Research 1.3.2 – Regional Research Forum 1.3.3 – Department of Research and Development in ICT 1.3.4 – Attract and Retain ICT Professionals 1.3.5 – Establish an ICT Awards and Incentives Schemes 1.3.6 – Establish Incubator for Technology/Solution Transfer and Commercialization

Table 1: Programmes – Innovation & Human Capital Development

5 Theme 2: Access and Digital Inclusion

The theme Access and Digital Inclusion seeks to contribute to poverty eradication and social justice through the provision of accessible and affordable ICT services and the promotion of ICT literacy.

Factors that contribute to digital exclusion within Trinidad and Tobago include geographic location, limitations of infrastructure (accessibility and affordability), physical disability, learning disability, education attainment, age, socio-economic status, exposure to ICT, awareness of ICT benefits, and willingness to adopt ICTs.

The key imperatives for "bridging the digital divide" are consistent with the strategy outlined below:

1. Identify, adapt and develop existing Government services into e-Services that match the needs of the digitally excluded;
2. Ensure accessibility of the specialised and standardised ICT tools necessary to allow marginalised groups to utilize e-Services;
3. Develop programs that train and certify digitally excluded citizens to use specialized and standardized ICTs and raise awareness of the usefulness and risks of ICTs;
4. Develop an R&D culture within Trinidad and Tobago that encourages both the public and private sectors to develop tools that aid in bridging the digital divide.

5.1 Alignment to Pillars for Sustainable Development

Access and Digital Inclusion is aligned to five (5) of the seven (7) Pillars for Sustainable Development: People Centred Development, Poverty Eradication and Social Justice, Information and Communication Technologies, A More Diversified, Knowledge Based Economy and Good Governance. A discussion of the relationship between this thematic area and each of the related Pillars is presented below. However, given that this is the National ICT Plan, the link between the thematic area and the Pillar "Information and Communication Technologies" is self-evident, and is therefore not included in the discussion.

Diagram 6: Access & Digital Inclusion Alignment to Pillars for Sustainable Development

5.1.1 People-Centred Development

Around the world, society's "under-served" are increasingly benefitting from the adoption, implementation, and distribution of ICTs. Through creative application of new technologies, individuals have been able to access information and systems that have led to improved lives. Under smarTT, programmes have been identified to provide the digitally excluded with the hardware and software necessary to take advantage of the Information Age. Training and awareness programmes have also been defined to ensure that users have the knowledge and skills necessary to take greater advantage of ICTs.

The Ministry of Science and Technology will establish user-friendly ICT-enabled Access Centres which can provide community members with readily available information, e-government services, and training in rural and less-developed areas. These rural locations traditionally lack basic ICT infrastructure and online connectivity to government and social services.

5.1.2 Poverty Eradication and Social Justice

ICTs have the potential to equalise access to information. Such access can empower persons by increasing educational opportunities, providing information on employment, and providing a voice to the disenfranchised. In addition, social networking and mobile communication tools play a significant role in facilitating social justice.

smarTT proposes both conventional and non-conventional ways through which ICTs can be incorporated into the lives of the digitally excluded to better serve their academic, financial, physical and social needs. Globally, ICTs have been successfully used as an avenue through which opinions, desires, concerns and injustices are shared – within and outside a neighborhood, city or country – catalysing remarkable societal transformation.

5.1.3 A More Diversified Knowledge Intensive Economy

In countries like South Africa and Brazil, provision of ICTs to underserved communities has exposed them to borderless education, increased the reach of their businesses, and allowed them to sell their goods globally. As a result, the earnings of the previously digitally excluded have translated to the diversification and expansion of local markets.

GoRTT hopes to transform local communities through programmes that improve access, connectivity and skills of the digitally excluded. These programmes are designed to increase both employment and employability.

5.1.4 Good Governance

An important component of good governance is ensuring that all citizens have equitable access to services and that government programmes are wide reaching. As GoRTT shifts towards an electronic Government, the aim is to increase transparency through an e-Democracy programme and to improve efficiency through an expansion of e-Services. For such initiatives to be truly successful, the Government must ensure that the differently abled, financially disadvantaged, and other digitally excluded groups of society have access to government services, and that pertinent public information is readily available to them.

Programmes under this thematic area are therefore designed to ensure that the tools and skills required to use electronic Government services are available, accessible and affordable to the digitally excluded.

5.2 Key Imperatives

Each Key Imperative listed below has accompanying Programmes which are detailed in Appendix 1.

5.2.1 **Key Imperative 2.1**: Providing ICT Services for Digital Inclusion

Infrastructure, including basic utilities and network connectivity, must be enhanced in less developed areas of the country. This Key Imperative aims to bridge the digital divide by providing

citizens with basic ICT literacy skills and reliable infrastructure (the "means"), as well as computing devices with Internet access (the "tools").

Citizens will be encouraged to own at least one Internet enabled computing device in each household. Different technology tools and financial assistance schemes will be made available to accelerate computer ownership among previously excluded groups.

5.2.2 **Key Imperative 2.2**: Increasing the Accessibility and Affordability of Technologies

The hardware, software and infrastructure (basic utilities and network connectivity) needed to utilize ICTs must be affordable and accessible in each area of the country. This will allow under-served and un-served citizens to gain access to and benefit from Internet-enabled tools.

The "Connectivity Agenda" under ***fastforward*** made the Internet more accessible through the provision of computers with free Internet access at public places around Trinidad and Tobago including libraries and community centres. The **ttconnect** service centres and kiosks were also set up to help citizens access government electronically. This provisioning allows otherwise excluded members of society to access e-services.

The number of **ttconnect** service centres will be increased to make e-services more accessible. For citizens living in remote areas, the establishment of additional **ttconnect** Express buses will extend reach and access.

For the financially and socially disadvantaged who cannot afford to own a computer, low cost units bundled with Internet access and helpdesk support will be made available through financial assistance schemes.

5.2.3 **Key Imperative 2.3**: Increasing ICT Learning and Awareness

Affordable technology without the awareness of the value added by these devices and applications can lead to low integration of ICTs and e-services. ICT awareness campaigns, programs, and workshops will be created to address this issue. Citizens will be equipped with the knowledge and skills to effectively harness the full potential of digital content from the Internet, and at the same time, cope with the risks associated with the online world.

Programmes will include the promotion of digital media literacy - the ability to access, analyse, evaluate, participate or create content using digital media. In addition, given that citizens are exposed to both reliable and unreliable sources of information on the Internet, target groups will need to be equipped with media literacy skills to protect themselves from exposure to harmful, unauthorised or inappropriate material.

Emphasis will be placed on data privacy, security and safe usage of the online content through training and outreach programmes.

5.2.4 **Key Imperative 2.4**: Facilitating R&D Focused on Bridging the Digital Divide

It should be noted that the Telecommunications Authority of Trinidad and Tobago (TATT) through its Digital Divide Survey, collects key statistics related to access and usage. To build on this, a research programme will be established within Government to further analyse and report on factors contributing to the digital divide and how they can be addressed. This facility will develop projects and initiatives for execution by private and public sector organisations. The research programme will monitor and evaluate the programmes developed through its research initiatives as well as projects under this thematic area.

5.3 Programmes

The programmes under this theme, which listed in the following diagram, are further detailed in Appendix 1.

Programmes: Access & Digital Inclusion

Key Imperative	Programmes
2.1 Providing ICT Services for Digital Inclusion	2.1.1 – Development of e-Services that Ensure Digital Inclusion
2.2 Increasing the Accessibility and Affordability of Technologies	2.2.1 – Computers and Connectivity for Digital Inclusion
2.3 Increasing ICT Learning and Awareness	2.3.1 – Increased and Affordable ICT Education and Training Toward Digital Inclusion
2.4 Facilitating R&D Focused on Bridging the Digital Divide	2.4.1 – R&D Focused on Digital Divide

Table 2: Programmes - Access & Digital Inclusion

6 Theme 3: e-Business and ICT Sector Development

The ICT sector is usually measured in terms of the proportion of the total business sector workforce involved in the ICT industry and the proportion of total value added to Gross Domestic Product (GDP) credited to the sector[4]. Currently, the ICT sector in Trinidad and Tobago is bolstered primarily through demand among public sector organisations, as well as the Financial Services, and the Energy sectors.

e-Business, a key component of ICT sector development, is defined as the use of ICT or computer mediated networks to support common business processes[5]. This facilitation allows for greater operational efficiency, closer collaboration with suppliers and business partners, and increased capabilities to meet the needs of customers. e-Commerce is an important subset of e-Business, and is defined as the sale or purchase of goods and services over the Internet[6]. e-Commerce adoption can result in the reduction of transaction costs while also increasing transaction speed and reliability. Developing e-Commerce capabilities is essential to enable both the production and exportation of knowledge products and services. GoRTT is therefore committed to executing programmes geared towards increasing e-Business and e-Commerce.

6.1 Alignment to Pillars for Sustainable Development

e-Business and ICT Sector Development is aligned to six (6) of the seven (7) Pillars for Sustainable Development: People Centred Development, Poverty Eradication and Social Justice, National and Personal Security, Information and Communication Technologies, A More Diversified, Knowledge Based Economy and Good Governance. A discussion of the relationship between this thematic area and each of the related Pillars is presented below. However, given that this is the National ICT Plan, the link between the thematic area and the Pillar "Information and Communication Technologies" is self-evident, and is therefore not included in this discussion.

4 Definition and calculations of the indicators can be sourced from the United Nations 2007 publication: Manual on the Production of Statistics on the Information Economy

5 Business processes include activities such as customer acquisition and retention; ecommerce; order fulfilment and order tracking, logistics (inbound and outbound) and inventory control; finance, budget and account management; human resource management; product service and support; research and development; and knowledge management.

6 Source: http://www.eclac.cl/portofspain/noticias/paginas/4/34944/MODULE_B1.pdf

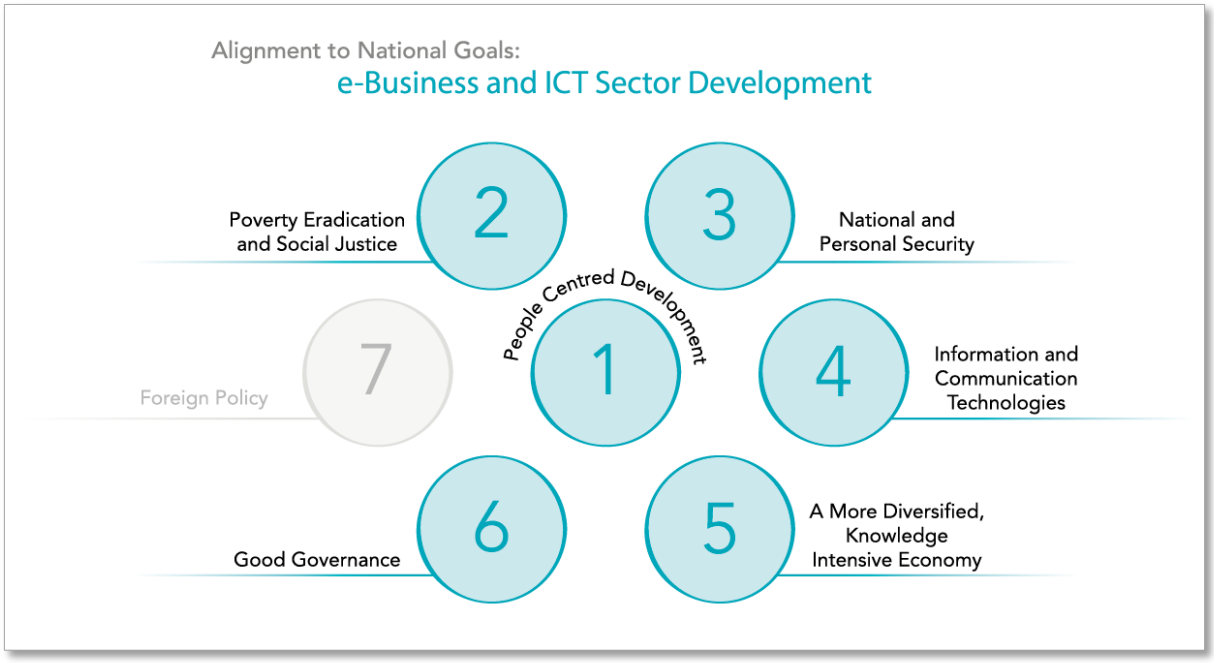


Diagram 7: e-Business & ICT Sector Development Alignment to Pillars of Sustainable Development

6.1.1 People-Centred Development

The programmes under this thematic area emphasise e-business adoption not only as a means of fostering local business development but also a means of developing a robust ICT-savvy workforce. Additionally, when businesses, driven by the economic efficiency of e-business adoption, can sufficiently articulate their human resource needs, this stimulates the coordination of efforts by Government, research institutions and businesses – the "triple helix" – necessary for integration and innovation.

ICT-based innovation which is closely linked to people-centred development is also greatly facilitated by the availability of qualified labour and an entrepreneurial spirit for translating ideas into commercially viable consumer products and services. smarTT therefore aims to build a pro-enterprise environment supported by transparent, simple and accessible corporate regulations, IP protection and affordable access to ICT infrastructure. The aim is to encourage innovative ventures that offer solutions for the evolving needs of citizens.

6.1.2 Poverty Eradication and Social Justice

e-Business contributes to the expansion of both Business-to-Business (B2B) and Business to Consumer (B2C) markets. These translate into greater business opportunities which facilitate job creation and stability. Additionally, in recognition of the contribution that Micro, Small and Medium Enterprises (MSMEs) can make to economic development, several programmes have been designed to ensure that this group has the tools and opportunities needed to increase e-Commerce uptake.

6.1.3 National and Personal Security

Security infrastructure is a necessary component for wide-spread e-Commerce adoption. Citizens and business owners must feel an adequate sense of security before they become confident enough to consistently engage in online transactions. smarTT has therefore focused on the development of secure e-business infrastructure. Further, as the of ICT sector grows, there will be greater awareness, understanding and proliferation of ICT tools that can be leveraged to increase the security posture of businesses as well as assist individuals in protecting themselves and their property.

6.1.4 A More Diversified Knowledge Intensive Economy

Wealthy economies tend to be those that are knowledge-driven. As one might expect, a knowledge driven economy is closely linked to the ICT sector, since the latter produces the tools which aid in the productive creation, use and dissemination of knowledge. The overarching objective of smarTT's e-business and ICT sector programmes is to ensure that Trinidad and Tobago is counted among these "best-in-class" knowledge-driven economies.

6.1.5 Good Governance

Local organizations find that they can no longer ignore the call for greater accountability and fairness in business dealings. Oftentimes, their very survival depends on adherence to this call. However, attaining transparency and accountability requires more than simply good intention. As the Government, along with private enterprises, strive to attain better governance, both will increasingly rely on technology.

6.2 Key Imperatives

Each Key Imperative listed below has accompanying Programmes which are detailed in Appendix 1.

6.2.1 **Key Imperative 3.1**: Stimulating ICT Demand to Encourage e-Commerce Adoption

A major barrier to e-Commerce adoption is the perception that ICT investments will not yield the returns necessary to recoup initial costs. This perception stems from the seemingly high costs of integrating ICTs into business operations. Within Trinidad and Tobago, businesses, especially MSMEs are hesitant to engage in e-Commerce as a sufficient pool of online consumers is not as yet evident to justify the costs of ICT integration. smarTT addresses this issue through the development of programmes focused on various consumers. Examples include the execution of ICT consumer promotions and implementation of e-commerce-enabled platforms and creation of the underlying infrastructure needed to drive ICT demand. The aim is to ensure that a viable business case is built for e-Commerce adoption among the business community.

6.2.2 **Key Imperative 3.2**: Developing e-Business Capacity

A significant barrier to e-Business adoption, especially among SMEs, is the lack of the following: awareness of the existence of e-business funding, business support services and the cost of technology. Government therefore will endeavour to increase education and awareness programmes directed at SMEs with a view to generating a better understanding of and willingness to pursue e-Commerce.

Since, the costs to implement new ICT solutions can be prohibitive, and this hinders pervasive use of technology, Government intends to further stimulate business ICT adoption through funding incentives. These incentives will be accompanied by business support services to help with the uptake of these new e-Commerce opportunities.

6.2.3 **Key Imperative 3.3**: Enabling the Production, Distribution and Promotion of Local ICT Products and Services

Technology consumption far outweighs technology creation in Trinidad and Tobago. This does not auger well for the profitability of the ICT sector and further stymies diversification efforts. Programmes have been developed to facilitate a pro-business environment as a basis for e-business. A focus has been placed on strengthening Government trade infrastructure, improving the regulatory environment for starting and operating a business, encouraging foreign direct investments in the field of ICT, and establishing a services platform to increase the online exposure of local businesses.

6.2.4 **Key Imperative 3.4:** Enabling Other Sectors through ICT

The rationale for enabling other sectors through ICTs is much the same as the rationale for promoting e-business adoption in general; which is the massive potential for efficiency and productivity gains as a result of ICT infusion.

The Medium Term Policy Framework outlines several new strategic sectors with the potential to contribute to economic growth. These include the creative industry (composed of various sub-sectors inclusive of the Music Industry, Film and Television, Advertising, Book and Magazine Publishing, Fashion and Glamour, and the Performing Arts and Visual Arts) and the Environmental Services Sector inclusive of Eco-Tourism. The Agriculture sector has also been marked as a key area for diversification. In particular, fishing and fish processing have been identified as one of the nine growth sectors for diversification. smarTT proposes programmes to ensure that appropriate technologies and ICT models are used to support the development of these priority sectors through interventions at the firm and sector levels.

6.2.5 **Key Imperative 3.5**: Facilitating Leadership and Coordination of Efforts among Key Stakeholders

The role of Government in promoting e-business is meant to be facilitative. A crucial component of building this facilitative environment is the effective implementation of an ICT Governance structure composed of key stakeholders in the private and public sectors (See Section 11- Governance Model). The e-Business Roundtable, a component of the structure, is an existing advisory group that represents the views of the business community and makes recommendations to Government on matters related to e-Business. The Roundtable also transfers information on new business opportunities and assists in coordinating efforts in the areas of e-business integration, technology exportation, cluster development, R&D innovation and venture capital funding. Due to the critical role of the e-Business Roundtable, a programme has been developed to assess the Roundtable with an aim to increase and enhance its capacity and capability, especially with respect to delivering on smarTT's objectives. Beyond the effort to strengthen the e-business Roundtable, the smarTT Governance Model underscores the need for proactive and on-going stakeholder engagement.

6.3 Programmes

The programmes under this theme, which listed in the following diagram, are further detailed in Appendix 1.

Programmes: e-Business & ICT Sector Development

Key Imperative	Programmes
3.1 Stimulating ICT Demand to Encourage e-Commerce Adoption	3.1.1 – Move Government Business Online 3.1.2 – Encourage Consumer Adoption of e-Lifestyles 3.1.3 – Develop Online B2B and B2C Marketplaces 3.1.4 – Implement and Strengthen Services Infrastructure and Legislative Framework
3.2 Developing e-Business Capacity	3.2.1 – Facilitate SME e-Commerce Awareness, Education and Training Programmes 3.2.2 – Promote and Facilitate Increases in the Availability of Funding for SME e-Business Adoption
3.3 Enabling the Production, Distribution and Promotion of Local ICT Products and Services	3.3.1 – Facilitate a Pro-Business Environment 3.3.2 – Promote ICT Cluster Development 3.3.3 – Develop a Localized Search Engine for Marketing Businesses Online
3.4 Enabling Other Sectors through ICT	3.4.1 – Develop and Promote the National Integrated Business Incubator System (IBIS) 3.4.2 – Develop and Implement an E-Commerce Strategy for the Agriculture Sector as a Model for Other Key Sectors
3.5 Facilitating Leadership and Coordination of Efforts among Key Stakeholders	3.5.1 – Assess the Mandate and Expand the Capacity of the e-Business Roundtable

Table 3: Programmes – e-Business & ICT Sector Development

7 Theme 4: Infrastructure Development

Infrastructure comprises a set of physical equipment, components, and technologies that function to convey data and information across specific transmission routes and electronic interfaces. ICT infrastructure is most effective when accompanied by pertinent rules, laws, and regulations that guide the ways in which it interacts with different environments.

In fulfilling the "*connectivity*" mandate, the goal is to ensure that ICT broadband infrastructure is resilient and robust enough to permit network availability at all times. This is critical for network survivability, especially in the event of natural disasters. ICT infrastructure must also be constructed in a manner that preserves and protects the natural environment. Additionally, network development must be institutionalised in order to avoid uneven network development and insufficient market efficiency.

While broadband infrastructure "build out" is being encouraged through competitive markets, sole reliance on market forces may not be sufficient to meet the nation's broadband targets. In this regard, government intervention may be needed to ensure that targets are achieved. The areas chosen for intervention through smarTT are those that are necessary to guarantee availability, and affordability of adequate broadband infrastructure, while also catering to under-served and un-served communities.

smarTT addresses the provisioning of telecommunications and broadcasting networks at the national-level in order to support an information society that functions within the paradigm of next generation technologies.

The following is the high level vision and objective that will govern Trinidad and Tobago's move towards a full infrastructure resource:

Broadband Vision: To deliver a future-proof broadband infrastructure capable of delivering access speeds of 10 Mbps and above to the population by 2018.

High-Level Broadband Objective: To promote widespread access to high-speed broadband services throughout the country as a significant driver of economic growth, job creation, and development; and a critical component of GoRTT's broader objective of building a knowledge-based economy.

For the period 2014 – 2018 the national access and penetration targets have been set as follows:

2013	2014	2015	2016	2017	2018
1 Mbps (90%)	1 Mbps (98%)				
2 Mbps (75%)	2 Mbps (90%)	2 Mbps (98%)			
5 Mbps (55%)	5 Mbps (65%)	5 Mbps (80%)	5 Mbps (90%)	5 Mbps (98%)	
10 Mbps (55%)	10 Mbps (60%)	10 Mbps (70%)	10 Mbps (80%)	10 Mbps (90%)	10 Mbps (98%)
100 Mbps (55%)	100 Mbps (60%)	100 Mbps (70%)	100 Mbps (80%)	100 Mbps (85%)	100 Mbps (90%)

Table 4: Target broadband (fixed and mobile) access speeds (percentage population coverage)

2013	2014	2015	2016	2017	2018
60% (≥ 1 Mbps)					
42% (≥ 2 Mbps)	49% (≥ 2 Mbps)	56% (≥ 2 Mbps)	63% (≥ 5 Mbps)	70% (≥ 5 Mbps)	77% (≥ 10 Mbps)

Table 5: Targt broadband fixed penetration rates (subscription per household)

2013	2014	2015	2016	2017	2018
50% (≥ 384 kbps)	65% (≤ 2 Mbps)	77% (≥ 2 Mbps)	85% (≥ 5 Mbps)	90% (≥ 5 Mbps)	95% (≥ 5 Mbps)

Table 6: Target broadband mobile penetration rates (subscribers per 100 inhabitants)

7.1 Alignment to Pillars for Sustainable Development

Infrastructure Development is aligned to four (4) of the seven (7) Pillars for Sustainable Development: People Centred Development, Poverty Eradication and Social Justice, National and Personal Security and Information and Communication Technologies. A discussion of the relationship between this thematic area and each of the related Pillars is presented below. However, given that this is the National ICT Plan, the link between the thematic area and the Pillar "Information and Communication Technologies" is self-evident, and is therefore not included in this discussion.

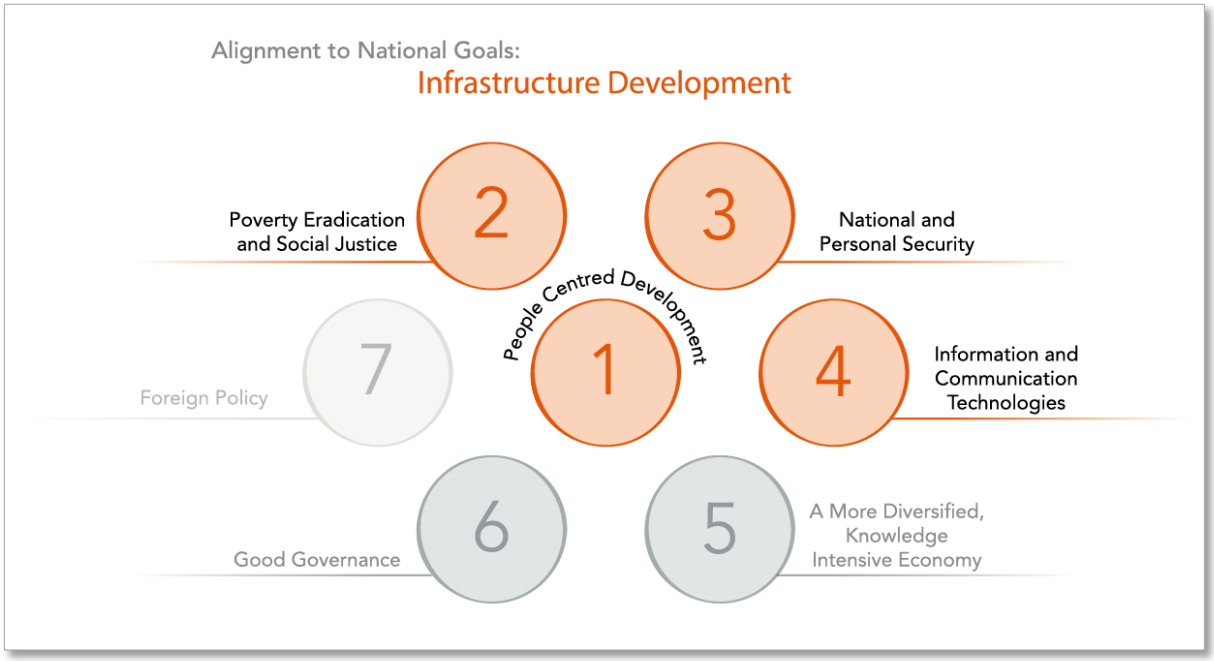


Diagram 8: Infrastructure Development Alignment to Pillars of Sustainable Development

7.1.1 People-Centred Development

Through liberalisation of the telecommunications sector, infrastructure development has become a key facilitator in expanding the role of ICT in people-centred development. This has been accomplished through the provisioning of greater accessibility, affordability and quality of internet services to citizens.

7.1.2 Poverty Eradication and Social Justice

smarTT proposes programmes for the provisioning of technical infrastructure to small community groups and organisations, to ensure that they have greater access to online content and to improve their visibility online. By allowing all citizens access to new technologies, the potential exists to improve equality and effective democracy.

Poverty eradication remains a priority for GoRTT. However, research has shown that the use of ICTs for poverty eradication is most effective when embedded and synchronised with other strategies as follows:

- A conducive environment which comprises freedom of expression, competitive markets and independent regulators.
- National poverty reduction strategies or sector specific strategies.
- Job opportunities or access to credit.

7.1.3 National and Personal Security

ICT offers advantages, but also increases vulnerabilities in a society when greater dependence is placed on connectivity and new technologies. A deliberate or accidental breakdown caused by technical/ human error or natural causes could lead to social disruption. Examples include the rapid developments in mobile data transmission and cloud computing, which give way to new vulnerabilities and opportunities for misuse. The growing use of internet services involving the entry of personal details and the rise in the popularity of social media are also creating new forms of misuse, such as identity theft.

In the continuing development and expansion of the existing ICT infrastructure, smarTT adopts a two pronged approach in mitigating the risks associated with Crime and Law and against cyber threats.

In the area of Crime and Law, ICT infrastructure resources will be expanded to support backbone, backhaul and local conveyance that provide video conferencing, surveillance, trunked radio and other services. An open access eco-network will also be provided for the Judiciary and other related law enforcement departments to enable interactive law enforcement and digital information flow across the judicial eco-system.

7.2 Key Imperatives

Each Key Imperative listed below has accompanying Programmes which are detailed in Appendix 1.

7.2.1 **Key Imperative 4.1**: Enhancing Infrastructure, Access, ICT Policies and Regulatory Oversight to Facilitate Sustainability.

This Key Imperative focuses on making ICT infrastructure and services universally available and accessible at affordable prices to facilitate adoption. Ubiquitous connectivity of ICT infrastructure is important to support both the telecommunications and broadcasting infrastructures and the services they provide.

The availability of broadband ICT infrastructure and related services is critical to the realisation of the benefits identified under all Thematic Areas and Key Imperatives of smarTT. A focus is placed on the availability of spectrum resources to effectively meet the demands of emerging technologies, for example, 4G mobile technologies such as Long Term Evolution (LTE) which are fast becoming the new standard for cellular mobile operators globally. The upside of applied infrastructure is that it enables the development and dissemination of local content, encourages peoples' participation in democracy, provides an alternative medium for building public awareness in ICT utilisation and facilitates the dissemination of critical information during instances of national disasters.

The *"connectivity agenda"* associated with this Key Imperative will be achieved, in the first instance, through a competitive telecommunications and broadcasting market. A technologically-neutral approach to competition is already part of the licensing and authorisation process designed to facilitate the roll out of all networks, inclusive of broadband services in Trinidad and Tobago.

In the event that competition does not provide the desired ubiquitous connectivity outcome (especially in under-served and un-served areas of the country); Government intervention can be used to facilitate rollout of ICT infrastructure and services.

7.2.2 **Key Imperative 4.2**: Instituting Appropriate Governance Structures to Drive Infrastructure Planning and Development

Currently there are approximately 6,000 km of fibre deployed within Trinidad and Tobago which mainly belongs to the two major telecommunications providers that operate in the country. The fibre runs are not complementary, as there is much duplication and parallel "build out" along the same locations. This has left approximately 30 percent of the country yet to be served with an adequate primary fibre optics backbone.

In order to enhance infrastructure and connectivity, network development and "build out" in un-served and under-served communities are essential. Despite the gains made by the introduction of competitive service providers within the telecommunications landscape, GoRTT recognizes that there is a need for the application of new co-investment oriented models to expedite investment in infrastructure, especially in the rural areas. In this regard the use of Public Private Partnership mechanisms shall be considered, within the wider competitive framework.

The fragmentation of responsibilities for "right-of-way", and the need to obtain relevant authorisation from various ministries and government agencies to build telecommunications network infrastructure has, and continues, to stymie infrastructure "build out". It is envisaged that during the first year of smarTT's roll out, a completed "check list" of relevant requirements will be developed for fixed telecommunications networks construction. It is also envisaged that during the initial years of this Plan, suitable mechanisms will be implemented to affect "utility corridors" for the deployment of all utilities in Trinidad and Tobago. This will require harmonization of efforts between and amongst all relevant ministries and government agencies.

7.2.3 **Key Imperative 4.3**: Building Information Society Capacity to Ensure Availability of Internet Resources and Viability of the Internet Economy

This Key Imperative focuses on the global Internet landscape that shapes and influences the evolution and existence of interconnectivity between the domestic and international ICT infrastructure and services. Interconnectivity at the physical infrastructural level enables the networking of ICT devices and facilitates the delivery of cross-jurisdictional services. These services allow citizens to actively participate and utilise ICT in the evolving global arena. Emphasis for physical interconnection will be on increasing off-island bandwidth capacity to facilitate the intended "upload" culture envisaged under Key Imperative 1.2 - Creating and Promoting Local Digital Content.

The establishment of an Internet eXchange Point (IXP) in Trinidad and Tobago is proposed to give strategic positioning for Internet peering arrangements. Further, development of routing diversity and redundancy is a key focal area, to ensure network resilience during instances of disasters. Government will work with the private sector to establish an alternate cable landing station. Consideration will also be given to housing a carrier hotel, an Internet Exchange Point, and a data centre, which may serve as an off-site backup facility for Government. The establishment of an alternate landing point may also encourage the provisioning of new cable systems in the country.

Other key focus areas include: building ICT institutional capacity and the professional capital stock for managing internet governance related issues; development, implementation, enforcement and harmonisation of information society rules and regulation based on a comprehensive e-legislative frameworks; creation of an appropriate enabling environment that promotes the creation, dissemination/distribution and archiving of local content in any ICT format; building of public awareness to heighten ICT visibility as an enabler and driver for socio-economic growth and development and the canvassing for buy-in from the business and residential segments of society for ICT adoption; and building the ICT institutional capacity and the cadre of professionals to address the specific IG issues.

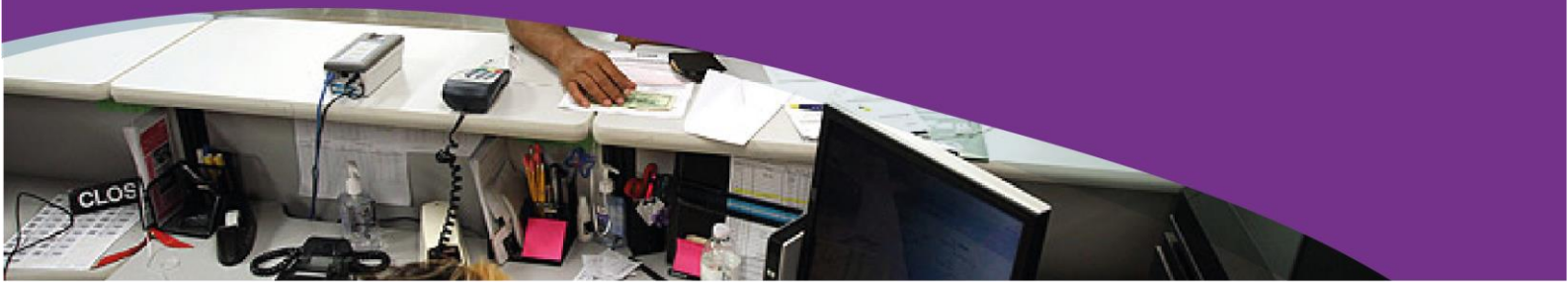
7.3 Programmes

Programmes: Infrastructure Development

Key Imperative	Programmes
4.1 Enhancing Infrastructure, Access, ICT Policies and Regulatory Oversight	4.1.1 – Universality 4.1.2 – Broadband Acceleration Plan 4.1.3 – Development of the Internet Infrastructure
4.2 Instituting Governance Structures for Planning and Development	4.2.1 – Cross Utility Sector Collaboration 4.2.2 – National Infrastructure Taskforce
4.3 Building Information Society Capacity	4.3.1 – Information Society Legislation-tt (eL-tt)

Table 7: Programmes – Infrastructure Development

8 Theme 5: e-Government



Information and Communication Technology can help bring Government closer to the people through major improvements in the delivery of government services. To achieve an efficient and effective Government, transformation is needed in the way that Government "does business". Through the synergies enabled by a robust infrastructure, the availability of shared services, and e-services, transactions and information flow can be streamlined to allow for better management of resources, the promotion of accountability, and the facilitation of real-time decision-making.

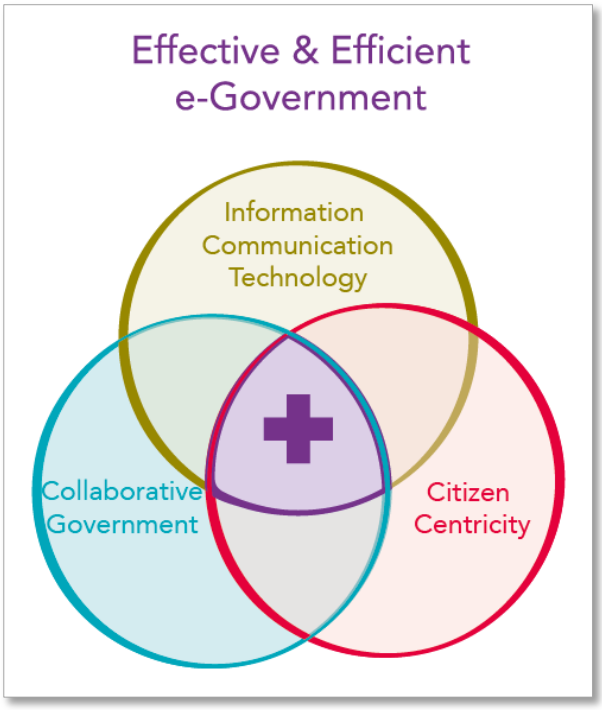


Diagram 9: e-Government Equation

e-Government is an integral component for building delivery of government services. The underlying principle of e-government is the improvement in the internal workings of the public sector while simultaneously reducing operational costs and transaction times. This leads to greater process and workflow integration, and enhances resource utilization across various public sector agencies. GoRTT is committed to an integrated and streamlined public sector based on a "Whole-of-Government" approach to service delivery.

8.1 Alignment to the Pillars for Sustainable Development

e-Government is aligned to six (6) of the seven (7) Pillars for Sustainable Development: People Centred Development, Poverty Eradication and Social Justice, National and Personal Security, Information and Communication Technologies, A More Diversified, Knowledge Based Economy and Good Governance. A discussion of the relationship between this thematic area and each of the related Pillars is presented below. However, given that this is the National ICT Plan, the link between this thematic area and the Pillar "Information and Communication Technologies" is self-evident, and is therefore not included in this discussion.

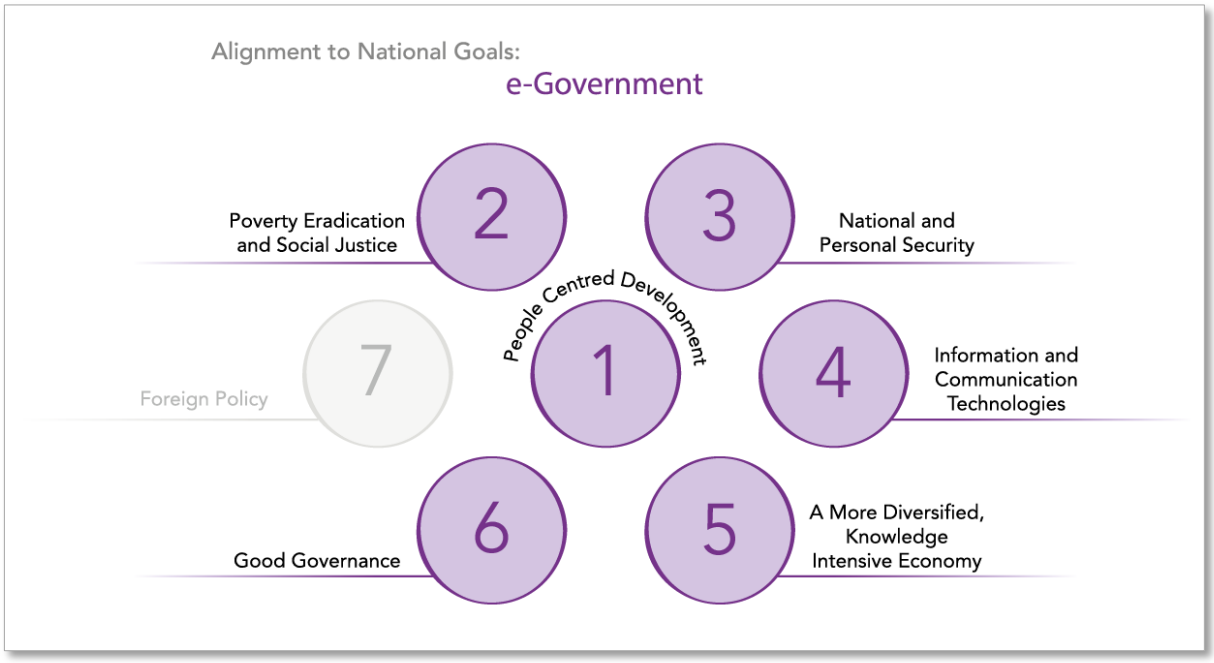


Diagram 10: e-Government Alignment to Pillars of Sustainable Development

8.1.1 People Centred Development

e-Government will contribute to human capital development by training citizens and businesses in the use of ICT and by promoting the adoption of ICT, as they relate to government services. Through this thematic area, the government will develop a more citizen-centric approach especially via the roll-out of e-participation and e-democracy, whereby a virtual space for concerns and ideas on Government will be created. The development of public-sector led initiatives will also benefit from consultations with and feedback from the population through ICT enabled mechanisms.

8.1.2 Poverty Eradication and Social Justice

GoRTT has a commitment to ensure that its development initiatives are for the greater good of the greatest number of the population. Along the lines of social justice, ensuring citizen protection with respect to the provision of data to and from government agencies, process transparency, information access, and building trust and confidence, is of prime concern within smarTT. Further, e-Service delivery, especially through an enhanced multi-channel approach, addresses the need for

Government to make services equitably available to all citizens, thus fulfilling the mandate of social inclusion.

8.1.3 A More Diversified, Knowledge Intensive Economy

GoRTT, in its role as 'model user' will encourage development of new business opportunities for local investors in the ICT sector. This will create potential opportunities for Public-Private Partnerships in the provision of government services, and allow for market efficiencies in operations. GoRTT will also seek to actively use locally created ICT solutions in an aim to support and build the sector. e-Government further includes programmes to build human capital, expand research and development initiatives, and focus investment in chosen knowledge intensive sectors.

8.1.4 National and Personal Security

GoRTT will seek to use infrastructure and systems based on best practice security standards and guidelines for interoperability with its stakeholders. Mandatory provisions will be established to ensure that all GoRTT entities conform to security standards. In addition, rigorous compliance monitoring will support all initiatives. Additionally, the establishment of mechanisms for prompt response to incidents will be implemented through policy and legislative measures.

In the area of cybercrime, the following will be addressed:

- Set up a Cyber Security Agency to monitor ICT security, as well as report on and mitigate cyber-threats;
- Set up a Computer Security Incident Response Team for incident reporting, management and response;
- Build capabilities in managing cyber threats and enhance cyber security;

8.1.5 Good Governance

Enforced infrastructure standards, government-wide ICT policies, and improved business processes will ensure transparency and accountability in government service delivery. Further, new initiatives such as the e-Democracy will allow citizens to contribute to issues of national importance thereby leading to more informed and strategic decision making.

8.2 Key Imperatives

Each Key Imperative listed below has accompanying Programmes which are detailed in Appendix 1.

8.2.1 **Key Imperative 5.1**: Migrating to Transactional e-Services

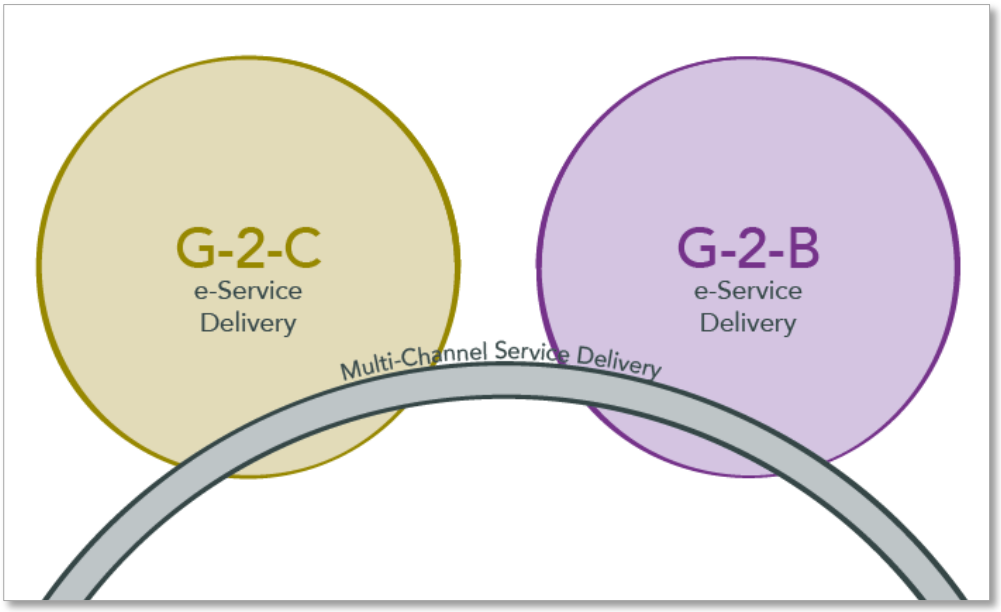


Diagram 11: Government e-Service Delivery

This Key Imperative seeks to put key Government-to-Citizen (G2C) and Government-to-Business (G2B) services online and to ensure that all e-services are of a high quality. While citizens do not need to understand the complexities of Government to obtain timely government services, they do need convenience as well as an excellent customer experience**.**

An integrated channel delivery for e-services will offer standardised quality and accessibility regardless of a citizen's location or socio-economic circumstances. This type of electronic channel will allow the Government to be more responsive, flexible and efficient in service delivery and more transparent with its processes.

The programmes under this Key Imperative are designed to deliver integrated, personalised and value-adding Government e-services. e-Services development will take place along a continuum where simple services are developed and implemented first, and the more complex and high-impact e-services are created and rolled-out based on lessons learnt from prior implementations.

Government service delivery has to reach and go beyond 'transactional' to 'personalised'. Areas where personalised e-Services will add value include:

I. ***Content Subscription***: Customers can subscribe to receive electronic versions of policies opened for public consultations, budget debates, parliamentary proceedings etc.;

II. ***Personalised Notifications***: Customers can subscribe to receive weather and traffic alerts by location; government fees and fines payment schedules; reminders for events such as court hearings; and

III. ***Personalised Page***: Customers can maintain and manage personal data and interactions with the Government.

Change management will be important to the implementation and adoption of e-Services. Education and public awareness programmes have therefore been developed to aid in this regard. There will also be a review to ensure that the **ttconnect** business model is viable for sustained service delivery.

8.2.2 **Key Imperative 5.2**: Collaborating to Implement Shared ICT Systems and Services

This Key Imperative focuses on leveraging ICT to improve the efficiency of government processes, enhance the effectiveness of government policies, and ensure sound ICT investment.

By consolidating the ICT infrastructure requirements of GoRTT, the Government as a whole stands to reap cost savings, to build in redundancy, and to exercise better control by enforcing ICT infrastructure standards and government-wide ICT policies. Government ministries and agencies will be sensitized to the need to streamline existing processes, relinquish control over individual systems where appropriate, and focus on their core business. Successful deployment of common ICT infrastructure, systems and policies calls for a clearly articulated position on GoRTT's use of shared services, top-down directives to support these efforts, timely and clear communications to the various levels of government, tangible consequences for non-compliance, and relevant support from Government IT Managers and Agencies.

GoRTT will advance a shared services approach to launch all new technology-related government applications by establishing which services lend themselves to central roll-out and management. This will require an assessment of all major government agencies to identify both the areas of functional commonality, as well as those areas ready for increased automation. Based on this assessment, a limited-focus business process re-engineering and IT integration project will be launched - using a 'model Ministry' method - preferably with a new Ministry, such as the Ministry of Justice.

Utilization of new models of deployment will include the implementation of Cloud-based Solutions[7]. In addition, enhancements to the existing wide-area network through the roll-out of value-added services such as VoIP, video-conferencing, shared storage and managed services for application

7 The Cloud Computing refers to the provision of ICT capabilities and solutions over a network or the internet to multiple users.

hosting, and the progression towards the provision of Infrastructure as a Service (IaaS) will be aggressively pursued.

There will also be shared applications for collaboration via intranet models, including Citizen Relationship Management Systems which will allow for rapid deployment based on a "build-once, use-many" approach which will facilitate integration and inter-agency information sharing.

8.2.3 **Key Imperative 5.3**: Building Government Infrastructure to Develop and Support a Vibrant e-Government Ecosystem

Government will focus on two main areas to support a robust e-government ecosystem: internal governance and external collaboration.

Internal Governance

Internal Governance comprises Shared Storage and Infrastructure; Improving Connectivity; and Policy Development.

Policy Development

Frameworks for efficient operation, governance and standardisation of the infrastructure will be made a priority as follows: government network and data centre which include usage policy, security policies, monitoring and access policies, administrative procedures, and policies outlining appropriate responses to service interruptions and requests for services.

Shared Storage and Shared Infrastructure

Government will establish systems, processes, policies and regulations to achieve more efficient government. The technologies and policies deployed in this phase will seek to improve internal operations within and across Government departments. The aim is to facilitate collaboration, communication, cost reduction, telecommuting, standardisation and quality management, data-driven measurement and reporting, and improved data access and security within the context of existing laws with respect to personal privacy.

Improve Connectivity (Quality and Quantity)

Network connectivity will be improved both in quality and quantity of bandwidth. This will be deployed first by improving connectivity among ministries. The re-architecture of GovNeTT into a modularized Enterprise Network will ensure simplified network design, expansion, scalability, addition of common and ministry-specific services, management, simplified integration of cloud-based/virtualization services in future routing paths and access to resources, and inter and intra ministerial access to shared resources/services. Other initiatives for GovNeTT include movement to an application based routing design as opposed to the existing hierarchical design. This will allow for easier access to Government data.

Micro-level integration of Government Voice services on GovNeTT, will permit ministries to utilize a toll free calling system with real time collaboration across their various sub-offices. This will be deployed to ministries and sub-offices that are currently on GovNeTT in the first instance, with a

medium term objective to deploy to remaining sub-offices. Macro-level integration of Government voice services will also allow citizens to access Government services through the use of one phone number to connect to relevant ministries and public offices.

External Collaboration

ICT infrastructure is also required to support external collaboration. This is necessary as the establishment of online systems provide a convenient way in which citizens can interact with the government for routine business. The two areas that are required to support external collaboration are: External Facing Portals and a Middleware Solution.

8.2.4 **Key Imperative 5.4**: Securing the ICT Environment

Government must secure the ICT environment and defend the country's critical resources from cyber threats and attacks. Trust and confidence in the security of the ICT environment is crucial as organisations and citizens become increasingly dependent on technology. Trust and confidence is also key in encouraging the adoption and uptake of technology.

This Key Imperative is focused on securing the nation's ICT systems through examination of the country's laws, regulations and policies; identification of current and potential threats; and addressing gaps where they exist.

Cyber Security

Government holds the largest repositories of citizen data and is therefore susceptible to cyber-attacks that may target financial data, medical data, and other sensitive/personal information. Further, businesses, as a result of the services that they provide to government, citizens and other businesses, can amass sensitive and confidential data that should be protected. Failure to protect personal and proprietary information and trade secrets exposes businesses to reputational, legal and financial risks. Citizens are the primary consumers of services provided by Government and businesses. Therefore, creating a safe cyber-space involves not only securing citizen data, but also necessitates educating people on ways to share information in a safe and secure manner.

Personal Cyber Security

Private use of the Internet and other ICT services represents the bulk of ICT interactions in Trinidad and Tobago. However, systems to protect end users and citizens from compromising their personal data and subscribed services are not universal.

Citizens are faced with multiple daily threats, ranging from phishing email scams to social engineering attacks designed to make the user voluntarily give up personal information. Dangers to personal security via cyberspace include identity theft, internet defamation, cyber-stalking and cyber-bullying. This signifies the need for public awareness regarding user responsibility/rights. A comprehensive legal and regulatory framework to protect users and criminalize perpetrators is therefore required.

Legislative Support for a Secure Cyberspace

- **Privacy**

Privacy concerns exist wherever personally identifiable data is collected and stored – in digital form or otherwise. Improper, inadequate or non-existent controls for data/information processing can lead to privacy and legal issues, especially if data is inappropriately shared or made public.

The challenge is to develop legislation to enable the sharing of data while still offering protection against unauthorized disclosure of personally identifiable information.

The Freedom of Information Act (1999) seeks to find a balance between protecting the privacy of citizens while allowing for official public disclosures of information, while The Data Protection Act (2011) focuses specifically on encouraging proper management of sensitive personal and private data held by public and private organisations.

- **Criminalizing Undesirable ICT-Related Behaviors and Activities**

At present, the Computer Misuse Act of 2000 is the only legislation that specifically criminalizes the unauthorized use or targeted misuse of computer systems.

The Electronic Transfer of Funds Crime Act (2000) establishes the criminal offence associated with the transfer of money via electronic terminal with respect to the use of a card unlawfully acquired or copied for the purpose of instructing, or authorising a financial institution to debit or credit a cardholder's account without proper authorisation. As defined in the Act, "card" means a bankcard, credit card, or smart card.

However, the Act does not provide for similar protections with respect to other forms of electronic monetary transfer.

In order to prosecute ICT-related crimes, and address the gaps identified above, subsequent cyber-crime legislation will expand on cyber-related criminal activity and focus specifically on Internet based crimes. This Act will be forward looking, and will take into account emerging and horizon technologies, which may find their way into government, commercial and personal use.

Industry Regulation

Regulation of the ICT industry is required to ensure that public and private entities providing goods and services are held to a legally binding code of conduct. This can be in the form of legislative regulations as well as directives from statutory authorities such as the Telecommunications Authority of Trinidad and Tobago (TATT), and the Office of the Information Commissioner, among others.

8.3 Programmes

The programmes under this theme are listed in the following diagram:

Programmes: e-Government

Key Imperative	Programmes
5.1 Enabling the Migration to Transactional e-Services	5.1.1 – Government-to-Citizens e-Services Delivery 5.1.2 – Government-to-Businesses e-Services Delivery 5.1.3 – Multi-Channel Access 5.1.4 – e-Democracy Platform
5.2 Collaborating to Implement Shared ICT Systems and Processes	5.2.1 – Enhancements to GovNeTT 5.2.2 – Smart Card Development 5.2.3 – GIS Application 5.2.4 – Intranet G2E 5.2.5 – Procurement Reform 5.2.6 – Cloud Computing 5.2.7 – Document and Information Management
5.3 Building a Vibrant e-Government Ecosystem	5.3.1 – Shared Storage and Shared Infrastructure 5.3.2 – Frameworks for efficient operation, governance and standardisation of the Infrastructure 5.3.3 – Middleware Platform
5.4 Securing the ICT Environment	5.4.1 National Cyber-Security Strategy 5.4.2 Information Security Policy 5.4.3 Information Security Awareness Programme 5.4.4 Risk Management Programme 5.4.5 Disaster Recovery and Business Continuity Management

Table 8: Programmes – e-Government

9 Tobago

The islands of Trinidad and Tobago are at different stages of ICT readiness in terms of infrastructure, connectivity, training and access. smarTT's focus in Tobago for the period 2014 – 2018 will be on connectivity, people-centred development, and extension of government services; each of these will be driven by innovation and use of relevant ICTs.

During the consultation process, working groups in Tobago were asked to develop programmes specific to the island, and to strengthen already proposed initiatives through the incorporation of Tobago's perspective. The sections below present the programmes that have been crafted for Tobago through working group recommendations and analysis of the island's distinctive structures of community and governance.

Especially unique to Tobago is the system of Village Councils. Districts in Tobago have strong community ties and community leaders leverage these relationships to reach consensus on a number of issues extending from the district to the national level. smarTT has taken note of the Village Council system and has incorporated this critical infrastructure into the development of programmes and initiatives for Tobago.

In some instances, the programmes below closely mirror Trinidad's programmes (see Appendix 1), but have been tailored to meet Tobago's specific needs. In other cases, new programmes have been developed to address circumstances or challenges which are unique to Tobago's context.

9.1 Thematic Areas

9.1.1 Theme 1: Innovation and Human Capital Development

In Tobago, ICT infrastructure is not as robust as in Trinidad. This has led to a slower uptake of ICTs among individuals and businesses. In addition, there are significantly smaller percentages of persons with specialized ICT skills, and fewer resources for ICT initiatives in Tobago compared with Trinidad. As a result, all of smarTT's objectives – especially with respect to the Theme of *Innovation and Human Capital Development* – have to reflect these inter-island disparities. The programmes under this thematic area have been developed to facilitate the enhancement of the ICT skillset across the island, from the basic to more advanced competencies.

Programme 1: Computers and Connectivity for Schools

In order to promote the use of technology, access to the Internet will be offered at little or no cost to Primary and Secondary Schools, and Community Centres. The aim is to encourage the integration of technology into pedagogy and curriculum, labour market preparation, and overall lifelong learning.

The Education Division of the Tobago House of Assembly will work closely with the Ministry of Education to ensure that e-CAL and other initiatives are appropriately tailored and streamlined to meet Tobago's needs.

Programme 2: ICT Leaders to Foster Paradigm Shifts

In order to promote new and creative ways of thinking, there is need to engender the requisite attitudes and perspectives to change. ICT leaders in Tobago will cultivate and champion the view that human development is the highest priority, and the most important outcome of the island's ICT investment. For this programme to be successful, ICT leaders will be at the forefront, advocating society to view ICT as an important component of both personal and national development.

ICT leaders will be responsible for exposing society to new, innovative ways of working. They will be also take the lead in developing transition strategies that will guide Tobagonians along a clearly outlined developmental plan for ICT enabled innovation.

The Tobago House of Assembly will lead the development of a strategy to utilize Tobago's ICT leaders in a movement for island wide sensitization and buy-in towards ICT uptake. A Public Sensitization campaign will be developed by the THA in collaboration with the Ministry of Science and Technology to ensure that messaging is streamlined for the appropriate audiences.

Programme 3: Digitize Indigenous and Heritage Related Content

Tobago has a rich and unique heritage and digitisation of this content is important to preserve the history and culture of the island. The preservation of history in electronic formats will also provide the channels for interested national, regional and international audiences to learn about and appreciate Tobago's diverse and unique background. Further, development of local digital content – designed to specifically target local needs – can serve to boost citizens' support of locally produced products.

The focus of this programme in Tobago will be on forming partnerships between ICT practitioners and local communities to ensure that history is captured and recorded. Indigenous digital content will be organised via local networks in the areas of business, education, lifestyle, arts, etc. As Tobago develops its ICT skill base, and as ICT know-how is transferred, persons in the local communities will be required to take ownership of these digitization efforts.

The Division of Community Affairs of the Tobago House of Assembly will work closely with the Village Councils to develop a strategy geared at systematically recording the customs and traditions of each village for incorporation into a comprehensive online historical museum.

Programme 4: ICT Training for the Public Sector

Feedback from the consultations held in Tobago revealed that the public sector has critical need for ICT training at the administrative and clerk level. An ICT training plan will be tailored to Tobago and will focus on clerks and administrative staff with an aim to build basic ICT skills. Training will be facilitated by leveraging existing training centres and expanding curricula to include ICT and related subjects.

This training plan will target all administrative staff in Tobago's public sector in order to build competency in word processing, spread sheets, PowerPoint and other software applications required for effective job performance. The Tobago House of Assembly in collaboration with the

Ministry of Public Administration will design this training plan for Tobago. Partnership with the Ministry of Tertiary Education and Skills Development, via the Ministry's National Skills Centers, may also be required to implement the training programs.

9.1.2 Theme 2: Access and Digital Inclusion

The digital divide between the islands of Trinidad and Tobago is wide. This is in large part due to the lack of infrastructure on the smaller island and the unavailability of ICT training and educational opportunities. However, the divide can also be attributed the lack of information dissemination on ICTs and their usefulness. While smarTT proposes programmes to address infrastructure and training, it will simultaneously focus on bridging the digital divide by educating local communities.

The Village Councils will be used to sensitise communities, launch and deliver programmes, and obtain feedback on proposed initiatives. The Division of Community Development and Culture in the Tobago House of Assembly will be leveraged to encourage the Councils to host meetings at community centres and schools. Feedback from the Village Councils will be used to inform and guide decisions on future projects. The sensitization campaign will be coordinated between the Ministry of Science and Technology and the Tobago House of Assembly.

Programme 1: Computers and Connectivity for Digital Inclusion

Through the e-Connect and Learn Programme, a greater number of families in Tobago have gained access to computers. However, e-CAL alone is not enough to ensure that all families across Tobago have access to the internet and other digital technologies.

As a first stage of this programme, telecentres will be established as public places where individuals can access computers, internet and other ICTs at minimal cost. At these centres, users will gain access to information, create, learn and share while simultaneously developing and enhancing digital skills. The Tobago House of Assembly will work closely with the Ministry of Science and Technology and the Ministry of Tobago Development to ensure that the infrastructure is in place for the successful roll out of this programme.

Programme 2: Increased and Affordable ICT Education and Training towards Digital Inclusion

ICT training will be made available to communities through free workshops at community centres and telecentres. In addition, the number of **ttconnect** buses in Tobago will be increased, and consistent service will be offered throughout Tobago's underserved communities and districts. This programme will be a joint partnership between the Tobago House of Assembly, Ministry of Tobago Development, and the Ministry of Science and Technology.

9.1.3 Theme 3: e-Business and ICT Sector Development

Programme 1: Micro and Small Enterprise ICT Development

SME Sensitization

Most businesses in Tobago fall into the category of Micro and Small Enterprises (MSE's). These entities will be targeted for the uptake of ICTs with the aim of extending their reach to wider markets, improving efficiencies and enhancing productivity. The Business Development Unit and Consumer Affairs Unit of the Tobago House of Assembly have proven success at mobilizing businesses especially with respect to adopting new ways of working. In this regard, Tobago's business community will be targeted, through these Units, to attend seminars, forums and training sessions.

Business Incubators

A Business incubator will be developed to support entrepreneurial efforts in Tobago. An array of business support resources and services will be offered through the incubator and its network of contacts. The two conceptual models are the *Community Based Business Incubator* and the *Commercial Business Incubator* (See Programme 3.2.1 in Appendix 1). The most viable product ideas derived from the business incubators will be targeted for commercialisation.

The Business Development Unit of the Tobago House of Assembly will work in collaboration with the Ministry of Trade and Industry to tailor components of these nation-wide initiatives for Tobago.

Programme 2: Develop and Implement an E-Commerce Strategy for the Tourism Sector

Information and Communication Technologies are crucial drivers for tourism providers to transact business, distribute products and services, network with trading partners and provide information to consumers worldwide. Although Tourism is an important component of Tobago's economy there has been insufficient technology usage this sector. Inadequacies are most evident in the deployment of ICT infrastructure, and the adoption of e-integrated business processes. The Tourism Division of the Tobago House of Assembly will work with the Ministry of Trade and Industry to develop an e-Commerce strategy geared specifically to Tobago's Tourism sector.

9.1.4 Theme 4: Infrastructure Development

Programme 1: Broadband and Connectivity

The World Bank has stated that Trinidad and Tobago's national objective of creating a future-proof infrastructure, requires that the backbone be built to deliver at least 100Mpbs to every household[8]. Approximately 30 percent of Trinidad's territory is not connected with an adequate primary fibre optic backbone, whereas the rest of the country has access to at least one or more fibre optic

8 Draft World Bank Broadband Report 2012.

networks. However, Tobago has access to only one fibre optic cable which runs between Trinidad and Tobago and is often non-functioning. This has led to erratic and unpredictable connectivity across the island of Tobago. The submarine link with Tobago needs to be enhanced and proper diversity and redundancy measures need to be instituted if these connectivity challenges are to be effectively addressed. In light of this, an estimated 1500-2000km of additional terrestrial primary backbone network needs to be built on both islands. Further, a 35-50km submarine link between both islands is urgently needed.

Closing the broadband gap will entail heavy investments in access networks as well as in the backbone infrastructure (the majority of these access networks entail either Ethernet, coaxial or fibre links to homes). Fortunately however, as broadband wireless technologies continue to evolve, the hardest to reach areas, and Tobago in particular, now have an alternate option via wireless technology.

The strategic character of access networks - due to their quasi natural monopoly characteristics – should encourage private operators to invest in Tobago's infrastructure. Therefore, the expectation is that once an effective backbone is established, the approximately 70-90 percent of Tobago's population will be covered by private operators. However, the World Bank estimates that between 5-10 percent of the population - mostly persons living in the poorest rural areas - may be not considered commercially viable. In this regard, a requirement may exist to provide a subsidy to households in these locations. The Universal Service Fund managed by the Telecommunications Authority of Trinidad and Tobago (TATT) can be leveraged to close this broadband gap.

The Tobago House of Assembly and the Ministry of Tobago Development will work with the Telecommunications Authority of Trinidad Tobago to map out a 5 year plan for ICT infrastructure in Tobago. This plan should be completed by the second quarter of 2013.

9.1.5 Theme 5: e-Government

Programme 1: Collaborating to Implement Shared ICT Systems and Processes

The Tobago House of Assembly (THA) has numerous divisions and departments that are dispersed across various locations. Since collaborative government is a fundamental element in modernising the public sector, collaboration tools will be deployed to link THA's Divisions and to connect employees through an intranet. This intranet will extend to the Ministry of Tobago Development to promote and facilitate smoother collaboration between the two entities.

Another area of focus will be the development of a policy to promote the sharing of government data in a standardised format. This will be pursued through the document management system programme which allows for the following shared services:

- Email
- E-Meetings
- Instant Messaging
- E-Calendar

Tobago House of Assembly, Ministry of Tobago Development and the Ministry of Science and Technology will work on a twofold strategy to:

I. Bring all THA Divisions and the Ministry of Tobago Development onto GovNeTT and;
II. Deploy a document management system designed to handle the work processes and output of both the THA and the Ministry of Tobago Development.

Programme 2: Government to Citizens e-Services Delivery

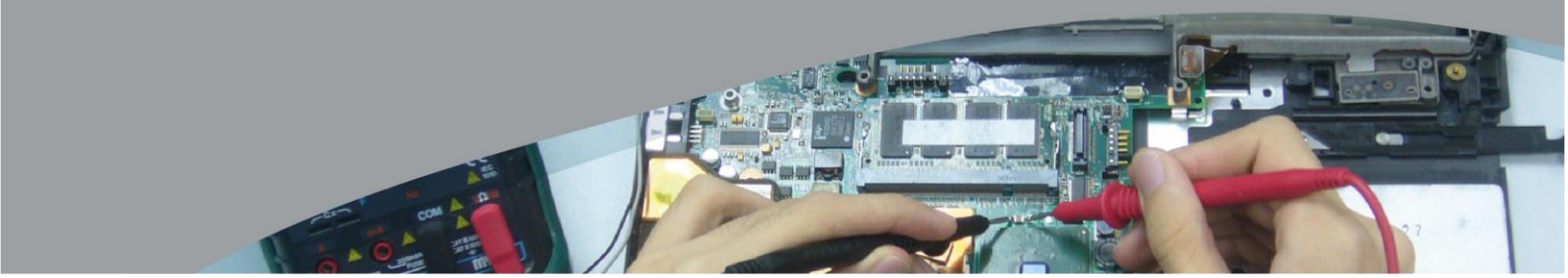
Government-to-Citizen (G2C) initiatives are designed to facilitate more citizen interaction with government online. A focus will therefore be placed on extending government online services to include the Tobago House of Assembly (THA). Presently, the THA has social divisions which extend critical services to citizens. At the onset, forms and documents will be placed online and thereafter, transactional services will be offered. These services will be extended through the **ttconnect** suite to ensure that persons on both islands have equitable access.

The deployment of e-Services for Tobago would allow for:

- Citizen's Participation: increasing the input of citizens into public sector decisions and actions.
- Public Services Improvement: improving the services delivered to members of the public along dimensions such as quality, convenience and cost.
- Reduction in travel time between Tobago and Trinidad to transact with government.

The Ministry of Science and Technology, through the National ICT Company Limited (iGovTT), will work with the Tobago House of Assembly and the Ministry of Tobago Development to develop and finalize a Strategy for **ttconnect** in Tobago.

10 Supporting Mechanisms



Mechanisms to support smarTT's implementation will be critical to the Plan's success. These are outlined in the sections below.

10.1 Open Government Data

The Internet allows citizens to participate more fully in Government. GoRTT, through the Ministry of Science and Technology, will develop policies to make non-sensitive government information available to the public in a standardized electronic format. This initiative is expected to increase civil discourse, improve public welfare, and provide more efficient use of public resources.

Policies and procedures will be crafted to ensure that online information is easily accessible, used, and understood. This initiative aims to improve transparency in government, encourage civil participation, aid in the development of new products and services, encourage innovation, and improve Government efficiency.

10.2 Free / Libre / Open Source Software (FLOSS)

Free / Libre / Open Source Software (FLOSS) refers to any software that provides users with the ability to run a programme and access its source code for viewing, distribution and or modification, free of charge. Research and position papers have already been developed at the National ICT Company Ltd. (iGovTT) to aid in developing policies for FLOSS uptake.

Thus far, GoRTT has identified the following focal areas:

- Development and execution of a statistical monitoring system for the use of open source in the public as well as in the private sector;
- Development and promotion of a comprehensive policy to improve the usage of open source software;
- Coordination of open source software migration and implementation in the public sector and coordination and cooperation within open source projects of public interest;
- Development of strategies to transition the public and private educational sector to open source requirements;
- Support business models that are based on open source software, and inform and advise small and medium size enterprises during all phases of transition to open source software; and
- Ensure security under the Data Protection Act

Providers of Open Source Software Solutions will also be tasked with offering viable alternatives for *vendor lock-in and dependence*.

10.3 Green Computing and Sustainable ICT

The field of Green Computing is, "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment[9]."

GoRTT intends to establish the necessary administrative, environmental and technical mechanisms for efficient and effective e-waste management[10] for sustainable ICT. Through the Waste Electronic and Electrical Equipment (WEEE) Act, GoRTT will also develop the requisite legal framework within which specific e-waste requirements will be addressed. Notably, GoRTT has already begun to adopt Cloud Computing, the most recent Green technology innovation.

As one of the largest consumers of ICT products and services, GoRTT has the responsibility to ensure that a well-defined strategy exists to promote green computing initiatives as well as to deal with the disposal of end-of-life assets. GoRTT, through the Ministry of the Environment will drive the initiative to seek alternative disposal methods through deposit/refund mechanisms, reduction of export costs of "end-of-life" equipment and their waste components, and the re- vitalisation of previous e-waste disposal mechanisms. Establishment of quality standards around e-waste disposal will be a requirement that will encourage the already existing e-waste recycling sector to perform to industry standards.

Monitoring volumes of computing equipment will become necessary for data collection agencies as national planning for e-waste disposal is conducted. Ultimately both public and private sector procurement practices will require accurate monitoring and recording of computing equipment inventory. In addition, procurement requirements within the context of e-waste will require a schedule of acquisitions, expected duration for use, storage and disposal practices.

10.4 Ministry and Agency ICT Planning

A concerted ICT planning effort is required at the Ministry and Agency level. Upfront ICT planning will provide the roadmap through which necessary infrastructure, systems, and policies can be put in place to support current and future business needs. A government-wide Enterprise Architecture (EA) development exercise is a systematic way to accomplish this. A Government EA serves as a framework and repository of standards that enable the sharing of information and systems across ministries. A robust Enterprise Architecture (EA) includes the Business Architecture, Information Architecture, Solution Architecture and Technical Architecture needed to optimise internal processes. In addition, upfront planning with respect to *demand aggregation* of ICT goods and services is another area in which there can be reduction in effort and cost due to economies of scale.

9 San Murugesan, "Harnessing Green IT: Principles and Practices," IEEE IT Professional, January–February 2008, pp 24-33
10 Edison Garraway, Egarr & Associates, 2010. e-Waste Assessment in Trinidad & Tobago Final Report

10.5 ICT Cluster Development

An ICT cluster is a geographic concentration of interconnected companies and institutions in the field of ICT. These clusters present a dynamic environment where networking, investment and technology transfer can be concentrated. Such an environment creates local jobs and drives the economic growth of a region and country[11].

eTeck's 15-year Strategic Plan (2012-2027), is in alignment with the Ministry of Trade and Industry's overall goal "*to drive the non-energy sectors for the sustainable long-term growth and development of a diversified and knowledge-based economy that contributes to the creation of high quality jobs*". The Plan articulates the context for the development of ICT clusters within Trinidad and Tobago and identifies two overarching goals: (1) sustainable growth, driven by diffusing ICT to enhance economy-wide competitiveness; and (2) poverty reduction, facilitated by broad-based growth, accelerated human development, and empowerment. Noteworthy, is the fact that the NIHERST Science City, is also fostering development in this area. It aims to advance the levels of scientific and technological literacy in both the children and adults of Trinidad and Tobago and the wider Caribbean.

GoRTT's policy intent to pursue ICT cluster development is expected to drive the prioritisation of relevant technology initiatives, R&D incentives and infrastructure. GoRTT will target the most dynamic segments of the ICT industry for promotion and export. There will be efforts to sequence entry, and systematically upgrade capabilities towards higher value segments of the global supply chain. Government will partner with the private sector to promote incubators, develop hi-tech clusters, and develop local knowledge networks. GoRTT will also mobilize the diaspora for capital, technology, entrepreneurship, and market intelligence.

The ICT cluster environment will foster a cohesive engagement that will optimise the inherent talents, knowledge and skills for overall national development.

11 http://www.eteck.co.tt/1content/en/e_news.aspx?articleid=602&zoneid=103

11 Governance Model

The Governance Structure and processes outlined in this section are designed to facilitate the effective implementation of smarTT.

The Governance Structure will focus on coordinating and driving the successful planning and execution of nation-wide, government-wide, or major ICT initiatives that affect more than one government ministry or agency and which also include public private partnerships. smarTT's programmes will be deconstructed into specific projects. Government-wide projects refer to those that cut across government ministries and agencies, while major projects refer to those that have profound impact on business such as the Single Electronic Window (SEW) for trade and business facilitation.

The Governance Structure will involve key public-facing government ministries and agencies and business organisations, and will provide platforms for decision makers to drive ICT initiatives that ultimately bring benefits to the nation as a whole.

11.1 Governance Structure

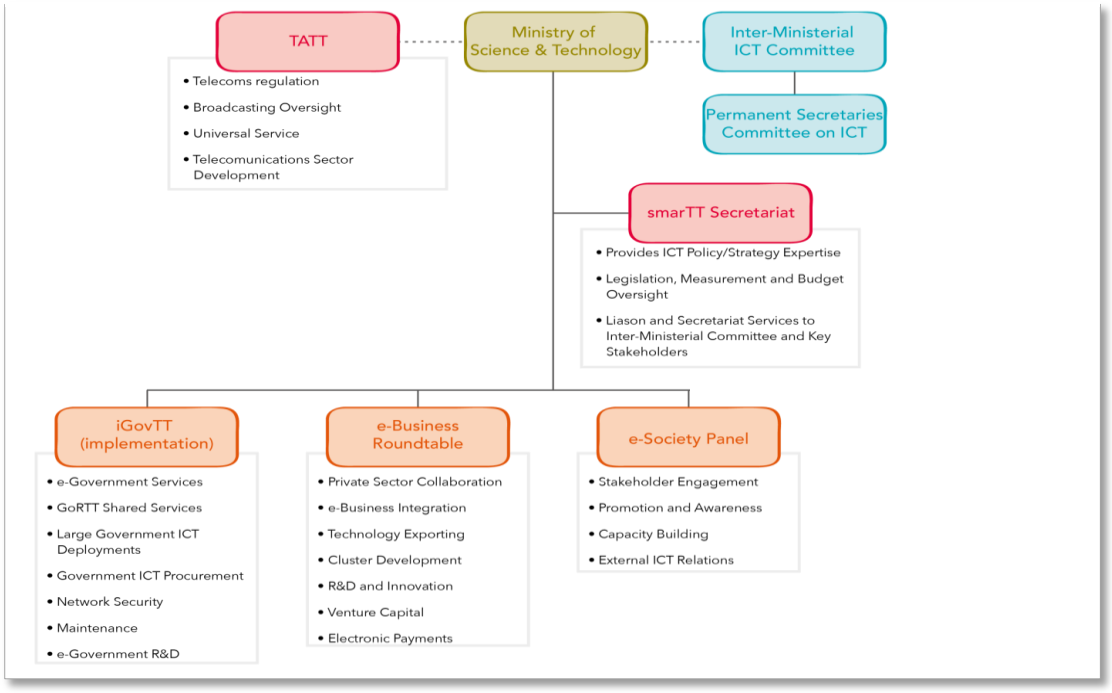


Diagram 12: smarTT Governance Model

The recommended ICT Governance Structure for the implementation of the smarTT is displayed in Diagram 12 and further details are given in the section below.

11.1.1 National ICT Steering Committee

A National ICT Steering Committee will be established to drive the development and adoption of major ICT projects within Government, ICT projects requiring cross ministry participation, and ICT projects with nation-wide impact. The Committee will determine the ownership and responsibilities for such projects and will also be in charge of monitoring the progress of smarTT implementation. The Committee will further review performance of smarTT's various initiatives through the tracking of Key Performance Indicators (KPI's).

The existing Inter-Ministerial Steering Committee (IMSC) on ICT will assume the role of the National ICT Steering Committee. The National ICT Steering Committee will be the highest approving and decision-making body that oversees and drives the suite of major and government-wide ICT projects and will provide strategic direction towards realizing the National ICT Vision. It is recommended that the Committee be headed by the Minister responsible for ICT in Trinidad and Tobago.

11.1.2 Permanent Secretaries Committee on ICT

The role of the Permanent Secretaries Committee on ICT will be to ensure that government agencies' efforts are aligned and coordinated, and that adequate policies are in place, and adhered to, in order to support the successful implementation of all major and enterprise-wide ICT initiatives. The Committee will report to the Inter-Ministerial ICT Steering Committee and will review findings and recommendations from the smarTT Secretariat (see below) prior to submission to the National ICT Steering Committee.

11.1.3 smarTT Secretariat

The smarTT Secretariat will be established under the Ministry of Science and Technology and will support and coordinate the work of the various entities under the smarTT Governance Model. The Secretariat will comprise Sector Specialists who will be liaisons to executing agencies, and will include a policy and research function, monitoring and evaluation, and administration. The Secretariat will coordinate and integrate efforts across the various programmes of the Plan, and ensure alignment with other national development efforts. The Secretariat will further identify and address gaps and areas of overlap between the various programmes of smarTT and other National Plans. Opportunities for major Government ICT projects and G2B and G2C e-Services will also be identified at this level. The work undertaken by the Secretariat will inform the submission of ICT related initiatives for PSIP consideration within GoRTT's budgetary cycles.

11.1.4 Agencies, Authorities, Committees and Roundtables

Entities such as Evolving TecKnologies and Enterprise Development Company Limited (eTecK), the Telecommunications Authority of Trinidad and Tobago (TATT), the National ICT Company Limited (iGovTT), the e-Business Roundtable, the Inter-Ministerial Committee on Cyber-Security and e-Legislation Technical Advisory Committee and the proposed e-Society Panel and e-Government

Roundtable (formerly the CIO Forum) will collaborate with the smarTT Secretariat to champion the national ICT Agenda and to promote ICT Capacity Building.

12 Funding and Implementation

12.1 Funding

Two types of funding arrangements will be used to support the deployment of smarTT. Firstly, a central fund will be developed and implemented for cross-agency ICT shared systems, and will subsidise the use of these systems to encourage government agencies' participation. Secondly, a fund will be set up to encourage Public Private Partnerships (PPPs). Utilization of both types of funding arrangements must be reported to the National ICT Steering Committee through the smarTT Secretariat.

Indicative budget estimates for each programme and project will be determined by the National ICT Company Limited (iGovTT) in collaboration with the Ministry of Planning and Sustainable Development. The figures will be used for budgeting purposes but actual cost of programme / project delivery is subject to:

- the priority of the Government at the proposed time of programme /project initialisation, and
- the outcome of the tendering process for procurement of ICT goods and services for the programme /project.

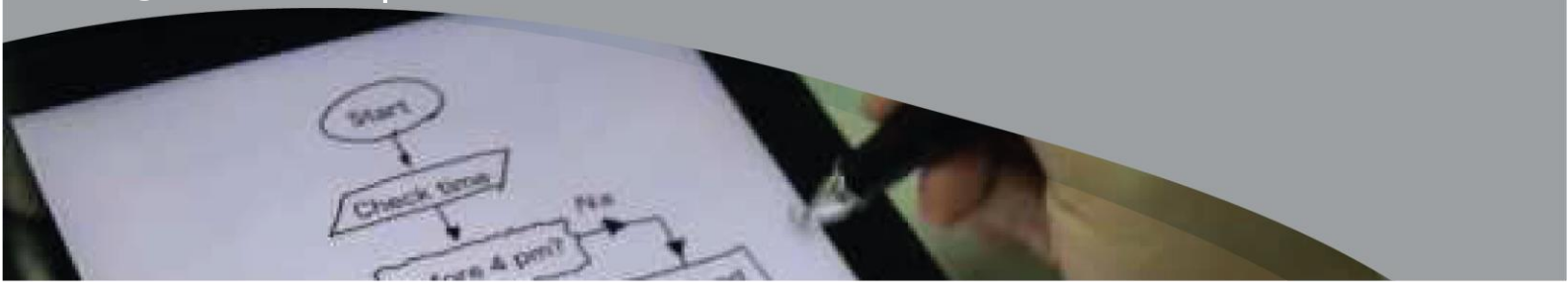
12.2 Implementation Roadmap and Performance Measurement

The list of initiatives described in the five thematic areas will be delivered over a period of 5 years from 2014 to 2018.

Throughout the implementation of the Plan, there will be numerous stakeholders with an interest or involvement in its programmes. These stakeholders include individuals and agencies that will be directly or indirectly contributing to, or affected by, specific programme outputs and outcomes. With this awareness, keen focus will be placed on active stakeholder engagement to improve the likelihood of uptake and encourage stakeholder commitment to the national ICT agenda. Stakeholder mapping will be conducted to identify the unique interest areas of key influencers and beneficiaries. In addition, workshops and consultations will be hosted for ministries and agencies to facilitate active communication.

Appendix 2 contains the Programme Implementation Roadmap against a 5-year timeline. The roadmap captures details on the programmes, outputs and outcomes by thematic areas. Since timely monitoring and evaluation are critical success factors for smarTT; during the implementation phase of the Plan, key performance indicators (KPIs) will be clearly set out in collaboration with the appropriate line Ministry. These KPIs will be used to track progress towards the achievement of the stated imperatives.

13 Next Steps



smarTT presents recommendations that stem from the review of ***fastforward****, a* comprehensive understanding of Trinidad and Tobago's ICT environment through surveys and stakeholder engagement, alignment to the Pillars for Sustainable Development and the Medium Term Policy Framework, and best practices gleaned from the Singapore e-Government experience. The programmes outlined in Appendix 1 have been validated through stakeholder engagement comprising small group consultations in Trinidad and Tobago, group reviews, and online public consultation. The immediate next steps are outlined below.

13.1 Formalise the ICT Governance Structure

Effective governance is critical to the achievement of the e-Government vision and maximising the value of ICT investments. However, there is currently no formalised ICT governance structure.

ICT governance needs to be established for the successful implementation of smarTT. This will entail the following:

1. Establishment of the National ICT Steering Committee;
2. Appointment of the Government CIO and Ministry CIOs;
3. Establishment of the smarTT Secretariat to support the ICT governance committees in driving the implementation of the National ICT Plan including the management of approved ICT programmes and budgets; and
4. Confirmation of ICT programmes and allocation of funds and performance measurement for the programmes.

13.2 Develop a Communications Plan

A Communications Plan must be developed to inform all stakeholders of smarTT's purpose, objectives and content (including approach, benefits, impact, and timelines). The roll-out of the Communication Plan will be tabled for discussion by the National ICT Steering Committee.

14 Conclusion

The National ICT Plan 2014 – 2018 (smarTT), provides direction for the allocation of economic and human resources for this country's ICT development in accordance with the nation's stated development goals. smarTT utilized global trends, Trinidad and Tobago's ICT development rankings and the status of specific ICT programmes that commenced under the first National ICT Plan 2003-2008 (***fastforward)***. Further, in strict adherence to the 5 Stage Master-Planning Methodology, the contents of smarTT also reflect the views and ideas of citizens spanning different representative groups including civil society, academia, government and the business community.

smarTT's implementation will ultimately be guided by a National ICT Vision that seeks *to create a dynamic knowledge-based society, driven by the innovative use of ICTs to enhance the social, economic and cultural development of the people of Trinidad and Tobago.* Progress towards achieving this vision will be reflected in Trinidad and Tobago's movement towards the following desired objectives:

I. People Centred Development

II. Poverty Eradication and Social Justice

III. A More Diversified, Knowledge Intensive Economy

IV. Personal and National Security

V. Good Governance

To spur these objectives, focus has been placed on five (5) thematic areas, beginning with the Plan's foundational theme 'Innovation and Human Capital Development' and consisting of four (4) others namely, 'Access and Digital Inclusion', 'e-Business and ICT Sector Development', 'Infrastructure Development' and 'e-Government'. The Key Imperatives and programmes documented under each theme provide clear direction and include outputs and timelines for monitoring and evaluation purposes. There are a total of fifty-six (56) national-level programmes carded for implementation over the five-year period (2014 – 2018).

In addition, consideration has also been given to the development of other supporting mechanisms ranging from open source software to security, which will ensure that the local environment remains conducive to ICT developmental efforts and that ICT development, itself, occurs in a responsible manner. Noting too, that smarTT initiatives cannot be successfully implemented without appropriate financing and governance structures, a related proposal has been made under smarTT for the establishment of such bespoke structures.

Sound investments made in the present will secure opportunity and well-being in the future. The people, businesses and Government of Trinidad and Tobago must be prepared to do things differently, and adapt to new ways of learning, living, doing business, staying 'connected' and delivering public services. It is expected that smarTT's successful implementation will result in vast

improvements in the quality of life of citizens, growth of businesses and strengthening of this country's competitiveness in the global arena.

smarTT
NATIONAL ICT PLAN 2014 – 2018

The Programmes herein are subject to approval, availability of funding, and other required resources. In some cases, there are prerequisites to implementation such as infrastructure and legislation. The aim of this Plan is to provide a comprehensive view of what is required to reach each goal on the ICT Roadmap.

Appendix One

PROGRAMMES

ProgrammThematic Area One: Innovation and Human Capital Development

Programmes: Innovation and Human Capital Development

Key Imperative	Programmes
1.1 Building an e-Ready Society through ICT Enriched Learning	1.1.1 – Computers and Connectivity for All 1.1.2 – Create a system/culture to challenge traditional ways of thinking 1.1.3 – M-Learning 1.1.4 – Develop an ICT Training Framework 1.1.5 – Integrate Human Capital Development / Education / Training with Industry Needs
1.2 Creating and Promoting Local Digital Content	1.2.1 – Digitize Heritage, Indigenous and Social Content 1.2.2 – Create Digital Content for Use at All Levels of Education 1.2.3 – Web Production Incentives 1.2.4 – Leverage the Diaspora and Wider Caribbean to Fund/Promote Digital Content
1.3 Establish a Culture of Research and Development	1.3.1 – Offer Scholarships in Identified Areas of Research 1.3.2 – Regional Research Forum 1.3.3 – Department of Research and Development in ICT 1.3.4 – Attract and Retain ICT Professionals 1.3.5 – Establish an ICT Awards and Incentives Schemes 1.3.6 – Establish Incubator for Technology/Solution Transfer and Commercialization

Key Imperative 1.1: Building an e-Ready Society through ICT Enriched Training and Learning

Programme 1.1.1 Computers and Connectivity for All

Under the Computers and Connectivity for All Programme, ICT will be integrated into the education system at the primary, secondary and tertiary levels.

Free devices will be made available to students via initiatives similar to the "eConnect and Learn" (eCAL) programme. While the focus will be on primary, secondary and tertiary institutions, assistance will also be given to early childhood education centres wishing to provide early ICT skills and learning to infants.

Hardware and software will be chosen based on the needs and learning patterns of the specified learning group. Software will also be developed to ensure that applications are designed specifically for the local context.

Computers and Connectivity for All will closely mirror the eCAL programme, utilizing best practices and lessons learnt as outlined in the following section.

This programme will also entail a special focus on Bridging the Digital Divide. See Programme 2.2.1 Computer and Connectivity for Digital Inclusion.

eConnect and Learn Programme (eCAL)

Under the eCAL programme approximately seventeen thousand (17,000) laptops are rolled out to students entering secondary schools each year. The devices are pre-installed with educational software, as well as security software and tools. The laptops include support and maintenance agreements to ensure timely repair and replacement. Guidelines and policies are issued to ensure proper usage and care for the laptops and to instil accountability for these assets. Such guidance includes the following:

I. Processes for monitoring, repair and replacement of hardware; and
II. Policies for disposal and security to ensure the responsible usage of the devices.

The eCAL programme is a key component of an overall strategy to augment ICT accessibility and usage, increase ICT-enabled learning, and cater to the various learning styles of students. eCAL includes projects which focus on the development of an ICT enriched curriculum, development of centralised self-paced learning tools and teacher training within the national education system. It further includes building, upgrading and maintaining ICT infrastructure, and the provision of technical support. A key strategy of eCAL's implementation ensures that technology does not dominate the pedagogical process but rather supports it.

A communication campaign that targets the students, parents and educators, helps to facilitate the roll out of these laptops. Key messaging includes the objectives and benefits of the programme, the roles and responsibilities of the students, parents and educators and Internet safety and security measures. The communication campaign will also be utilized for the primary and tertiary education components of the Computers and Connectivity for All programme.

Critical Components

Connectivity- Computers and Connectivity for All requires on-going efforts to ensure that reliable connectivity is available in all schools. This requires the provision or upgrade of physical ICT infrastructure within schools including network connectivity (Local Area and Wide Area Networks), power capacity and physical security. In the longer run, this programme's scope will be extended to include pre-school establishments.

Educator Training- An important success factor will be educators' engagement and training. To be effective, teachers need to be conversant with tools to develop relevant pedagogy and be able to use commercially available ICT-enabled curriculum. Such curriculum includes supporting software that enhances the learning experience of students. Examples include the Learning Management System for administering e-Learning, and the Learning Portal that provides centralised access to relevant digital content and curriculum materials.

Driving Agencies

Programme 1.1.1: Computers and Connectivity for All

Activity	Driving Agency
Develop early childhood, primary and secondary school ICT curriculum and policy.	Ministry of Education
Develop tertiary level ICT curriculum and policy.	Ministry of Tertiary Education and Skills Training
Plan and implement ICT infrastructure for school networks and learning portals.	Ministry of Science and Technology

Programme 1.1.2 Create a System/Culture to Challenge Traditional Ways of Thinking

Trinidad and Tobago's high literacy rates as well as high levels of primary and secondary education are evidence that the nation is well educated. However, the low rankings in innovation indicate that the educational system is not geared toward encouraging thinking "outside of the box". This programme to create a system/culture to challenge traditional ways of thinking has been formulated to strategically address the gaps which create obstacles to creativity and innovation.

Programmes and projects geared at developing innovative and creative thinkers will be established. This will be accomplished through interventions that systematize the innovation process. At present, within the schooling system, rote learning is the most pervasive form of education. However, this is not enough. The Ministry of Education will develop programmes to foster creativity and critical thinking starting from the pre-school and primary school levels. Such programmes will include:

- Science, technology and ICT school fairs;
- Funding and competitions that reward and promote innovative thinking; and
- Promotion of assignments and projects with students from different countries leading to the establishment of borderless, digital classrooms.

Driving Agencies

Programme 1.1.2: Create a System/Culture to Challenge Traditional Ways of Thinking	
Activity	Driving Agency
Develop programmes and policies to cultivate creativity and critical thinking in early childhood and primary school education (ICT School Fairs etc.)	Ministry of Education Relevant Division(s) of the Tobago House of Assembly Ministry of Gender, Youth and Child Development Ministry of Science and Technology NIHERST
Funding for innovation competitions	Ministry of Planning and Sustainable Development Ministry of Science and Technology NIHERST
Develop policies to guide borderless classrooms	Ministry of Tertiary Education and Skills Training Ministry of Education NIHERST

Programme 1.1.3 m-Learning

Over 70 percent of mobile phone subscriptions worldwide are in developing countries. This is especially evident in Trinidad and Tobago where mobile penetration is amongst the highest in the world at over 100 percent. Although m-Learning is relatively new globally, research shows that this is an area that has great potential to improve the learning process and to reach a wider range of people.

m-Learning has been utilized in North America, Europe, Latin America, Africa and Asia with great success. However, despite high mobile penetration rates, Trinidad and Tobago, and the wider Caribbean region, is far behind the rest of the world in utilizing this form of learning.

Critical Components

An examination of global best practice shows that a strategy should be developed to encompass the following:

- **Mobile Device and Education Policy** – Mobile phones are often viewed by educators and administrators as barriers and disruptors to the education process. A mobile phone and education policy which sets out the rules and regulations of m-Learning will contribute significantly to ensuring smooth integration of this technology in the learning process.
- **Equality of m-Learning tools** – Although m-Learning can be beneficial to students, it has the potential to highlight inequalities between rich and poor, as some individuals will have access to smart phones while others may only have access to small, basic devices due to financial constraints. Assimilation of this technology into the learning environment must therefore be mindful of these inequalities and mitigation strategies must be formulated to address same.
- **Partnerships** – In order to ensure a robust programme of initiatives that promotes effective learning and equitable access, partnerships need to be established with stakeholders that have not traditionally been part of the ecosystem, including companies that install telecommunications systems, mobile network operators and device manufacturers.

Areas for integration which were successful in Latin America and which can be replicated in the Caribbean include:

- experimental programmes launched at the university level;
- pilot programmes for children and adolescents in vulnerable populations;
- literacy programmes for youth and adults;
- programmes seeking to improve educational management; and
- programmes addressing specific issues such as assessment and test preparation, especially preparation for secondary and university entrance examinations.

Driving Agencies

Programme 1.1.3: m-Learning	
Activity	Driving Agency
Develop Mobile Phone Education Policy	Ministry of Education Ministry of Tertiary Education and Skills Training
Develop m-Learning pilots and programmes for youths and adults	Ministry of Education Ministry of Tertiary Education and Skills Training
Execute m-Learning pilot and program for youth and adults	Ministry of Gender, Youth and Child Development Ministry of Community Development
Plan and Implement m-Learning ICT Infrastructure	Ministry of Science and Technology

Programme 1.1.4 Develop an ICT Training Framework

The ICT Training Framework depicted below will be deployed to meet the ICT training needs of the nation's citizens and workforce.

The ICT Training Framework[12] provides a high-level overview, categorizing ICT capability and identifying skill gaps.

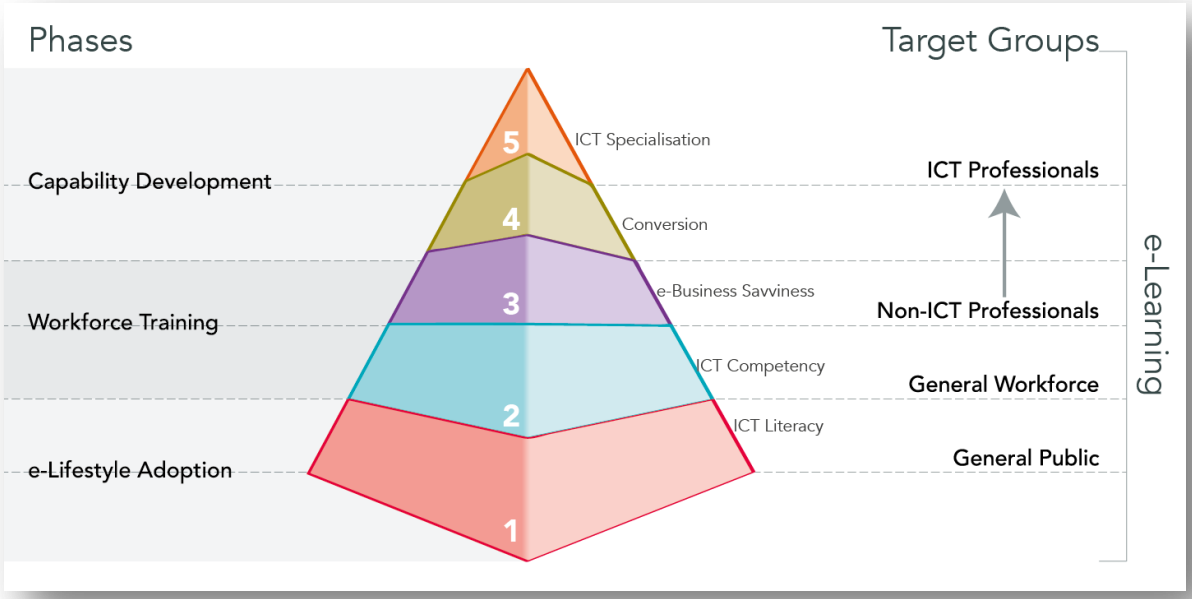


Diagram 13: ICT Training Framework

This framework defines different levels of ICT competencies and the type of training / certification required for each level. It is applicable to ICT professionals, businesses, the working population and the general public.

The objective is to ensure that the appropriate skill sets and knowledge needed at the various levels are identified and developed.

At the advanced level, training will focus on online content creation and the use of new media for collaboration. For intermediate levels, training will be available on the use of office automation tools and productivity applications. Introductory ICT courses and ICT acclimatisation programmes will equip those who are not ICT savvy with the necessary skills to embrace the use of ICT in their daily lives.

This programme is supported by the Connectivity for All Programme which addresses the ICT training needs of students, teachers and the digitally excluded.

This framework will provide ICT professionals with guidance on technology trends and ICT skills required to meet industry needs.

12 Framework adapted from IDA-I Singapore's INFOCOMM Training Framework.

In order for the ICT Training Framework to be successful, the engagement of the ICT industry, academia and businesses is required to help identify the appropriate ICT skill sets. Feedback from these stakeholders will be translated into current and near-term training needs assessments in order to develop relevant training programmes. In addition, training service providers will also be involved in the stakeholder engagement process.

In order to encourage programme uptake, the Government will provide training incentives including subsidies to course participants to offset course fees, and tax breaks or subsidies for businesses to encourage a minimum number of training hours for every employee.

Driving Agencies

Programme 1.1.4: Develop an ICT Training Framework

Activity	Driving Agency
Develop ICT courses for professionals	Ministry of Tertiary Education and Skills Training Ministry of Science and Technology
Develop ICT training programmes for children and teachers	Ministry of Tertiary Education and Skills Training
Develop ICT programmes for youths and adults	Ministry of Gender, Youth and Child Development Ministry of Community Development
Develop ICT programmes for Micro, Small and Medium Enterprises (MSME's)	Ministry of Labour and Small and Micro Enterprise Development

Programme 1.1.5 Integrate Human Capital Development / Education / Training with Industry Needs

ICT professionals will be encouraged to advance in their field of study and/or focus on a specific discipline and/or domain.

In Trinidad and Tobago, certifications in some key aspects of ICT are not available in the local environment. Students and businesses must therefore resort to foreign institutions for certifications and courses, which are often exorbitantly priced. In Singapore, the successful Critical Infocomm Technology Resource Programme (CITREP) is an incentive programme aimed to equip Singapore ICT professionals with critical and emerging skills.

A similar specialised ICT programme will be developed for Trinidad and Tobago to build the competencies of ICT professionals and the working population. The ICT industry and academia will be engaged to help identify training needs for development of a Training Plan. The Government will then work with training providers and industry stakeholders to select, develop and/or fund relevant courses and certification programmes.

This programme will be supplemented with an Accreditation Framework that ensures the quality of the ICT training courses. Through the process of ascertaining and verifying the quality of the ICT training courses, accreditation ensures:

I. Accountability for the use of government grants to subsidise such courses;
II. Effectiveness of the delivery;
III. Adherence to specified minimal standards; and
IV. Proper feedback loop for continual training course improvements.

Additionally, MSMEs will be encouraged to integrate ICT training into their operations. In order to ensure that this group is not excluded, the Government will assist via subsidies and grants.

A number of local entities will be involved in the successful roll out of this programme.

UTT

The University of Trinidad and Tobago will work with partners to lead a diagnosis of University programmes to ensure that such programmes produce industry ready and savvy graduates who are able to meet the demands of the local ICT sector.

Ministry of Public Administration (MPA)

The Ministry of Public Administration (MPA), through its Scholarships and Advanced Training Division has responsibility for the administration of scholarships and long-term technical assistance awards offered by/through the Government of the Republic of Trinidad and Tobago. Government scholarships enable nationals to acquire skills and training in areas that are critical to national development. In this light, MPA will play a key role in the disbursement of scholarships that target areas of ICT.

MPA will also provide online information to ensure that citizens are aware of focal scholarship areas in ICT. It is important to note that the scholarship areas will be driven by industry needs. This information will be derived from the Industry Diagnostic detailed below.

Critical Components – Industry Diagnostics

Industry Diagnostics will be undertaken for both the public and private sectors. The aim is to assess skills, abilities and gaps in order to ensure that training is geared toward meeting the needs of the relevant industry.

The private sector diagnostic will require a robust environmental scan with work being undertaken by various stakeholders. In order to ensure that this diagnostic is rigorous, it will be planned and applied within the first two years of smarTT implementation.

As a first step, smarTT has started with the build-out of the public sector diagnostic as outlined below.

(Public Sector Resource Development)

Public Sector Resource Development aims to advance public sector knowledge, skills and abilities in order to improve government's effectiveness and responsiveness. An important component of Public Sector Resource Development is Workforce Planning and Management.

Reform of the Workforce Planning and Management Process is a key step to ensuring a sustainable, engaged and highly skilled workforce. The success of technology-based change initiatives depends on the management of human resources and the coordination of technology-infused Government processes.

Components of Public Sector Resource Development

Public Sector Diagnostics

A focal area of GoRTT is building Public Sector capacity in ICTs to aid in national development. In this regard, a diagnostic study will be undertaken to:

I. Identify specific ICT skill sets required for effective functioning at various levels across the Public Sector;

II. Identify ICT knowledge gaps that exist across various levels of the Public Sector; and

III. Recommend and develop training interventions to address identified gaps.

Development in ICT can change the way public sector personnel perform their daily tasks. These persons will be trained to ensure that they are able to effectively employ the re-engineered work and business processes.

The following competencies have been identified as a general guide for various levels of staff in the public sector:

Decision Makers Within and Across Ministries Should: • Be able to use ICTs for achieving managerial goals. • Understand the policy changes that have resulted with the arrival of ICTs and e-Government and the need for such changes.
Administrators should: • Understand the new "re-engineered" business processes and be able to use the software and technologies that will be implemented.
End Users - Public Sector Personnel should: • Be able to use the software and hardware necessary to perform their tasks. Care should be taken to mitigate the natural resistance to change that users may exhibit.
Technology Staff -IT technicians, Network Administrators, etc. should: • Be able to install, maintain, configure, re-configure the new technology (software and hardware).

The infrastructures employed will result in inter-ministry and intra-ministry communication procedures and protocols.

Driving Agencies

Programme 1.1.5: Integrate Human Capital Development/ Education/Training with Industry Needs

Activity	Driving Agency
Define and maintain an Accreditation Framework for ICT Courses.	Ministry of Tertiary Education and Skills Training Ministry of Science and Technology NIHERST
Define and maintain an ICT Training Framework for ICT professionals and management of training providers	Ministry of Public Administration Ministry of Science and Technology NIHERST
Offer scholarships in the field of ICT	Ministry of Public Administration NIHERST
Leverage the Economic Development Board and Council for Innovation and Competitiveness for private sector reach	Ministry of Planning and Economy NIHERST

Key Imperative 1.2: Creating and Promoting Local Digital Content

Programme 1.2.1 Digitize Heritage, Indigenous and Social Content

The Government will embark on the digitisation of heritage-related and social-related content. One form of implementation will be the creation of an e-Heritage Portal which will collate all heritage-related information for presentation as world-class virtual museums, digital documentaries and narratives. The effort will also raise public awareness of the importance of preserving and safeguarding cultural heritage in order to maintain cultural diversity in the face of globalization. The understanding and appreciation of the heritage of different communities will also help with intercultural dialogue, and encourage mutual respect for differing ways of life.

This programme aims to re-orient citizens and local organisations from being online content consumers' to online 'content producers'. The use of ICTs will help to promote the culture of collaborative creation and contribute to socio-economic development through leveraging local talent, fostering expression and developing a culture of research and development.

In order to galvanise the creation of digital content, collaborative networks will be developed. This will also serve to distribute new content, as well as obtain feedback on same.

Copyrights and intellectual property will have to be properly managed in order to avoid potential infringement issues. To address this, a strong legal framework that enables innovative licensing and protection of intellectual property will help to generate potential revenue, as well as to better protect creativity.

In Trinidad and Tobago, efforts have started towards the development of local online content including distribution of a TT$2.2 million (US$355,000) grant under the Inter-American Development Bank's Multilateral Investment Fund to the National Carnival Development Fund (NCDF) for the creation of an online "Carnival Hub". This Web Portal will create new business opportunities by employing technology to strengthen and promote the growth and development of carnival bands.

Target Groups

The Government will drive the digitisation of heritage-related content for the e-Heritage Portal through the engagement of local communities. Projects will include the development of online museum 'tours', historical and cultural documentation, digitisation and recording of digital narratives.

Civil society groups and NGOs will be encouraged to use ICTs to extend their reach and to drive greater awareness and support for their respective causes. GoRTT will provide assistance in the form of grants to develop websites and various channels of ICT-enabled communications.

Community activists as well as NGOs will be encouraged to leverage the Internet to increase their outreach and generate greater awareness and support for their social causes. For example, Trinidad and Tobago's REd Initiative uses film, media, publications, events (cultural, sport, music) and creative methods to sensitize the public on the many issues of HIV, AIDS, other sexually transmitted infections, and sexual health and rights. The digitisation of their content has allowed the general public anonymous access to interactive and useful information and services.

The key driving agencies will be the Ministry of Arts and Multiculturalism, the Ministry of the People and Social Development and the Ministry of Community Development. These Ministries will form

Community Based Incubators (CBBIs) for digital content that follow the model for similar incubators under the Ministry of Labour and Small and Micro-Enterprise Development. Under the latter, CBBI's are established under the National Integrated Business Incubator System (IBIS) and are located in rural communities throughout Trinidad and Tobago. The CBBIs will support these communities' in their thrust to address poverty, unemployment alleviation, and wealth creation through enterprise development.

Driving Agencies

Programme 1.2.1: Digitize Heritage Related Indigenous and Social Related Content	
Activity	Driving Agency
Develop heritage related information and media campaigns	Ministry of Arts and Multiculturalism Ministry of the People and Social Development Relevant Division(s) of the Tobago House of Assembly Ministry of Community Development
Develop an e-Heritage Portal	Ministry of Science and Technology
Draft legislation pertaining to intellectual property protection and innovation licensing	Ministry of Legal Affairs

Programme 1.2.2 Create Digital Content for Use at All Levels of Education

Programmes such as e-CAL and e-Readers/Tablets (at the tertiary level) require digital content to support learning. Within Trinidad and Tobago, textbooks at the primary, secondary and tertiary level are localized to a large extent and it is important that these resources be made available digitally to ensure usability with technology.

The Ministry of Education intends to adopt a policy that addresses Curriculum and Computer Assisted Instruction as part of its wider eCAL policy. The policy states that devices will be integrated in subject areas identified by the school – for the development of lessons, for application and enrichment, and in the assessment of learning.

The intention is that ICT will be used to enhance learning through computer instruction that will include the following:

I. demonstration, drill and practice, tutorials, simulations and interactive activities, graphical representations of math equations, collaborative activities and the like;

II. resource-based learning which involves the achievement of both subject and information literacy objectives through exposure to and practice with diverse resources, making students active learners; and

III. collaborative learning in which learners communicate and work with their peers both inside the classroom and across classrooms and schools in projects designed to solve real-world problems through the application of subject-specific knowledge and skills.

In order to achieve the above objectives, a platform called **Student Connect** will be established to address solutions, support systems, applications and results. An important component of the Solutions element will be the creation of localised digital content including educational freeware, multimedia CD/DVDs, and open source educational software developed in collaboration with curriculum officers.

Driving Agencies

Programme 1.2.2: Create digital content for use at all levels of education	
Activity	Driving Agency
Develop policy and curriculum for early childhood, primary and secondary schools	Ministry of Education University of the West Indies University of Trinidad and Tobago
Develop tertiary Level policy and curriculum	Ministry of Tertiary Education and Skills Training
Develop and evaluate relevant Computer Assisted Instruction solutions	Ministry of Education Ministry of Science and Technology

Programme 1.2.3 Web Production Incentives

Financial incentives will be provided for the creation of local content including research grants to academia and commercial entities to increase opportunities for online content creation and commercial applications and recognition though national awards for innovation in ICT-usage and the development of local content.

An important aspect of promoting the creation of local commercial content is revenue-generation. However, due to issues of intellectual property piracy, a need exists to address the legal perspective. In this regard, a legal framework for licensing and protection of intellectual property will be a key success factor for this initiative.

Specific initiatives to target the development of web content, software and applications are as follows:

- **Human Resource Development**: The realm of web content development has become highly specialized creating a new demand for specific technology skills such as, but not limited to; script language programming, database programming, graphic design, web multimedia development, search engine optimization specialists and internet marketing specialists.
- Private ICT learning institutes, vocational institutes and the tertiary level institutions will provide training in these specific fields and grant incentives (such as tax credits) for providing on the job training, and internships.
- **Education**: A cadre of content creation specialists will be developed through capitalizing on the democratization of education through distance learning and the advent of free technology courses on platforms such as Udacity, Udemy, MITx (all Computer Science Courses) and private distance learning through the University of the West Indies (UWI) Open Campus.
- Use the Raspberry Pi[13] computer or a similar machine at the primary school level to teach basic programming to foster a "programming" literate generation.

13 The Raspberry Pi is a credit-card sized computer that plugs into televisions and keyboards. It is a small PC which can be used for various applications including spreadsheets, word-processing and games. It also plays high-definition video. http://www.raspberrypi.org/faqs

Driving Agencies

Programme 1.2.3: Web Production Incentives	
Activity	Driving Agency
Provide research grants for local online content creation	Ministry of Planning and Sustainable Development
Establish National ICT Awards which will include web production as a key component	Ministry of Planning and Sustainable Development Ministry of Science and Technology
Develop and manage a campaign on web media usage	Ministry of Science and Technology Ministry of Tertiary Education and Skills Training
Expand the primary school curriculum to include basic programming skills	Ministry of Education
Plan and install ICT infrastructure for the learning of basic programming skills at the primary level	Ministry of Education Ministry of Science and Technology

Programme 1.2.4 Leverage the Diaspora and Wider Caribbean to Fund/Promote Digital Content

The Trinidad and Tobago diaspora will be leveraged to fund and promote local digital content. Embassies and networks such as the e-Business Roundtable will be used to identify ICT professionals in the diaspora.

Communications, including the dissemination of information via websites will be used to inform the diaspora of the ICT skill gaps and ICT requirements in Trinidad and Tobago. Efforts will also be made to understand the past and foreseeable challenges of the diaspora with regard to collaborating locally, so that attempts can be made to mitigate these challenges. Incentives will be developed to encourage investments and transfer of expertise.

Driving Agencies

Programme 1.2.4: Leverage the Diaspora and wider Caribbean to Fund/Promote Digital Content	
Activity	Driving Agency
Connect with the Diaspora and embassies	Ministry of Foreign Affairs Ministry of Communication Ministry of Science and Technology (e-Business Roundtable)
Conduct media campaign including developing messages	Ministry of Communications Ministry of Science and Technology

Key Imperative 1.3: Develop a Culture of Research and Development

The programmes under this Key Imperative are geared toward addressing Trinidad and Tobago's low innovation rankings.

Programme 1.3.1 Offer Scholarships in Identified Areas of Research

There is an urgent need to increase the number of ICT graduates to meet the growing demand for ICT services and to create a culture of research and development. Greater awareness can be generated through publicity campaigns, such as the NIHERST Sci-Techknofest [14], outreach programmes and ICT scholarships. Scholarships will be offered for ICT related degree courses, either locally or overseas. This will be coupled with the On-Job-Training (OJT) schemes that offer mentoring opportunities and job placements in order to ensure real-life application and to nurture student talent.

Driving Agencies

Programme 1.3.1: Offer scholarships in identified areas of research	
Activity	Driving Agency
Provide ICT Scholarships	Ministry of Public Administration
Conduct media campaign and Fairs e.g. Sci-Technofest	Ministry of Science and Technology Ministry of Tertiary Education and Skills Training
Provide OJT Mentoring Programmes	Ministry of Tertiary Education and Skills Development

14 Sci-TechKnoFest is the singular science and technology festival within the Caribbean region. It celebrates knowledge of science and technology both global and local, over a period of several weeks using entertaining educational methods. The festival aims to promote public awareness and understanding of basic scientific principles and concepts, as well as the impact of science, technology and innovation on citizens' lives and well – being.

Programme 1.3.2 Regional Research Forum

Currently in Trinidad and Tobago, various research projects are not linked to national development goals. Further, in many cases, research work is not published and has not been disseminated nationally. A biennial forum, which will showcase cutting edge research, will be hosted by the University of Trinidad and Tobago in collaboration with the Caribbean Knowledge and Learning Network (CKLN).

The Caribbean Knowledge and Learning Network (CKLN) is a CARICOM inter-governmental agency with responsibility for the development and management of a high capacity, broadband fibre optic network called C@ribNET that is intended to connect the tertiary education institutions of all member states.

The project addresses six main areas:

- Excess demand and limited supply of tertiary education opportunities
- High costs and limited financing
- Articulation with education development: Teacher Training
- Diversification of tertiary institutions, Quality and Relevance
- Regional development of tertiary education, integration into global market and competitiveness
- The cost of connectivity, use of ICT and Distance Education

With this extensive mandate, CKLN will be leveraged to host the regional conference which will showcase the most cutting edge research emanating from the Caribbean region and which will also help to link regional research agendas.

Driving Agencies

Programme 1.3.2: Regional Research Forum

Activity	Driving Agency
Provision of coordination and facilitation between universities in Trinidad and the Caribbean Knowledge and Learning Network	Ministry of Tertiary Education and Skills Training Ministry of Science and Technology NIHERST

Programme 1.3.3 Department of Research and Development in ICT

GoRTT will akin to the Meraka Institute in South Africa[15]. The Meraka Institute contributes to enhancing the quality of life and economic competitiveness of South Africa. It focuses on research, innovation and advanced human capital development and has achieved great success. It is the largest group in South Africa dedicated to ICT research and has extensive national and international networks that actively collaborate with other organisations around the globe.

Given the similarities between the ICT landscape in South Africa and Trinidad and Tobago, an analogous model will be adopted locally. The newly established Strategy and Research Division under the Ministry of Science and Technology and similar to the Meraka Institute, will provide as its core functions:

- Researching new technology that enables ICT access, inclusion and use;
- Researching and transferring innovative ICT products, processes and services into the market;
- Researching world-class cyber infrastructure;
- Contributing skills and outcomes that are changing the profile of Trinidad and Tobago's ICT landscape;
- A special focus area will be the digitally excluded. (See Programme 2.4.1: R&D Focused on Digital Divide).

Research and Development for Public Sector Innovation

A key area of focus will be Research and Development (R&D) for Public Sector Innovation. There are four (4) areas to be considered:

- Basic Research – experimental or theoretical research with the primary purpose of knowledge discovery;
- Applied Research – investigative research with a specific aim and objective;
- Experimental Development – using existing knowledge and experience to produce new ideas; and
- Collaborative Research – engaging companies and various stakeholders within the ICT market.

The Innovation Management Plan involves the integrative use of all the above-mentioned research subsets in an effort to build comprehensive data repositories.

Successful innovation development requires the careful structuring of a system that will build human resources, enterprise capacity and market capacity. However, there are environmental challenges that hinder the development of innovation systems. These include:

- A lack of university and industry research collaboration

15 The Meraka Institute is an operating unit of the South Africa's Department for Science and Technology.

- Insufficient spending on R&D
- Shallow firm-level technology absorption
- Poor technological readiness
- Strong prevalence of foreign technology licensing
- Narrow value chain presence

The Innovation Management Plan will aggressively address environmental challenges in order to stimulate growth in the areas outlined below:

- Innovation Chains
- Linkages between commercial markets and factor markets such as education and R&D
- Innovation Acceptance
- Government Business Models
- Government Products and Services
- ICT Market Ideas for Government
- Improvement of Internal Government Processes

The following principles will guide the Innovation Management Strategy Framework:

- Formalized Research and Development Practices
- Formalized Recruitment Processes
- Regular Performance Measurement
- Development of a Long-Term Innovation Plan
- Benchmarking Exercises to Track Progress

Driving Agencies

Programme 1.3.3: Department of Research and Development	
Activity	Driving Agency
Establish Department of R&D	Ministry of Science and Technology Ministry of Planning and the Economy NIHERST
Coordinate and guide R&D for Public Sector Innovation	Ministry of Public Administration Ministry of Science and Technology NIHERST
Innovation Plan and Strategy	Ministry of Planning and Sustainable Development Ministry of Science and Technology NIHERST

Programme 1.3.4 Attract and Retain ICT Professionals

This programme focuses on sustaining the vibrancy of the ICT industry through attracting talent and retaining human capital.

There is a need to recognize talented individuals and companies that have made significant contributions to the ICT industry, especially in terms of economic growth and technological advancement. Annual ICT Awards will be given to key local ICT contributors to make the ICT industry more exciting and rewarding.

Diaspora Professionals

In order to successfully attract ICT professionals from throughout the diaspora, Government will implement initiatives to encourage ICT talent to relocate to Trinidad and Tobago. Government will provide tax relief to make the return of ICT professionals to Trinidad and Tobago appealing. In addition, developing a strong pool of ICT resources will have the potential spill-over effect of attracting foreign companies to set up business.

Compensation for ICT Professionals

ICT staffing within Ministries has to be regularised. This will be done by ensuring that the necessary mechanisms and resources are engaged to efficiently and effectively develop a suitable compensation package that will attract and retain the best in the field.

GoRTT will undertake a survey to establish market rates for ICT professionals to determine a competitive pay scale for ICT professionals that will be standardized across government. This will encourage such professionals to join the government service and will further encourage them to remain and build the sector.

Driving Agencies

Programme 1.3.4: Attract and Retain ICT Professionals	
Activity	Driving Agency
Survey to establish rates and terms for attracting ICT professionals	Ministry of Public Administration
Attract ICT Professionals from the Diaspora	Ministry of Foreign Affairs Ministry of Public Administration

Programme 1.3.5 Establish an ICT Awards and Incentives Schemes

An ICT Awards and Incentives Scheme will be established for projects that address national and regional challenges. Grants will be extended to allow communities and schools to adopt, invest and implement ICT solutions across a wide range of disciplines and areas. A set of guidelines and a reporting structure will be formulated to clearly articulate the objectives and outcomes to be achieved when using grants. Highly successful and useful systems arising from such schemes will be amalgamated and promoted at a national level.

Innovative technology competitions will also be organised annually for students in the areas of school website and blog development, and generation and application of innovative ideas on the use of ICT in education. Greater awareness and excitement among students and the public will attract and nurture young talent to the ICT industry.

The Scheme will provide grants to establish computer clubs in learning institutions to promote computer awareness, literacy and interest, and provide an avenue for software and hardware development. A core objective of the clubs will be the creation of digital content related to the schools or communities in which the schools are located. These clubs will establish linkages with ICT societies, such as the Trinidad and Tobago Computer Society, so that ICT professionals can share their experience and skills with students. Mentoring schemes will also be established between ICT professionals and students in order to cultivate student interest in ICT as a career.

Driving Agencies

Programme 1.3.5: Establish an ICT Awards and Incentives Schemes

Activity	Driving Agency
Provide community grants for ICT solutions	Ministry of Community Development Relevant Division(s) of the Tobago House of Assembly
Offer Innovation Technology Competitions for students, computer clubs	Ministry of Education Ministry of Tertiary Education and Skills Training
Media campaigns	Ministry of Communications Ministry of Science and Technology Ministry of Tertiary Education and Skills Training NIHERST

Programme 1.3.6 Establish Incubator for Technology/Solution Transfer and Commercialisation

Technology Incubators assist entrepreneurs and innovators to bring their products and services to market. A survey of University departments in Trinidad and Tobago revealed that when students and educators develop innovative applications to address local challenges, next-step assistance is often lacking. Consequently, many useful ideas are not commercialised and this can be a major deterrent to future innovation efforts.

To address this concern, iGovTT in collaboration with private and public sector stakeholders, is working towards the development of a Trinidad and Tobago ICT Innovation Centre Initiative that is predicated on partnerships with world-class vendors, industry leaders and academia. The primary objective is to contribute to the technology-led diversification of Trinidad and Tobago's economy.

The Initiative is based on the premise that in order to create a knowledge-based economy, human capital must be developed to create the entrepreneurial class needed to drive national development. While many companies globally do partner with governments to create innovation centres, a broader-based approach will be taken where such partnership arrangements sit under an overarching national framework that is vendor and technology neutral. This approach will allow the Government to play a pivotal role in influencing and driving economic change and growth. The best ideas developed through the innovation centre process will be refined and marketed.

Driving Agencies

Programme 1.3.6: Establish Incubator for Technology/Solution Transfer and Commercialization	
Activity	Driving Agency
Plan and facilitate the TT ICT Innovation Centre Initiative	Ministry of Planning and Sustainable Development Ministry of Science and Technology
Engage Entrepreneurs, SMEs	Ministry of Trade and Industry Ministry of Labour and MSME Development

Thematic Area Two: Access and Digital Inclusion

Programmes: Access & Digital Inclusion

Key Imperative	Programmes
2.1 Providing ICT Services for Digital Inclusion	2.1.1 – Development of e-Services that Ensure Digital Inclusion
2.2 Increasing the Accessibility and Affordability of Technologies	2.2.1 – Computers and Connectivity for Digital Inclusion
2.3 Increasing ICT Learning and Awareness	2.3.1 – Increased and Affordable ICT Education and Training Toward Digital Inclusion
2.4 Facilitating R&D Focused on Bridging the Digital Divide	2.4.1 – R&D Focused on Digital Divide

Key Imperative 2.1 Providing ICT Services for Digital Inclusion

Programme 2.1.1 Development of e-Services that Ensure Digital Inclusion

A diagnostic study has already been undertaken to identify which Government services should be electronically accessible to citizens. These services include common transactions such as birth and death certification, driver's license applications and identification card renewals. In order to gain private sector collaboration, the research and findings of this e-Services Diagnostic will be shared and government incentives will be established to facilitate the development of appropriate e-Services.

However, the unavailability of technology should not exclude users from being able to access government e-services. Therefore e-services like GATE application, OJT application, Public assistance, Motor Vehicle Certified Copy of Ownership, amongst others, will be incorporated into the **ttconnect** range of services. These services will be available at **ttconnect** centres.

ttconnect's mobile application will be tailored to ensure that it is user-friendly and can be accessed on any smart phone system. SMS processes will be created for **ttconnect** services, where practical. All **ttconnect** services whether web based or mobile and all **ttconnect** centres will be revamped and refurbished to ensure that all accessibility considerations are made. **ttconnect** centres will be equipped with devices and software to aid in the training and education of citizens in both the skills and equipment needed to use government services.

Driving Agencies

Programme 2.1.1: Development of e-Services that ensure Digital Inclusion	
Activity	Driving Agency
Support the deployment of e-services through multichannel options	Ministry of Science and Technology
Conduct process re-engineering to encourage increased uptake of e-services among the digitally excluded	Ministry of Science and Technology
Implement communications campaign to promote e-services among the digitally excluded	All Ministries

Key Imperative 2.2: Increasing the Accessibility and Affordability of Technologies

Programme 2.2.1 Computers and Connectivity for Digital Inclusion

An important aspect of the Computers and Connectivity for All Programme (Programme 1.1.1) is the component dedicated to Computers and Connectivity for Digital Inclusion. The Government will investigate the viability of subsidizing the price of a broadband Internet connection to allow citizens to procure cheap, fast Internet connections and ensure availability in all areas. This stipulation shall be made for a specified income bracket and may include the provision of both ICT devices and connectivity in a bundled package either rented or purchased at an affordable rate.

Other incentives such as tax breaks will be made available to Internet Service Providers (ISPs) to encourage them to provide affordable services to individuals within low-income brackets.

Additionally, support for affordable end user equipment for citizens will be accommodated by the development of financing mechanisms, such as appropriate consumer loan schemes.

A collection of software tools will be available for download at varying costs and will include advanced educational tools, specified educational tools, advanced ICT training tools, specified training tools, and tools for the differently abled. Updates for all preloaded software will also be made available through this software library.

In order to ensure that all citizens are included, ICTs for the differently abled and elderly will be factored in this provisioning. Tools and training will be made affordable to individuals with proven disabilities and citizens who care for the disabled. Training and information on tools for the differently abled will also be made available to private sector companies that trade ICTs.

Driving Agencies

Programme 2.2.1: Computers and Connectivity for Digital Inclusion	
Activity	Driving Agency
Develop financing mechanisms for devices supported by means-testing	Ministry of Finance
Explore the removal of VAT from broadband equipment and peripherals by broadband service providers	Ministry of Finance TATT
Subsidize broadband subscription packages on a sliding scale to under-privileged segments of the population	Ministry of Finance TATT

Key Imperative 2.3: Increasing ICT Learning and Awareness

Programme 2.3.1 Increased and Affordable ICT Education and Training Toward Digital Inclusion

Special grants for ICT educational programs will be established to encourage the digitally excluded to seek ICT training and academic opportunities.

Under this programme, financial aid and assistance will be provided to individuals who have ICT skills and knowledge, but, who cannot afford the education or tools required for advancement in the field of ICT. Further, programmes will be created to provide training to the differently abled in ICTs. Courses that focus on the mentoring and training of women in the field of ICT will also be defined.

The Electronic Document Production and Management initiative (EDPM) that is presently available within secondary schools will be extended to the public. These classes will be provided at an affordable rate or with Government assistance. This will provide communities with access to regionally recognised ICT certification. Schools that agree to provide this training service to their communities will be given additional compensation based on the size of their classes.

Driving Agencies

Programme 2.3.1: Increased and Affordable ICT Education and Training toward Digital Inclusion

Activity	Driving Agency
Provide Community ICT Training and certification	Ministry of Tertiary Education and Skills Training Relevant Division(s) of the Tobago House of Assembly Ministry of Community Development
Offer ICT Scholarships	Ministry of Public Administration

Key Imperative 2.4: Develop an R&D Culture Focused on Bridging the Digital Divide

Programme 2.4.1 R&D Focused on Digital Divide

GoRTT recognizes that there is a need to continue research into the reasons for digital exclusion. The Telecommunications Authority of Trinidad and Tobago (TATT), through its Digital Divide Survey, collects key statistics related to access and usage. Building on this effort, the Department of Research and Development (outlined under Programme 1.3.3) will provide additional support for research activities related to the ICT and excluded population segments. Researchers will be able to apply to the Department for grants and funding, and the output created through these grants will be made available to the public.

Under Programme 1.3.7: Establish an ICT Awards and Incentives Schemes, special awards will be given in the field of research as it pertains to theme of digital inclusion. Rewards and awards will also be given for ICT products, services and programmes created specifically for digitally excluded groups

Driving Agencies

Programme 2.4.1: Develop an R&D Culture Focused on Bridging the Digital Divide

Activity	Driving Agency
Provide grants for digital divide research	TATT Ministry of Planning and Sustainable Development Ministry of Science and Technology NIHERST
Awards for Digital Divide research	TATT Ministry of Planning and Sustainable Development Ministry of Science and Technology NIHERST

Thematic Area Three: e-Business and ICT Sector Development

Programmes: e-Business & ICT Sector Development

Key Imperative	Programmes
3.1 Stimulating ICT Demand to Encourage e-Commerce Adoption	3.1.1 – Move Government Business Online 3.1.2 – Encourage Consumer Adoption of e-Lifestyles 3.1.3 – Develop Online B2B and B2C Marketplaces 3.1.4 – Implement and Strengthen Services Infrastructure and Legislative Framework
3.2 Developing e-Business Capacity	3.2.1 – Facilitate SME e-Commerce Awareness, Education and Training Programmes 3.2.2 – Promote and Facilitate Increases in the Availability of Funding for SME e-Business Adoption
3.3 Enabling the Production, Distribution and Promotion of Local ICT Products and Services	3.3.1 – Facilitate a Pro-Business Environment 3.3.2 – Promote ICT Cluster Development 3.3.3 – Develop a Localized Search Engine for Marketing Businesses Online
3.4 Enabling Other Sectors through ICT	3.4.1 – Develop and Promote the National Integrated Business Incubator System (IBIS) 3.4.2 – Develop and Implement an E-Commerce Strategy for the Agriculture Sector as a Model for Other Key Sectors
3.5 Facilitating Leadership and Coordination of Efforts among Key Stakeholders	3.5.1 – Assess the Mandate and Expand the Capacity of the e-Business Roundtable

Key Imperative 3.1: Stimulating ICT Demand to Encourage e-Commerce Adoption

Programme 3.1.1 Move Government Business Online

Government will support e-Business by effectively positioning itself as the model user and consumer of ICT products and services. There needs to be widespread governmental awareness and acceptance of the value and importance of ICTs in the delivery of products and services to both citizens and businesses.

Government intends to develop a G2B Web Portal, the mechanism through which the Government's FairShare Programme will be administered. The FairShare Programme connects Government to SMEs and co-operatives for public procurement opportunities. FairShare will facilitate Government Ministries and other public sector entities access to the services of small businesses. It will simultaneously help small businesses to access information on Government procurement opportunities up to TTD 1,000,000. The G2B Web Portal will essentially operate as the first instalment of Government's e-Procurement system by incorporating an e-Payment infrastructure for facilitating end-to-end Internet-based payments so that merchants will be able to accept payments in a "card-not-present" environment. As the major source of revenue for businesses, Government will encourage e-commerce adoption among the business sector. Such a system also allows for greater transparency and equal opportunity access for SMEs.

Driving Agencies

Programme 3.1.1: More Government Business Online	
Activity	Driving Agency
Engage SMEs	Ministry of Trade and Industry Ministry of Labour and MSME Development
Plan and install ICT Infrastructure for a G2B Portal	Ministry of Science and Technology Ministry of Trade and Industry
Implement e-Procurement	Ministry of Finance
Provide GoRTT Services	All Ministries

Programme 3.1.2 Encourage Consumer Adoption of e-Lifestyles

In order to encourage citizens to fully embrace an e-Lifestyle GoRTT will re-build and re-brand the ***fastforward*** website [16] to house content on various ICT projects and programmes within Government. e-Lifestyle adoption is reflected in the integration of ICT into citizens' daily activities, regardless of their age, socio-economic status, or technology savvy. When individuals are inculcated into an e-lifestyle mind-set, they use technology to simplify activities, to link with others locally and globally, and to participate in IT-enabled learning.

Digital content on the website will be presented in multi-media formats. Specific types of content will include:

- News and Statistics - information on local and foreign developments in the field of technology in both public and private sectors that allow web visitors to follow this country's progress relative to others. ICT statistics and rankings for Trinidad and Tobago will also be included.
- E-Seminars that will incorporate identified ICT Workshops, forums, seminars and conferences within Government – streamed live and archived online for later viewing.
- Tutorials - text and video lessons on any technology-related activity. This section will facilitate do-it-yourself fixes on simple tech issues. Citizens will be encouraged to contribute posts on the various topics.
- The e-Library will comprise whitepapers, essays, presentations, etc. around the topic of ICT and will be available for viewing online or downloaded for later reading. Once registered with the website, persons will be able to read or download material as well as submit literature to the website. A structured process around content submission and downloads can be built in to ensure that the e-Library continues to grow.
- Blogs will focus on the latest developments in ICT including mobile devices, apps and other mobile platforms and Internet security.

The ICT Website will be sufficiently promoted using various marketing communications strategies to create buzz and attract local attention and increase website traffic.

16 The ***fastforward*** website was established to provide timely and relevant information on ICT trends and issues as they related to Trinidad and Tobago. The website is now defunct.

Driving Agencies

Programme 3.1.2: Encourage Consumer Adoption of e-Lifestyles	
Activity	Driving Agency
Rebuild and rebrand the National ICT Website	Ministry of Communication Ministry of Science and Technology
Plan and install ICT Infrastructure	Ministry of Science and Technology

Programme 3.1.3 Develop Online B2B and B2C Marketplaces

The Internet has spawned mass opportunities for global trade that is characterised by cross-border movement of goods, services, technology and capital. Electronic Marketplaces (e-Marketplaces) leverage the Internet to bring buyers and sellers together for the purpose of transacting business. An e-marketplace therefore acts as an effective and facilitative environment for allowing local businesses to market themselves online to other businesses and consumers across the globe. Government will support the development of a Trinidad and Tobago Business to Customer (B2C) Web Portal, which benefits both businesses and consumers. In constructing this Portal, attention will be paid to infrastructural interoperability to prepare for integration with other existing B2C Portals.

Driving Agencies

Programme 3.1.3: Develop B2B and B2C Online Marketplaces

Activity	Driving Agency
Develop a Business Trade Portal	Ministry of Trade and Industry
Plan and install ICT Infrastructure for interoperability	Ministry of Science and Technology
Engage SMEs	Ministry of Trade and Industry Ministry of Labour and MSME Development

Programme 3.1.4 Implement and Strengthen Services Infrastructure and Legislative Framework

Underlying Government's plans to stimulate ICT demand is the development and enforcement of various services and legislative infrastructure. Government is set to build its own authentication and e-Payment systems though such infrastructures are currently still limited to government use only. Policies will therefore be crafted to guide the use of this infrastructure to include private sector usage. A business model can also be developed on a cost-recovery basis to ensure that the services are affordable to local enterprises. Such common ICT infrastructure will help to reduce the operating costs for SMEs, as well as ensure the security and integrity of information on the Internet. It will also help to offset Government's return on investment for this key infrastructure, which can potentially be a costly undertaking.

Online Protection Mechanisms

Consumer confidence in transacting remotely with businesses online will be stimulated by the strengthening of online consumer protection mechanisms inclusive of the development of certification and authentication infrastructure. Additionally, structured and pervasive business and consumer awareness programmes that translate the content of existing data privacy and consumer protection laws in ways that are easily understood by relevant parties are equally essential to inspiring trust in online purchasing.

The necessary regulatory and governance framework must be in place to facilitate e-transactions and electronic payments. A review of the laws to further facilitate electronic transactions will be undertaken including but not limited to consumer protection, online privacy and piracy and intellectual property rights. Additionally, the promotion and adoption of information security best practices in the public and financial services sectors is also essential to building business and consumer confidence in adopting e-Business and e-commerce.

In particular, these eight (8) critical pieces of legislation and supporting regulations are required:

- Proclamation of the Electronic Transaction Act;
- Exchequer and Audit Amendment Act;
- Electronic Transfer of Funds Crime Amendment Act;
- Cybercrime Bill;
- Cyber Security Agency Bill;
- Electronic Evidence Act;
- Proclamation of the Data Protection Act; and
- Telecommunications Amendment Act

Driving Agencies

Programme 3.1.4: Implement and Strengthen Services and Legislative Infrastructure	
Activity	Driving Agency
Draft Legislation in areas such as e-Payments, m-Payments, certification, IP.	Ministry of Finance Ministry of Legal Affairs Ministry of Public Administration Ministry of Science and Technology Ministry of National Security
Provide certification and authentication infrastructure	Ministry of Science and Technology

Key Imperative 3.2: Developing e-Business Capacity

Programme 3.2.1 Facilitate SME e-Commerce Awareness, Education and Training Programmes

According to a report from the Ministry of Labour and Small and Micro Enterprise Development, SMEs constitute 91 percent of business establishments in Trinidad and Tobago, with 75 percent of these being Micro Enterprises.[17] The ICT sector stands to gain from national-level programmes that provide support to SMEs in increasing their contribution to economic diversification, transformation and growth.

There is a need to develop and disseminate SME toolkits on e-Commerce. Toolkits should be available in both text and multi-media formats. Specifically, the toolkits will help facilitate the value add of ICT and benefits of adoption to specific industries such as the creative industry, eco-tourism and agriculture[18]. This will be done through pointed business cases highlighting experiences in other developing economies. The toolkits will aid in building familiarity with e-commerce solutions and technologies, laws applicable to e-Commerce and available funding avenues. They will cover business-specific services ranging from how to start a business to annual reporting responsibilities and dissolution of businesses. The toolkits will be incorporated into existing SME-directed capacity building programmes such as the Integrated Business Incubator System (IBIS) and other seminars and workshops using local content (expertise and training material). These training programmes will also call attention to the regulatory, financial and promotional value of adopting Trinidad and Tobago's code top-level domain (ccTLD) name, ".tt" and advocating for its use when developing SME websites. Additionally, business support training will cover basic project management, online marketing and managerial training as pre-requisites to the disbursement of funds to SMEs.

Driving Agencies

Programme 3.2.1: Facilitate SME e-Commerce Awareness, Education and Training Programmes	
Activity	Driving Agency
Provide awareness in trade and new business and commerce	Ministry of Trade and Industry
Provide support to SME through policy and management of the Business Portal	Ministry of Trade and Industry Ministry of Labour and MSME Development
Provide awareness of ICT programme plans	Ministry of Science and Technology

17 http://www2.accaglobal.com/pdfs/caribbean_sme_trin1.pdf

18 These industries have been identified by in the Medium Term Policy Framework as new strategic sectors for diversification.

Programme 3.2.2 Promote and Facilitate Increases in the Availability of Funding for SME e-Business Adoption

There are a number of business financing opportunities and cost relief programmes provided by GoRTT to SMEs including the Venture Capital Incentive Programme, the Micro Enterprise Loan Facility, Entrepreneurial Funding and Training, the Trinidad and Tobago Free Zones Programme, the Business Research and Development Facility and the Innovation Financing Facility. However, many SMEs are unaware that these opportunities exist and how to qualify and access them. Funding should be accompanied by requisite business training and advisory services as provided through Government agencies and the Integrated Business Incubator System (IBIS). After a review of business uptake of these funding and business support schemes, Government will make a determination as to the expansion of these programmes.

Driving Agencies

Programme 3.2.2: Promote and Facilitate increases in the Availability of Funding for SMEs	
Activity	Driving Agency
Conduct awareness campaign on Venture Capital Incentives, Loan Facilities, Entrepreneurial Funding, T&T Free Zones, Innovation Financing, Enterprise Wide Solutions	Ministry of Labour and MSME Development Ministry of Finance Ministry of Trade and Industry Ministry of Planning and Sustainable Development Ministry of Communications Ministry of Science and Technology
Provide more funding to SMEs	Ministry of Finance Ministry of Labour and MSME Development NEDCO

Key Imperative 3.3: Enabling the Production and Distribution of ICT Products and Services

Programme 3.3.1 Facilitate a Pro-Business Environment

A facilitative environment must be built to encourage entrepreneurial behaviour. Trinidad and Tobago ranks extremely low in the "ease of doing business" rating of the GITR 2011-2012[19]. In this regard, the establishment of the Single Electronic Window (SEW) operating under the Ministry of Trade and the Automated System for Customs Data (ASYCUDA) system managed by Ministry of Finance's Customs and Excise Division are two positive advancements towards increasing the ease of doing business.

The SEW seeks to allow trade and business declarations and applications to be submitted via the Internet (per service). Specifically, customs brokers, importers, exporters, ports, banks, shipping agents and government agencies will be able to exchange electronic trade messages and information simultaneously, thereby ensuring efficiency in the local business environment.

The SEW will initially allow for the following services to be administered online by various government departments.

I. Cargo Declaration
II. Manifest Declaration
III. Permits and Licences
IV. Fiscal Incentives
V. Import Duty Concessions
VI. Company Registration
VII. Certificate of Origin

Upon implementation of these services, additional e-Services will be added to derive greater benefits from the system. The SEW will also interface with the existing "in-house" IT systems in various government agencies, such as the Customs and Excise Division, Ministry of Finance, Trinidad and Tobago Bureau of Standards, Port Services and Ministry of Legal Affairs. The SEW will allow these agencies to share information through agreed security and administrative protocols.

The SEW Portal will be featured on **ttconnect** Online with a Single Sign-on (SSO) Authentication feature allowing registered users to manage one profile and avoid having to utilise multiple usernames and passwords.

The ASYCUDA system seeks to allow trade and business declarations and applications to be submitted via the Internet (per service). This will be routed instantaneously and simultaneously to all relevant government and private sector agencies for processing and approval. Government will work toward the integration of the SEW and ASYCUDA systems such that it becomes one seamless interactive experience for the business customer.

19 In the GITR 2011-2012, Trinidad and Tobago ranks 110 and 136 respectively on the number of procedures and number of days it takes to start a business.

Driving Agencies

Programme 3.3.1: Facilitate a Pro-Business Environment	
Activity	Driving Agency
Expansion of SEW	Ministry of Trade and Industry
Expansion of ASYCUDA	Ministry of Finance

Programme 3.3.2 Promote ICT Cluster Development

Clusters are geographic concentrations of interconnected companies and institutions in a particular field. The Government, through the State Enterprise Evolving TecKnologies (eTecK) as well as the Ministry of Planning and Sustainable Development, has begun efforts towards developing an ICT Cluster in Trinidad and Tobago. The ICT Cluster will promote ICT diversification and the introduction of enabling technologies that can be exploited for e-business development.

The ICT Cluster will consist of a congregation of ICT developers and business users, local graduates, nearby research institutes and universities. The aim is that it will act as a magnet for foreign direct investment in the area of ICT. Local ICT enterprises, on account of partnerships with these foreign direct investors and research institutions will be able to develop quality ICT products and services. This will in turn allow them to elevate themselves from simply being resellers and ascend the value chain so that they become more competitive and profitable. The research and development aspects of the cluster are important in terms of identifying areas of need and evidenced-based recommendations for the development of viable products and services. Underpinning this ICT Cluster are various enabling legislations such as the Foreign Investment Act and Intellectual Property Laws. These laws will be leveraged to ensure that developers are protected and are able to commercialise their ideas.

Driving Agencies

Programme 3.3.2: Promote ICT Cluster Development

Activity	Driving Agency
Stimulate ICT cluster development in alignment with eTeck's mandate	Ministry of Trade and Industry Ministry of Labour and MSME Development e-TecK Trinidad and Tobago Manufacturer's Association
Promote Foreign Direct Investment	Ministry of Finance Ministry of Trade and Industry e-TecK Trinidad and Tobago Manufacturer's Association
Conduct promotion and awareness of IBIS	Ministry of Science and Technology – e-Business Roundtable e-TecK Trinidad and Tobago Manufacturer's Association

Programme 3.3.3 Develop a Localised Search Engine for Marketing Businesses Online

There are several activities that are important to the enablement of local content services: accumulation of content, digitization of content, aggregation of content and the commercialisation of content. In terms of content accumulation, existing content may be drawn from various public sources. Once content has been collected, it must then be translated in easily digestible digital formats. Programmes for developing local content are contained under the theme of Innovation and Human Capital Development.

The availability of a wide array of local content online lays the foundation for content aggregation. There are several types of aggregators including data, polls, search, news, video and review aggregators. Aggregators may offer free or paid-for services. Google is perhaps the most well-known lucrative example of a Global content aggregator. However, paid online marketing through global search engines like Google may be too high for SMEs and local businesses do not often turn up in search listings. Because the online exposure and marketing of local businesses is vital to ICT Sector Development, Government will pursue the development of a free search engine that will facilitate more country specific searches for local content and businesses. Businesses desirous of more premium listings on the search engine can be provided with such at an additional cost. Subsequent promotional activities undertaken by the Government in partnership with the business community will be executed to draw attention to the search engine, thereby attracting more usage and business exposure. The intention is not to compete with search giants like Google, but rather, to create a more relevant "local search" experience for users and businesses.

Driving Agencies

Programme 3.3.3: Develop a Localized Search Engine for Marketing Businesses Online

Activity	Driving Agency
Develop local search engine for businesses	Ministry of Labour and MSME Development Ministry of Trade and Industry Ministry of Community Development
Promote National Carnival Development through an online Carnival hub	Ministry of Arts and Multiculturalism Ministry of Tourism

Key Imperative 3.4: Enabling Other Sectors through ICT

Programme 3.4.1 Develop and Promote the National Integrated Business Incubator System (IBIS)

Cabinet approved the establishment of the National Integrated Business Incubator System (IBIS) which seeks to offer solutions and interventions to address the problems typically faced by Micro and Small Enterprises (MSEs) such as unaffordable work spaces, information deficiencies, inadequate financing, management deficiencies, and other such problems. IBIS, which is intended to operate on a Public Private Partnership Model, will promote the use of shared infrastructure facilities and will provide mentorship guidance to MSEs[20] as well as stimulate the commercialisation of innovative ideas[21]. Two business incubator models have been conceptualised: the Community Based Business Incubator (CBBI) and Commercial Business Incubator (CBI). Both will incorporate the sharing of ICT best practices and methodologies.

Based on the strategic areas highlighted in the Government's Medium Term Policy Framework, three sectors have been identified as having maximum potential for ICT-based interventions: the Creative Industry, Eco-Tourism and Agriculture Industry. There are several key activities that must be undertaken in order to stimulate the creation of innovative ICT products and services for these sectors. The first activity involves engagement with key stakeholders within the sector. For example, artistes, nature guides, and farmers are key stakeholders of the creative, eco-tourism and agriculture sectors respectively. The purpose of these engagements will be to gain an appreciation of the unique nature of the industry and specific areas that have the greatest potential for ICT intervention. Innovators and entrepreneurs armed with this business intelligence can set about researching and acquiring relevant applications for commercial use.

20 Successful candidates from the Scholarship Entrepreneurial programme will also be given a space in the IBIS.
21 There will be close alignment between the National Innovation Centre and the IBIS.

Driving Agencies

Programme 3.4.1: Develop and Promote the National Integrated Business Incubator System	
Activity	Driving Agency
Develop Integrated Business Incubator System (IBIS)	Ministry of Labour and MSME Development Ministry of Science and Technology
Implement legislation – IP on new products and services	Ministry of Legal Affairs
Promote National Carnival Development through an online Carnival hub	Ministry of Arts and Multiculturalism Ministry of Tourism

Programme 3.4.2 Develop and Implement an E-Commerce Strategy for the Agriculture Sector as a Model for Other Key Sectors

The development of an e-commerce strategy for a pilot sector can be replicated in other sectors. The Agriculture Sector has been chosen as a pilot as food security has been identified as one of the Government's major goals and there is great potential for improving the profitability of the sector through e-commerce. The Medium Term Policy Framework, identifies that one of the strategies for food security is increasing agricultural production, distribution and access. A key component of this strategy is strengthening institutional marketing to support farmers for domestic, regional and international market penetration. An e-commerce strategy for the sector will entail the following:

- A detailed agriculture e-Commerce Strategy, developed with technical assistance in close co-operation with the governing Ministry and local farmers, including an analysis of the supply chain, current and potential markets, e-commerce requirements, and the like.
- The identification of a number of high-quality food products and their potential for collective branding.
- The identification of a number of partner SMEs willing to engage in e-commerce.
- Leveraging a shared Web-based B2C facility or 'Portal' for marketing and selling the products online.
- Supply of technical/grant assistance to implement the strategy among an initial key set of SMEs.

Driving Agencies

Programme 3.4.2: Develop and Implement an E-Commerce Strategy for the Agriculture Sector as a Model for Other Key Sectors

Activity	Driving Agency
Develop and implement an e-commerce strategy for the Agriculture sector	Ministry of Food Production
Develop a B2C Facility	Ministry of Trade and Industry Ministry of Food Production

Key Imperative 3.5: Facilitating Leadership and Coordination of Efforts among Key Stakeholders

Programme 3.5.1 Assess the Mandate and Expand the Capacity of the e-Business Roundtable

This programme involves an assessment of the current mandate of the e-Business Roundtable (e-BRT) to identify areas which need attention and ensure alignment with the ICT governance structure[22]. A review of the composition of the e-BRT will also be undertaken to ensure that the following stakeholders are represented:

- Representative of Telecommunications providers;
- Representative of Government;
- Representative of Government ICT Implementation;
- Representative of the Business sector;
- Representative of Academia;
- Representative of the Youth community;
- Representative of Business Development and Facilitation Companies;
- Representative of the Regional Banking and Financial Institutions Sector;
- Representative of Regional Media and Broadcasting Sector.

In efforts to understand the needs of the business community for developing e-Business, the Central Statistical Office (CSO) guided by the Statistics Act (Chapter 19:02) will collaborate with the e-BRT to conduct continuous diagnostics of the business sector including information on general human capital requirements (business, technical, engineering, science etc.) which will be used to develop recommendations for meeting the needs of the business community.

Driving Agencies

Programme 3.5.1: Assess the Mandate and Expand the Capacity of the e-Business Roundtable	
Activity	Driving Agency
Expand and leverage off the e-Business Roundtable	Ministry of Science and Technology

22 See section on Governance for the position of the e-Business Roundtable in relation to the other bodies contained in the ICT Governance structure.

Thematic Area Four: Infrastructure Development

Programmes: Infrastructure Development

Key Imperative	Programmes
4.1 Enhancing Infrastructure, Access, ICT Policies and Regulatory Oversight	4.1.1 – Universality 4.1.2 – Broadband Acceleration Plan 4.1.3 – Development of the Internet Infrastructure
4.2 Instituting Governance Structures for Planning and Development	4.2.1 – Cross Utility Sector Collaboration 4.2.2 – National Infrastructure Taskforce
4.3 Building Information Society Capacity	4.3.1 – Information Society Legislation-tt (eL-tt)

Key Imperative 4.1: Enhancing Infrastructure, Access, ICT Policies and Regulatory Oversight to Facilitate Sustainability

Programme 4.1.1 Universality

The Universality programme focuses on making ICT services ubiquitously available to all geographic locales and social groups within society. Its focus will be on the expansion of the infrastructure required to support access to the telecommunications and broadcasting components of ICT services.

Pertaining to telecommunications, as of December 2012, over 52.1% of households have subscriptions to broadband services, of a modal average throughput of 2Mbps. The programme will ensure that citizens of Trinidad and Tobago can readily access bandwidth of no less than 5 Mbps throughput to residences and Micro, Small and Medium Enterprises (MSMEs) by 2015. Similarly whereas currently over 90% of corporate businesses have access to broadband services of modal average throughput of (5 Mbps), the programme is geared to ensure access to 10 Mbps throughput to corporate businesses throughout Trinidad and Tobago by 2018. The programme recognizes the importance of maintaining an effective competitive environment while ensuring infrastructure markets are established to the benefits of all of the population. To this end, the programme will therefore be composed of key projects inclusive of the implementation of number portability, and the encouragement of greater resale of telecommunications networks and services by telecoms service providers.

With respect to broadcasting, while the majority of the population has access to free-to-air broadcasting services, there are still geographic areas where coverage is less than satisfactory. As of December 2012, 48% of households have ready access to subscription broadcasting services. There are 37 radio and 9 television free-to-air stations and 4 broadcasters via cable service providers. The Universal Service programme will seek to enrich the lives of citizens of Trinidad and Tobago through providing an avenue for the broadcast of the creative expressions of the widest cross section of citizens. The programme comprises as two key projects, namely, the establishment of a Public Broadcasting Service (PBS) and the deployment of Digital Terrestrial Television.

This programme adopts a technology agnostic approach to high-speed access and encourages the deployment of data-centric networks. This approach will facilitate competition amongst infrastructure-based providers cognizant of the data-centric evolutionary path of the telecommunications networks infrastructure. It also aims to ensure the development of infrastructure to common access nodes that will readily support competitive last-mile provision. In that regard, providers of wired and wireless broadband access will be encouraged to compete in the broadband market and provide broadband access at affordable rates. Providers will also be required to deploy their networks in a manner that is cognizant of the natural environment. Sharing of infrastructural facilities is necessary under this programme to guarantee preservation of same.

Notwithstanding this general framework, GoRTT recognises that a need may arise to incentivise the deployment of high-speed access. Therefore, an appropriate policy framework will be established to attain desired high speed access deployment.

The public will also benefit indirectly from an institution-based Universal Service Program. This entails providing subsidised ICT costs to institutions that themselves administer other forms of universal services to the public. For example, hospitals and health service centres who deliver universal health care; libraries, schools, universities and educational institutions who deliver universal education; transport, security and law enforcement and the judiciary who deliver universal public transport and universal law and order may benefit from this programme of subsidised ICT access.

The successful execution of the programme pivots upon the development and implementation of relevant policy frameworks and accompanying regulations by GoRTT and the Telecommunications Authority Trinidad and Tobago respectively. Specific to broadcasting, success requires GoRTT to prioritize appropriate legislation to extend universality obligation to broadcasters.

From the perspective of funding, the projects under the programme leverage the "Universal Service Fund" financed by contributions from the Telecommunications and broadcasting industry. GoRTT's main role will be to establish the relevant policy frameworks to govern the formation of regulations and to deepen competition and facilitate local content, all of which can be performed within its existing expenditure structure.

There is recognition that a PBS project under the Universality programme may incur costs if it is perceived as a "Greenfield Project". However, given the "National Policy on Broadcast and The Broadcasting Industry" GoRTT may consider converting one of its existing State-owned broadcasting entities into a PBS broadcaster. This recommendation will facilitate the developmental dimension of broadcasting as articulated in that "Broadcast Policy" while simultaneously addressing any broadcast market gaps that may exist within the present broadcast sector.

Driving Agencies

Programme 4.1.1: Universality

Activity	Driving Agency
Enact telecoms legislation to support infrastructure expansion	Ministry of Science and Technology TATT
Initiate projects through the use of the Universal Service Fund	Ministry of Science and Technology TATT
Establish Digital Terrestrial Television (DTT) providers and a Public Broadcasting Service (PBS) provider to facilitate increased dissemination of local content and local broadcasting media	TATT

Programme 4.1.2 Broadband Acceleration Plan

The Broadband Acceleration Plan focuses on the establishment of a nationwide backbone that providers of retail services can leverage to expedite the roll-out of competitive high-speed telecommunications networks. Universality will be an integral aspect of the Broadband Acceleration Plan framework given the shared objective of providing high speed access at affordable prices to underserved communities. The Broadband Acceleration Plan programme will therefore comprise key projects inclusive of access to facilities, and universality.

The Broadband Acceleration Plan builds on the current thrust to establish an IXP and Root Server in Trinidad and Tobago, and deepen the current framework incentivising the investment in data centres onshore. As an integral part of the ICT strategy, the IXP will ensure that capital outflows from the ICT sector are minimised as the sector develops and grows. The surplus bandwidth emanating after the establishment of the IXP will increase off-island capacity. This additional capacity will facilitate the development of content hosting clusters in Trinidad and Tobago. As such, the Broadband Acceleration Plan will establish at least two clusters, one each in Trinidad and Tobago. These centres will be used to host content locally and to serve as a critical element of the emerging cloud computing paradigm.

Minimum off-island capacity as well as route diversity are necessary conditions to support the various programmes articulated under smarTT. Resilience of the off-island connectivity can be achieved through the construction of new cable landing locations - one in Tobago and the other in Trinidad. These locations will facilitate the introduction of a new cable system which will increase off-island capacity. Carrier hotels will be constructed at these new locations to support the increase in the uptake of capacity by international network providers. Another requirement of this programme is the guarantee of network resilience with the required bandwidth as identified in the Universality programme. At present, both islands are linked via a recently installed subsea cable system. This new fibre optic link between the islands replaces the former fibre link that belonged to the Trinidad and Tobago Electricity Commission (TTEC).

The critical success factors towards effective execution of the Broadband Action Plan programme include:

- The establishment of a Broadband Backbone Wholesale Service Provider in the short term, leveraging a mix of new and existing investments in ICT infrastructure;
- Leveraging the implementation key Internet infrastructure such as the Internet Exchange Point;
- The establishment of a new landing point with supporting carrier hotel, in the context of invitations for new submarine cable systems to Trinidad and Tobago, and between the islands in the medium term;
- Implementation of Access Corridors in all new infrastructure developments and the mandatory and enforceable use of same, in conjunction with the sharing of existing facilities; and

- The implementation of tax and fiscal incentives for both supply and demand sides to support the coverage and penetration [23]objectives of the programme.

The success of the programme will require timely action by GoRTT in the completion of a number of supporting policy initiatives, including:

- The enactment of a competition framework for the Telecommunications and Broadcasting Sectors;
- The enactment of necessary legislation to support the oversight of the Wholesale Provider Model;
- The continued identification of Spectrum Resources to facilitate the deployment of new technologies, in mobile and fixed wireless spheres.

[23] Broadband (fixed and mobile) access speed (percentage of population coverage) is defined as the downlink throughput data speed to which a specified percentage of the population can subscribe.

Broadband fixed penetration (subscription per household) refers to the number of fixed Broadband Internet subscribers (in a country) based on the total number of households. Fixed broadband Internet subscribers per household is calculated by dividing the number of fixed broadband Internet subscribers by the total number of households.

Broadband mobile penetration refers to the number of mobile Broadband Internet subscribers in a country) for each 100 inhabitants. Mobile broadband Internet subscribers per 100 inhabitants is calculated by dividing the number of fixed broadband Internet subscribers by the total population and then multiplying by 100.

Subscribers should be distinguished from users. Subscribers are entities (e.g. businesses, individuals) that subscribe to an Internet access service. Users are entities that use those services. In the case of individuals, users are always more numerous than subscribers, because one subscription can service several users.

Driving Agencies

Programme 4.1.2: Broadband Acceleration Plan	
Activity	Driving Agency
Increase the number of households/businesses with broadband access	Ministry of Science and Technology TATT
Develop and implement a competition policy framework	TATT
Create a central body/space for obtaining relevant approvals for the construction of towers	Ministry of Science and Technology TATT
Develop strategies aligned to the Universality programme, which encourage facility sharing, network resilience and disaster preparedness	Ministry of Science and Technology TATT
Increase international telecoms infrastructure resilience through infrastructural projects with focus on off-island connectivity	Ministry of Science and Technology TATT
Encourage efficient utilization of network resources and routing of data packets through the identification of locations to facilitate IXP and data centres	Ministry of Science and Technology TATT
Construct new cable landing stations and carrier hotels to Increase Inter Island Infrastructure capacity and redundancy	Ministry of Science and Technology TATT

Programme 4.1.3 Development of the Internet Infrastructure

The increased usage of the Internet in Trinidad and Tobago will be supported by the build-out of the Broadband Acceleration Plan. However the affordability, effectiveness and quality of service will be dependent on the following development in the external environment and the timing of their deployment in Trinidad and Tobago:

- **Migration to IPV6**

The migration to IPv6 will ensure that the next generation fixed and wireless ICT networks in Trinidad and Tobago are capable of supporting the exponential growth expected through the adoption of ICT as envisioned under smarTT.

This programme will assess the IPv6 readiness of existing ICT network infrastructure, ensure that new ICT networks are fully compliant with IPv6 standards and guarantee a seamless transition from IPv4 to IPv6. Specific to existing ICT networks, the programme will assess the readiness of both telecommunications infrastructural providers, and the Government - GoRTT's backbone and Local Area Networks (LAN). The latter will provide an estimate for the effort and cost required for the IPv6 transition.

The migration to IPv6 will also require the management of the country code Top Level Domain (ccTLD) name locally. This responsibility should be undertaken by the Telecommunications Authority of Trinidad and Tobago. This recommendation is premised upon the existence of synergy between the Authority's existing responsibilities and that of management of the ccTLD.

Successful execution of the migration to IPv6 pivots on the timeframe to conduct a readiness assessment of GoRTT's backbone and LAN infrastructure, the lead-time to develop the relevant policy frameworks that inform appropriate legislation to delegate responsibility to manage the ccTLD, and the enactment of the corresponding legislation.

IPv6 - ready and available ICT networks are critical to the long - term survivability of the National ICT Plan and all key imperatives articulated therein. This recommended schedule is based on the correlation of the timeframe for IPv4 exhaustion and the understanding that the transition process to IPv6 will free up existing IPv4 resources that can be re - used.

- **ccTLD (Country Code Top Level Domain)**

Management, administration and technical co-ordination and operation of the 'dot tt' Country Code Top Level Domain (ccTLD) is of critical importance to the effective functioning and management of Trinidad and Tobago's presence on the Internet. The management and operation of 'dot tt' was initially assigned to the University of the West Indies but the current management is essentially done via an individual delegation. It is considered essential to have a multi-stakeholder involvement in the management, administration and technical co-ordination and operation of 'dot tt'. As such, discussions have been initiated with the current administrator and the Telecommunications Authority has been given the responsibility of pursuing such an arrangement with the currently assigned administrator of 'dot tt'.

- **Establishment of an Internet Exchange Point (IXP)**

The IXP is a facility where all local Internet Service Providers (ISPs) meet to exchange all locally originating and terminating internet traffic. Currently, local originating and terminating internet traffic is switched via the Network Access Point (NAP) of the Americas in Miami.

The establishment of an Internet Exchange point (IXP) will give strategic positioning for internet peering arrangement and will reduce payments of foreign currency, raise the level of security of the local traffic, and reduce latency.

- **Installation of a F-root server**

The Latin American and Caribbean Internet Registry (LACNIC) has taken a decision to populate its region with Root Name servers. LACNIC has entered into an agreement with the Internet Systems Consortium (ISC) to install seven (7) copies of the F Root Name servers around the LACNIC region.

As an additional security measure for internet traffic, the Authority will install a root server next to the IXP to enable the resolution of internet addresses. Latency will be reduced allowing the user in Trinidad and Tobago to enjoy an improvement in internet response time. The F-root server will resolve DNS queries locally in lieu of external root name servers which are based externally to Trinidad and Tobago.

Driving Agencies

Programme 4.1.3: Development of the Internet Infrastructure

Activity	Driving Agency
Facilitate long term guaranteed connectivity to the global Internet	Service Providers/ Operators
Provide for multi-stakeholder participation in management, administration, technical co-ordination and operation	TATT
Ensure IPv6 standards and compliance	TATT iGovTT
Conduct IPv6 Readiness Assessment and develop migration plan	TATT
Facilitate the establishment of IXP and F-root Server	TATT

Key Imperative 4.2: Instituting Appropriate Governance Structures to Drive Infrastructure Planning and Development

Programme 4.2.1: Cross Utility Sector Collaboration

In order for the country to achieve many of the goals presented in smarTT, cross-sector collaboration among utility providers is necessary. The lines between providers of ICT related services are becoming increasingly blurred as advances in technology, such as VOIP, challenge the traditional service providers. In addition, redundancy on key infrastructure installations leads to increased costs to the nation and under-service in certain areas.

In this regard a cross utility sector Collaboration Committee will be established. This Committee will ensure respective utilities observe all the laws that call for coordination by utilities with respect to physical infrastructure development. From this foundation, further development on this mandate can be extended to cover costing and pricing of physical facilities for wholesaling and inter-utility sharing arrangements.

As part of the Government's thrust to bridge the digital divide, utility providers must be encouraged to collaborate and develop win-win solutions for both themselves and the wider citizenry. The cross utility sector Collaboration Committee will be tasked with developing incentive mechanisms as well as establishing the various instruments, processes and procedures for streamlining infrastructure development.

Driving Agencies

Programme 4.2.1: Cross Utility Sector Collaboration

Activity	Driving Agency
Establish a legitimate convener to encourage facility sharing, coordinated civil works, collocation and right of ways amongst utility players.	Ministry of Science and Technology Ministry of Public Utilities Ministry of Works and Infrastructure Ministry of Trade and Industry

Programme 4.2.2: National Infrastructure Taskforce

The full roll out of the e-Government and other initiatives require a concerted effort driven by a singular vision and focus on the achievement of key objectives. Because infrastructure underpins the national ICT agenda, a National Infrastructure Taskforce is needed to support the coordination of Government's infrastructure development programme with a thrust to ensure nationwide development of Broadband and other information technology infrastructural development strategies.

The Taskforce will comprise leaders from all key agencies involved in telecommunications and information communication policy and implementation, the business sector and academia. The Taskforce will work with relevant Private Sector Associations and Public Sector Agencies to lay the foundation for ICT to become a catalyst for national development across all sectors of the economy.

It is envisaged that the Taskforce's specific areas of focus will include:

- Championing the implementation of world class ICT infrastructure;
- Specialised ICT Infrastructure Planning; and
- Universal Service Implementation.

Driving Agencies

Programme 4.2.2.: National Infrastructure Taskforce

Activity	Driving Agency
Articulate and implement GoRTT's vision for an Information Infrastructure	Ministry of Science and Technology TATT Ministry of Works and Infrastructure
Develop strategies aligned to the Universality programme, which encourage facility sharing, network resilience and disaster preparedness	Ministry of Science and Technology TATT Ministry of Works and Infrastructure

Key Imperative 4.3: Building Information Society Capacity to Ensure the Availability of Internet Resources and Viability of the Internet Economy

Programme 4.3.1 Information Society Legislation-tt (eL-tt)

The e-Legislative programme will provide the required legislative certainty for the development of a robust ICT ecosystem in Trinidad and Tobago. The programme will establish the right legal environment in terms of legislation, regulations, rules, procedures and legal institutions to facilitate, encourage and enforce a culture of transparency, accountability and consumer and business empowerment.

Integral to the eL-tt programme is information society legislation that addresses the issues of convergence and regulation of the NGN type network and services. With consideration to a rapidly evolving ICT sector, a more forward-looking approach will be undertaken with respect to the preparation of a new converged ICT sector policy and a corresponding brand new sector law, which integrates the various pieces of legislation under a consistent framework.

Similarly, the eL-tt programme will support the information society legislative framework. This programme will protect the country's electronic infrastructure (physical and logical) from unwanted intrusion.

The Programme will seek to elaborate on the groundwork established by regulations to effect the aspects of the Electronic Transaction Act required to facilitate indigenous ICT-based entrepreneurs. The programme will also facilitate the implementation of the governance framework, Sector Codes of Conduct and Regulations associated with the full implementation of the Data Protection Act.

The programme will ensure coordination of these frameworks with the revised statute to update the provisions of the Computer Misuse Act. The Government will also undertake a comprehensive review of statutes associated with the wider financial system to ensure that the appropriate regulatory controls and administrative frameworks are put in place to facilitate e-money and e-payments.

The government will continue to monitor developments in the evolution of Intellectual Property laws, particularly in the context of online rights recognition and monetisation in order to guarantee the intellectual property rights of local content developers, in both the application, IT services and electronic entertainment spheres.

Driving Agencies

Programme 4.3.1: Information Society Legislation-tt (eL-tt)	
Activity	Driving Agency
Establish and enable e-legislative ecosystem	Ministry of Legal Affairs Ministry of Science and Technology Ministry of Public Administration

Thematic Area Five: e-Government

Programmes: e-Government

Key Imperative	Programmes
5.1 Enabling the Migration to Transactional e-Services	5.1.1 – Government-to-Citizens e-Services Delivery 5.1.2 – Government-to-Businesses e-Services Delivery 5.1.3 – Multi-Channel Access 5.1.4 – e-Democracy Platform
5.2 Collaborating to Implement Shared ICT Systems and Processes	5.2.1 – Enhancements to GovNeTT 5.2.2 – Smart Card Development 5.2.3 – GIS Application 5.2.4 – Intranet G2E 5.2.5 – Procurement Reform 5.2.6 – Cloud Computing 5.2.7 – Document and Information Management
5.3 Building a Vibrant e-Government Ecosystem	5.3.1 – Shared Storage and Shared Infrastructure 5.3.2 – Frameworks for efficient operation, governance and standardisation of the Infrastructure 5.3.3 – Middleware Platform
5.4 Securing the ICT Environment	5.4.1 National Cyber-Security Strategy 5.4.2 Information Security Policy 5.4.3 Information Security Awareness Programme 5.4.4 Risk Management Programme 5.4.5 Disaster Recovery and Business Continuity Management

Key Imperative 5.1: Enabling the Migration to Transactional e-Services

Programme 5.1.1 Government-to-Citizens (G2C) e-Services Delivery

This programme seeks to deliver services to citizens electronically as part of the strategy to "Work as an Integrated Government".

Currently, online information is available on 400 government services. While this number includes most government ministries and agencies, the shift must now be made from informational to transactional (end-to-end) services.

Within the smarTT period, 2014 – 2018, 70 e-services will be developed and launched. These 70 services will be prioritised on the basis of feasibility and impact.

The criteria for identification of services which are ready for electronic delivery is as follows:

- Feasibility – possibility for electronic enablement and current e-readiness level; and
- Impact of the agency's service – volume of transactions, revenue generation potential, customer feedback and government business needs.

The design considerations for the 70 e-services will ensure delivery of "quality" e-services, i.e. ease of use, convenience, responsiveness, interactivity and reliability. The "value-added" through the delivery of these e-services will be measured in terms of availability, accuracy, privacy and security, and customer-centricity.

Government ministries and agencies will be given autonomy to lead the delivery of e-services particular to their mandate within stated guidelines and standards. The proposed deployment timeline is based on an assessment of impact and availability of infrastructure and legislation to support the delivery of the particular e- service. Where feasible, the service will also be delivered on the **ttconnect** mobile platform.

e-Service Classification for Implementation

Government ministries and agencies are classified into three groups of e-Readiness, "High e-Readiness" or "Medium e-Readiness" and "Low e-Readiness". These classifications are based on strategic direction, ICT goals and capability of achieving stated goals within a specified timeframe, and achievements to date.

Based on the individual government ministry or agency's e-Readiness classification, the appropriate type of e-Service can be developed in line with Type 1, 2 or 3 defined below:

Type	Description
(Type 1) Simple service	Collection, tracking and sharing of data
(Type 2) Intermediate services	Collection and transformation of data into information
(Type 3) Complex services	End-to-end transactional systems which include information, payment collection and processing

In Trinidad and Tobago, most ministries and agencies targeted for priority e-services are at the lower end of the e-readiness spectrum (Type 1). Consequently, a phased approach is necessary to support the advancement of ministries and agencies from Type 1 to Type 3 e-services development.

Supporting Mechanisms

Promotion and Awareness of e-Services

Ensuring that e-services are available is not enough. Citizens must be aware that the services exist and must be comfortable accessing and using these services. In this regard, **ttconnect** service centres play a crucial role in building citizens' familiarity with, and comfort levels when using e-service tools. In addition, 'open-house' type training sessions on the use of e-government services will be provided at service centres, community centres, and other appropriate public venues.

Driving Agencies

Programme 5.1.1: G2C e-Services Delivery

Activity	Driving Agency
Develop e-Services Policy for use by all of GoRTT	Ministry of Science and Technology Ministry of Public Administration Ministry of Trade, Industry and Investment
Plan and install ICT Infrastructure	Ministry of Science and Technology
Conduct Business Process Re-engineering	Ministry of Science and Technology Ministry of Public Administration
Conduct promotion and awareness programmes for e-Services	Ministry of Science and Technology

Programme 5.1.2 Government-to-Businesses (G2B) e-Services Delivery

This programme seeks to deliver services to businesses electronically as part of the strategy to "Work as an Integrated Government".

Services that are feasible for electronic delivery will be developed and will include services that regulate town and country planning approval, employment, property registration, credit searches, investor protection, taxes, trading across borders, and contract enforcement. There will also be an expansion of the services available through the full deployment of TTBizLink – the Single Electronic Window, driven by the Ministry of Trade and Industry. With the integration of trade and customs and excise services, significant efficiencies will be realised with regard to businesses transacting with Government

Procurement

The Ministry of Labour and Small and Micro-Enterprise Development has launched a G2B website under the FairShare Programme. The key components of this programme include making procurement opportunities available to qualifying Micro and Small Enterprises (MSEs) through a gateway that provides ministries with access to a database of registered MSEs.

Business Hub

A key enabler of effective G2B e-Services is the development of the "Business Hub" – a single, trusted source of essential company and business information. The Business Hub will build off of the existing Companies Registry managed by the Ministry of Legal Affairs.

Driving Agencies

Programme 5.1.2: G2B e-Services Delivery	
Activity	Driving Agency
Develop ICT Policy (e-Services)	Ministry of Public Administration
Plan and install ICT Infrastructure	Ministry of Science and Technology
Conduct Business Process Re-engineering	Ministry of Science and Technology
Engage MSMEs	Ministry of Trade and Industry
Integrate all ministries	Ministry of Science and Technology Ministry of Public Administration Ministry of Trade and Industry

Programme 5.1.3 Multi-Channel Access

Multiple channels are now the norm for government service delivery. To this end, **ttconnect** has been developed to provide: web access to government services via **ttconnect** Online; over-the-counter services at **ttconnect** Service Centres; mobile Service Centres servicing remote locations through **ttconnect** Express; self-help stations via **ttconnect** Self-Serve Kiosks (ATM-like machines); mobile service delivery via **ttconnect** Mobile and most recently, over the telephone assistance via **ttconnect** hotline.

It is imperative that the **ttconnect** suite of services continue to be developed through a comprehensive Channel Management Framework and that it operates on a sustainable business model. This Channel Management Framework will allow for the collection of citizen usage data, user preferences, time taken for each transaction and other data on each identified channel. This dashboard view will assist in better policy making in the multi-channel service delivery approach. Additionally, the expansion of channels has to be timely and assessed against the usage of existing channels (volume of transactions), the rate of increase in services offered and the rate of increase in demand for these services. The framework also has to provide guidance on the optimal mix of electronic versus other channels of delivery.

As a multi-channel service delivery vehicle, **ttconnect** will require a Constituent Management System to tie in the customer interactions, procedures and programmes for service delivery. A Constituent Management System allows the storage of customer's interactions and customer's contact in one web space. In terms of channels, **ttconnect** Online can be further enhanced with social media technologies to better engage the populace.

Franchising Programme for Management and Operations of ttconnect Service Centres

Franchising provides the opportunity to expand operations and reach without incurring additional cost. It further presents an opportunity to generate revenue. Hosting and managing **ttconnect** centres represent a viable opportunity for entrepreneurs who can also take advantage of the foot-traffic to promote other products and services. GoRTT will explore the possibility of using franchising as a mechanism to expand the reach of **ttconnect** centres. In this scenario, the franchising firm would have to enter confidentiality contracts which will be governed by robust security policies. This is to help mitigate sensitive and confidential data from being compromised within the centres.

Driving Agencies

Programme 5.1.3: Multi-Channel Access	
Activity	Driving Agency
Develop Franchising Policy for ttconnect Service Centres	Ministry of Science and Technology (iGovTT)
Develop business model for integrated channel service delivery for government services	Ministry of Public Administration Ministry of Science and Technology
Implement Constituent Management System	Ministry of Science and Technology

Programme 5.1.4: e-Democracy Platform

An e-Democracy application is a web based tool which serves as a social network between the government and citizens. It is an interface which allows the government to supply the electorate with information on government projects and initiatives through the posting of documents and statistics. This sharing helps citizens to develop more informed opinions and perspectives; while they, in turn, can provide feedback to the government through online posts or voting on the platform. The Platform can also provide analytics on the public's interests, views and concerns as it relates to national-level initiatives and projects, and allows for the collection of polling information during elections.

An e-Democracy Platform has already been designed and piloted. It comprises thirty-six features that allows for a user-friendly and flexible communication channel. To date, the platform has been used to accommodate the smarTT Online Consultations. GoRTT will continue to build out the e-Democracy Platform to meet various G2C communication needs.

Driving Agencies

Programme 5.1.4: e-Democracy Platform	
Activity	Driving Agency
Develop a policy to govern the sharing of information and rules of engagement on the e-Democracy Platform	Ministry of Public Administration Elections and Boundaries Commission
Complete the the e-Democracy Platform as an adaptable communication tool with all features available to allow quick adaptation to various scenarios	Ministry of Science and Technology
Launch test implementations of the e-Democracy Platform in small scale environments	Ministry of Science and Technology
Make the platform available for various applications across Government Agencies and to other stakeholders and clients at a cost	Ministry of Trade and Industry
Deploy the full e-Democracy Application as a social network between Government and it's Citizenry	Ministry of Science and Technology Ministry of Public Administration Ministry of Trade and Industry

Key Imperative 5.2: Collaborating to Implement Shared ICT Systems and Processes

Programme 5.2.1 Enhancements to GovNeTT

Significant investments have been made by GoRTT to create the ICT infrastructure for enabling e-Government including:

- Implementation of the Government Network (GovNeTT) which integrates all ministries and public schools on the Government Communication Backbone; and
- Design of the Middleware Infrastructure.

GovNeTT is hosted in the Government Data Centre (GDC) and provides the Wide Area Network (WAN) connectivity for various ICT infrastructure services such as Virtual Private Network connectivity, electronic mail, mobile electronic mail, corporate instant messaging, web / application / database hosting, Voice over Internet Protocol (VoIP), as well as common infrastructures such as the middleware systems and backup/storage systems (as discussed under the Theme Infrastructure Development). Protected by defence-in-depth security design that features mechanisms such as anti-virus, spam filtering and firewalls, these services are maintained by vendors on a continuous basis, with stipulated service levels to ensure availability.

GoRTT is in the process of ensuring that the Data Centre can host additional common infrastructure services such as authentication, payment and communication services (via SMS, MMS). These critical infrastructures are geared to support the demands of providing e-Services to citizens.

The Virtual Private Network connectivity is also necessary to allow for remote computing. This will serve as a means for alternative work arrangements, as well as supporting business continuity in the event of disaster. Other enhancements to GovNeTT are Internet Protocol telephony and Video Conferencing. With the implementation of Middleware, ministries and departments will be able to leverage and share the infrastructure for development and deployment of their e-Services.

Driving Agencies

Programme 5.2.1: Enhancements to GovNeTT	
Activity	Driving Agency
Conduct Infrastructure Assessment	Ministry of Science and Technology (iGovTT)
Conduct Systems Assessment	Ministry of Science and Technology (iGovTT)
Design and deploy the 3rd phase of GovNett	Ministry of Science and Technology Tobago House of Assembly All Ministries

Programme 5.2.2 Smart Card Development

A Smart Card is a plastic card (similar to a credit card) which contains an embedded computer chip on which applications can be loaded to enable data transactions. The applications are usually geared toward the enhancement of the convenience and security of day-to-day services. Smartcards are an emerging tool used for a variety of online, offline and hybrid applications in the public and private sectors. The main objectives of this system for Trinidad and Tobago are to:

I. Enhance service delivery by enabling citizens to track the progress and/or completion of any Government related service request;
II. Give citizens one identity throughout Government Agencies;
III. Provide convenient means of access for citizens' Government related information;
IV. Improve citizens' privacy; and
V. Increase security against identity theft and fraud.

A Smart Card Policy and overall governance framework will provide a harmonized, administrative and technical context within which the National Smart Card System will operate. It will also define the roles and responsibilities of each stakeholder in the system.

The major objective of the Smart Card Policy is to provide guidelines, structures and standards that will govern the effective design, implementation and operation of a National Smart Card System. This will facilitate maximum attainment of benefits from the system. Further objectives are to:

I. Ensure interoperability of the System across all Government Agencies;
II. Achieve economies of scale in the development, implementation and operation of the Smart Card System thereby allowing the maximum scope for innovation;
III. Develop technical standards that are internationally accepted in the implementation of Smart Card Systems; and
IV. Ensure maximum usability while establishing appropriate levels of security of the Smart Card System.

Driving Agencies

Programme 5.2.2: Smart Card

Activity	Driving Agency
Develop Smart Card Policy	Ministry of Public Administration
Establish Citizens' Data hosting	Ministry of Legal Affairs
Integrate infrastructure	All Ministries Tobago House of Assembly

Programme 5.2.3 National Geographic Information System (GIS) Plan

A Geographic Information Systems (GIS) is a collection of computer hardware, software, and geographic data for capturing, managing, analysing, and displaying all forms of geographically referenced information. In a GIS, information is characterized spatially (i.e. by location and distance).

Governments commonly utilize GIS to inform decision making in a number of key areas including:

- Resources: urban planning, natural resource management:
- Transportation: emergency management Land: soil type evaluations, elevation contours, historic shorelines;
- Crime and Security: global and local surveillance;
- Epidemiological data: population settlements, epidemic and pandemic patterning for planning and response; and
- Tourism attractions and entertainment.

GIS generally organizes geographic data in an interactive way that allows users to select or input data specific to a project or task. It uses thematic maps with a table of contents that allows the user to view layers of information. The layers are a variety of datasets that can be presented in an infinite number of ways and be applied to knowledge areas in various fields.

The development of a National Geographic Information System Plan is proposed. It will incorporate:

- Research on infrastructural development of a National GIS;
- Research geared to identifying gaps which may impede the development of the GIS Design and Requirements Analysis for the National GIS;
- Develop a National Policy to govern the use of the GIS by all Government stakeholders;
- Develop a Security Policy to ensure that access to the GIS is appropriately controlled;
- Assess and develop a legislative framework to guide usage and dissemination of information produced by the system.

Driving Agencies

Programme 5.2.3: GIS Application	
Activity	Driving Agency
Collect and manage Geographic data on Trinidad and Tobago-maps.	Ministry of Food Production Ministry of Water Resources and the Environment (for Lands and Surveys Division)
Develop GIS Policy	Ministry of Planning and Sustainable Development
Plan urban-based population initiatives	Ministry of Planning and Sustainable Development
Collect and manage Crime data	Ministry of National Security
Collect and manage Tourism-based data	Ministry of Tourism

Programme 5.2.4 Government to Employees (G2E) Intranet

A Government to Employee (G2E) Portal or Government Intranet for the public service may be developed in order to allow a single point of access. The portal will include ***role-based access control*** mechanisms. This refers to a system in which users across one level are allowed identical access. The Intranet will provide tools for content management, broadcasting of notices, effective searches of information, interaction and collaboration across work groups within an agency and across separate agencies. These tools facilitate the knowledge sharing that is essential for the empowerment of public officers as knowledge workers.

The portal can also be a platform for piloting e-engagement programmes, and promoting digital and multi-media content creation within the public service before deployment to citizens.

The portal will also be the gateway for public officers to access Enterprise Systems for leave and training applications, job rotation requests and performance appraisal forms (managed by Human Resources), claims and pay application forms (managed by Finance), facilities booking applications (managed by Administration) and government tendering and procurement templates. These systems should be mandated across the public service to standardise administrative processes and reap economies of scale. This also helps in the streamlining of workflows, resulting in improved efficiency and improved information sharing across all departments, which can lead to better interdepartmental communication and performance optimisation.

Driving Agencies

Programme 5.2.4: Intranet G2E	
Activity	Driving Agency
Develop internal G2E Governance Policy	Ministry of Public Administration
Plan and install Ministry's WAN	Ministry of Science and Technology Ministry of Public Administration
Integrate all ministries	Ministry of Science and Technology

Programme 5.2.5 Procurement Reform

In GoRTT's Medium Term Policy Framework 2011-2014 as part of "Strategic Plans of Ministries", the Government intends to undertake measures to give effect to the recommendations contained in the White Paper on Reforming the Public Sector Procurement Regime. In this regard, a policy on e-Procurement will be developed.

Driving Agencies

Programme 5.2.5: Procurement Reform	
Activity	Driving Agency
Develop Policy on e-Procurement	Ministry of Finance

Programme 5.2.6 Cloud Computing

Cloud Computing refers to the provision of ICT capabilities and solutions over a network or the internet to multiple users. It is a system in which many users share pooled ICT resources, thereby reducing costs, resulting in greater computing efficiency. Cloud computing is evolving and while it may not be an immediate solution for all of government's computing needs, it can allow GoRTT to reduce major spending on software licenses and other ICT systems, while making more efficient use of staff and resources with a more forward-thinking, environmentally conscious approach. Cloud Computing can change the way Government leverages technology: at a Lower Cost, at Faster rates, and with Greener operational efficiency.

GoRTT comprises multiple ministries and agencies, most of which create and maintain their own internal ICT environments. These systems often perform similar tasks, such as providing email or web hosting and are generally used at a fraction of their capability. A Government Data Centre was established in an attempt to solve some aspects of the problems created by having disjointed ICT environments. However, through Cloud Computing, ministries and other government agencies can further benefit from pooled ICT resources and reducing the capital and recurrent expenditure associated with the installation and maintenance of architecture.

Additionally, the sharing of resources available through Cloud technology can contribute to increased computing efficiency, and business optimisation.

Other benefits of utilizing Cloud Computing within GORTT include:

1. Moving from Scale of Buying to Scale of Provisioning;
2. Moving from managing infrastructure to managing information availability;
3. Creation of eco-friendly incentives for cloud computing;
4. Satisfying enterprise-wide infrastructure demands and increasing scalability while reducing infrastructure costs;
5. Lower computer costs with improved performance;
6. Device independence.

It is GoRTT's intention to pursue Cloud development and membership, which will begin with the process of moving its ICT infrastructure into a cloud environment. GoRTT will begin the process by moving to a type of Virtual Private Cloud while simultaneously taking steps to ensure that a Government Cloud (G-Cloud) is implemented within the long term. GoRTT will ensure that the key benefits of on-demand self-service, location-independent resource pooling, rapid elasticity, and pay per use afforded by the Cloud will be realised.

Driving Agencies

Programme 5.2.6: Cloud Computing	
Activity	Driving Agency
Develop Cloud Computing Policy	Ministry of Public Administration
Plan and install ICT Infrastructure	Ministry of Science and Technology

Programme 5.2.7 Document and Information Management

In order for e-Government processes to achieve true efficiency, there is a need for efficient Records Management across Government institutions. Electronic media is becoming increasingly utilized as a standard means of processing and storing information. As a result, there is an increasing necessity for the standardization of information passing through these electronic mediums.

Governments around the world have recognized the critical value of using electronic channels to support many of their business processes and as a result, proficient Records Management has been recognized as an essential pillar to support e-Government processes. While traditional methods will not completely disappear, paper will no longer be the main method of Records Management within institutions and there will be need for Document and Information Management. The expectation is that within the next few years, digital data will replace traditional methods of information processing. Such a system should provide:

- Guidelines for the inclusion of electronic records as part of the business process;
- A framework and milestones for implementation; and
- Guidelines to support standardization and inter-departmental sharing, exchange and interoperability of electronic documents and records between Government organizations.

An e-Cabinet solution is an example of an impactful project in Document and Information Management Systems. For decades, the Cabinet of the Government of Trinidad and Tobago has relied on paper-based documents which formed most of their internal business processes.

smarTT recommends a technological solution for electronic collaboration between the Cabinet and Ministries. This would involve the connection of all Ministries and Government agencies to the Cabinet Office to enable easy sharing of electronic cabinet notes and minutes.

The e-Cabinet solution would involve automation of the core operations of Cabinet Offices as follows:

- Receipt of cabinet notes/minutes;
- Automation of Cabinet's meeting agenda;
- Collation of meeting packages;
- Electronic mechanism for round robin in the voting, supported by a voting dashboard.

Driving Agencies

Programme 5.2.7: Document and Information Management	
Activity	Driving Agency
Develop Government Archives	Ministry of Public Administration
Conduct Public Sector Business Process Re-engineering	Ministry of Public Administration
Plan and install ICT Infrastructure	Ministry of Science and Technology
Integrate cabinet notes and other documents	All Ministries

Key Imperative 5.3: Building Government Infrastructure to Develop and Support a Vibrant e-Government Ecosystem

Programme 5.3.1 Shared Storage and Shared Infrastructure

The sharing of storage and infrastructure provides the opportunity for more efficient use of resources through the reduction of redundant assets and services. It also makes it easier to integrate Government's ICT services since data will be stored at a common site and it provides a basis for a common platform for all Government services.

The establishment of shared storage and infrastructure facilities is necessary to accomplish e-Government objectives. An assessment of the current infrastructure at various ministries will be made in order to determine the most appropriate mechanism to support this initiative.

Driving Agencies

Programme 5.3.1: Shared Storage and Shared Infrastructure	
Activity	Driving Agency
Ensure efficient use of government infrastructure	Ministry of Science and Technology

Programme 5.3.2 Frameworks for efficient operation, governance and standardisation of the Infrastructure

In order to ensure consistency and coherence in Government's infrastructure and provide quality services, common frameworks are required for governance and infrastructure standardisation. This approach will provide a basis for issuing standard policies, developing a common set of procedures across Ministries and improving security. Under smarTT, such frameworks will be developed with input from key stakeholders and will be deployed throughout the various Ministries.

Driving Agencies

Programme 5.3.2: Frameworks for Efficient Operation, Governance and Standardisation of the Infrastructure

Activity	Driving Agency
Adopt common standards for interoperability	Ministry of Science and Technology TATT National Information and Communication Technology Company Limited

Programme 5.3.3 Middleware Platform

Currently, GoRTT has no end-to-end electronic services (e-services) for its citizens, and there is a need for a Middleware solution to support the process of e-service deployment. As part of GoRTT's shared services architecture, a Middleware solution will be implemented to allow Ministries and Agencies to use a common platform to rapidly develop, deploy and operate their e-services.

Besides better operational efficiencies and economies of scale, an appropriately configured Middleware platform will allow for easier implementation of resiliency and protective measures. This will help safeguard the central environment upon which the government's critical business applications are hosted.

Through the Middleware platform, GoRTT will be able to:

- Have more rapid development and deployment of e-Services;
- Reduce incremental costs for the implementation of new e-Services;
- Reduce the lead time needed from requirements definition to deployment;
- Ensure compliance to a standardized structure for foundation services;
- Promote higher uptake of e-Services through uniform user experience (forms, transaction, payments etc.); and
- Support integrated services via a single portal, enhancing citizen/business access; as such, more incentives for other Agencies to use **ttconnect**.

Driving Agencies

Programme 5.3.3: Middleware Platform	
Activity	Driving Agency
Ensure rapid deployment and delivery of e-services	Ministry of Science and Technology
Conduct promotion and awareness plans for uptake of e-services	Ministry of Science and Technology

Key Imperative 5.4: Securing the ICT Environment

Programme 5.4.1 National Cyber-Security Strategy

In 2010, Cabinet appointed an Inter-Ministerial Committee (IMC) to oversee the development of a coordinated approach to a National Cyber Security Strategy. Deliverables of the Cyber Security Strategy will include:

- Establishment of a Cyber Security Agency;
- Establishment of a Computer Security Incident Response Team as a national focal point for incident reporting, incident management and incident response;
- Identification of critical infrastructures and assessment of their level of vulnerability to cyber-threats;
- Development of plans and mechanisms to proactively protect ICT infrastructures;
- Development of frameworks and guidelines for business continuity readiness assessments and development of business continuity plans;
- Building of capabilities in managing cyber threats and enhancement of cyber security;
- Development of appropriate legislation, policies and regulations to guide individuals and entities;
- Development of national information security awareness programmes to sensitize citizens on the issues related to the consumption of ICTs and in the protection of their sensitive and private data.

Driving Agencies

Programme 5.4.1: National Cyber-Security Strategy

Activity	Driving Agency
Initialization of a National Cyber-Security Strategy	Ministry of Science and Technology Ministry of National Security Office of the Attorney General T&T Police Service TATT
Establish a 24//7 National Cyber-Threat Monitoring Centre to monitor ICT security, as well as report on and mitigate cyber-threats;	Ministry of Science and Technology Ministry of National Security T&T Police Service TATT
Pass the Cybercrime Bill to strengthen the legal framework through which guidance, accountability and legal recourse can be achieved	Ministry of Science and Technology Ministry of National Security Office of the Attorney General T&T Police Service TATT

Programme 5.4.2 Information Security Policy

International standards exist for many aspects of ICT Security Management, which include codes of practice, measurement frameworks and guidelines for the management and security of information systems globally. Most successful of these standards is the ISO 27000 series of Information Security Implementation and Management Standards.

This series of ISO standards currently contain the following documents:

- ISO/IEC 27001 — Information security management systems — Requirements
- ISO/IEC 27002 — Code of practice for information security management
- ISO/IEC 27003 — Information security management system implementation guidance
- ISO/IEC 27004 — Information security management — Measurement
- ISO/IEC 27005 — Information security risk management
- ISO/IEC 27006 — Requirements for bodies providing audit and certification of information security management systems

For Government

Government, as the largest repository of public and citizen data, will seek to complete the development of an Information Security Policy Manual for GoRTT based on the requirements detailed in ISO 27001. ISO/IEC 27001 requires that Management:

- Systematically examine the organization's information security risks, taking account of the threats, vulnerabilities, and impacts;
- Design and implement a coherent and comprehensive suite of information security controls and/or other forms of risk treatment (such as risk avoidance or risk transfer) to address those risks that are deemed unacceptable; and
- Adopt an overarching management process to ensure that the information security controls continue to meet the country's information security needs on an ongoing basis.

For Private Organisations and Entities

The Trinidad and Tobago Bureau of Standards (TTBS) will promote standards in the ISO 27000 series, as well as any others that may be deemed relevant, for organisations producing ICT products and services. Trinidad and Tobago will, through the existing national standards bodies, pursue national ICT related standards adoption to maintain and increase compliance with international best practices.

Information Security Policy Compliance

GoRTT's approaches to policies and compliance will have a profound impact on the success or failure of the effort to maintain the security of sensitive and confidential information. Achieving compliance with IS policies is a far from trivial task. The best starting point in the compliance process is an assessment of the current position, followed by identification of what changes are needed for compliance. From this point, planning and implementation must be undertaken.

With the development of an Information Security Policy, an IS Policy Compliance Programme will be established to assess and measure compliance with the approved policies. This programme will

target all public institutions to assess, measure and report on compliance levels, as well as advise on measures and steps to be taken to achieve compliance.

Driving Agencies

Programme 5.4.2: Information Security Policy

Activity	Driving Agency
Disseminate an IS Policy Manual for GoRTT	Ministry of Science and Technology Ministry of Public Administration Office of the Information Commissioner Ministry of National Security
Advocate for desirable Information Security Standards by the Private Sector and Formal Adoption by National Standards Bodies	Ministry of Science and Technology TTBS Office of the Information Commissioner Ministry of National Security
Develop and implement of a IS Policy Compliance Programme for GoRTT	Ministry of Science and Technology Auditor General's Office Office of the Information Commissioner Ministry of National Security

Programme 5.4.3 Information Security Awareness Programme

Since GorTT holds the largest repositories of citizen data; its systems are prime targets for cyber-attacks on financial data, medical data, and other sensitive/personal information. Therefore, the government will implement an Information Security Awareness Programme for GoRTT employees to ensure that the behaviours, procedures and practices of staff maintain, rather than compromise, the security of the data and information that GoRTT stores, transports and processes via its ICT systems.

Further, since private use of the Internet and other ICT services represents the bulk of ICT interactions in Trinidad and Tobago, citizens are faced with multiple daily threats. These vulnerabilities range from phishing email scams to social engineering attacks designed to make a user voluntarily give up personal information. Additional dangers to personal security also include identity theft, internet defamation, cyber-stalking and cyber-bullying. However, to date, there is no coordinated effort to educate and protect end users from compromising their personal data when using ICT services.

Therefore, GoRTT will pursue a public campaign to sensitise citizens and residents on the importance of safeguarding themselves when accessing ICT services. The involvement of both public and private sector organisations will be required to promote this message.

Driving Agencies

Programme 5.4.3: Information Security Awareness Programme (ISAP)	
Activity	Driving Agency
ISAP for GoRTT, inclusive of all Ministries, State Bodies and Authorities	Ministry of Science and Technology Ministry of National Security Office of the Information Commissioner
ISAP for citizens and residents of Trinidad and Tobago	Ministry of Science and Technology Private Sector, namely the Financial Sector Office of the Information Commissioner Ministry of National Security

Programme 5.4.4 Risk Management Programme

As the operations, workflow, or technologies within GoRTT's ICT environment change, periodic reviews must be conducted to analyze these changes, to account for new threats and vulnerabilities created by these changes, and to determine the effectiveness of existing technical and behavioural controls.

The objective of performing risk management is to enable GoRTT to accomplish its strategic goals by:

- Better securing the ICT systems that store, process, or transmit organizational information;
- Enabling senior officers to make well-informed risk management decisions to justify the expenditures that are part of an IT budget; and,
- Assisting senior officers to authorize (or accredit) IT systems on the basis of the supporting documentation resulting from the performance of risk management

To ensure that proper risk management is a part of all GoRTT ICT and ICT-related projects and programmes, GoRTT will implement a Risk Management Programme to systematically and periodically assess, measure and report on the risks to ICT systems.

Driving Agencies

Programme 5.4.4: Risk Management Programme	
Activity	Driving Agency
Initiate an ongoing programme to identify, assess and report on the risk levels inherent in GoRTT's ICT Projects	Ministry of Science and Technology Ministry of Public Administration

Programme 5.4.5 Disaster Recovery and Business Continuity Management

Disaster Recovery (DR) and Business Continuity Planning (BCP) polices, standards and procedures will be introduced to enable organisations to develop and manage alternative arrangements for their critical processes in the event of an emergency or disaster. Among existing standards for DR/BCP Management, the ISO/IEC 24762:2008 and the ISO/IEC 27031:2011 are most applicable to the needs of Trinidad & Tobago.

ISO/IEC 24762:2008 provides guidelines on the provision of Information and Communications Technology Disaster Recovery (ICT DR) services as part of business continuity management, applicable to both "in-house" and "outsourced" ICT Disaster Recovery service providers of physical facilities and services. ISO/IEC 24762:2008 specifies:

- The requirements for implementing, operating, monitoring and maintaining ICT DR services and facilities;
- The capabilities which outsourced ICT DR service providers should possess and the practices they should follow;
- The guidance for selection of recovery site; and
- The guidance for ICT DR service providers to continuously improve their ICT DR services.

ISO/IEC 27031:2011 provides guidance on the principles to ensure business continuity. The standard:

- Suggests a structure or framework (methods and processes) for any organization – private, governmental, and non-governmental
- Identifies and specifies all relevant aspects including performance criteria, design, and implementation details, for improving ICT readiness as part of the organization's ISMS
- Enables an organization to measure its continuity, security and hence readiness to survive a disaster in a consistent and reliable manner.

Driving Agencies

Programme 5.4.5: Disaster Recovery & Business Continuity Planning	
Activity	Driving Agency
Adopt cross-government policy on Business Continuity Planning	Ministry of Science and Technology Ministry of Public Administration Ministry of Public Utilities
Adopt ISO Standards ISO/IEC 24762:2008 and the ISO/IEC 27031:2011	TATT TTBS Central Bank of Trinidad and Tobago

smarTT

NATIONAL ICT PLAN 2014 – 2018

Appendix Two

Programme Outputs & Outcomes

	Programme	Outputs and Outcomes
YEAR ONE 2014	3.1.2 Encourage consumer adoption of e-Lifestyles	National ICT Website rebranded and fully functional by start of fiscal year 2014
		Formalized strategy outlining how planned infrastructure will be leveraged to encourage consumer adoption of e-Lifestyles
		Greater citizen awareness of the benefits ICT to daily life
	3.5.1 Assess the mandate and expand the capacity of the e-Business Roundtable (e-BRT)	e-BRT Terms of Reference revised by start of fiscal year 2014
		Increased data-driven collaboration between the public sector and the wider private sector; with an emphasis on significant increase in the participation of and investment by the private sector in national ICT development
	5.2.5 Procurement Reform	Procurement Policy revised by second quarter of fiscal year 2014
		Procurement Policy implemented throughout Ministries by end of fiscal year 2014
		Increased efficiency in the procurement of resources needed to run Government operations, and the effective utilisation of economies of scale

	Programme	Outputs and Outcomes
YEAR ONE TO TWO 2014 – 2015	1.1.2 Create a System to Challenge Traditional ways of Thinking	National policy to drive innovation and creative thinking at the primary and secondary school level by the end of fiscal year 2014. Key focus on borderless classrooms
		2 new innovation competitions at the primary and secondary school level offered in fiscal year 2014
		3 borderless classrooms piloted by end of fiscal year 2015
		Increase interest in ICT related subject matter and higher levels of student engagement at the primary and secondary levels
	1.2.3 Web Production Incentives	Web production grants offered nationally for the creation of local content by the end of fiscal year 2014
		Campaign on web media usage implemented by end of fiscal year 2014
		Basic programming courses integrated into the primary school curriculum by end of fiscal year 2015
		Increase in on-line local content and commercial applications
	1.2.1 Digitize Heritage Related Indigenous and Social Related Content	Digitisation of heritage related and social related content campaign to be initiated by end of 2015
		e-Heritage portal to be launched by second quarter 2015
		Greater preservation of historical information and increased virtual availability of heritage related content for national development and pride
	Tobago – 1.1 Computers and Connectivity for Schools	e-CAL and similar initiatives tailored and streamlined for Tobago by end of fiscal year 2014
		All primary and secondary schools in Tobago with broadband internet connectivity by the end of fiscal year 2014
		Equal access and availability of ICTs at the primary and secondary school level
	Tobago – 1.3 Digitize Indigenous and Heritage Related Content	Strategy to systematically digitize the customs and traditions of each village developed by third quarter fiscal year 2014
		Pilot programme for digitizing heritage related content completed in 5 districts by end of fiscal year 2014
		Pilot programme formalized and expanded throughout Tobago by end of fiscal year 2015
		Greater preservation of historical information and increased virtual availability of heritage related content for national development and pride

	Programme	Outputs and Outcomes
YEAR ONE TO TWO 2014 – 2015	3.1.4 Implement and strengthen services infrastructure and legislative framework	Implementation of regulatory framework for electronic transactions by end of fiscal year 2015
		Full Proclamation of the Electronic Transaction Act by the end of fiscal year 2014
		Electronic transactions available by end of fiscal year 2015
	5.2.4 Government to Employees (G2E) Intranet	G2E Governance Policy developed by first quarter of fiscal year 2014
		Installation of WAN planned by the second quarter fiscal year 2014
		Installation of WAN completed by third quarter fiscal year 2014
		Integration of Ministries onto Intranet completed by end of fiscal year 2015
		Enhanced collaboration and communication between Government Ministries and increased Government efficiency
	5.2.7 Document and Information Management	All required business process re-engineering completed by third quarter fiscal year 2014
		Upgrades to ICT infrastructure completed by start of fiscal year 2015
		Database of Government documents fully functional by end of fiscal year 2015
		Improved access to and circulation of Government documents

	Programme	Outputs and Outcomes
YEAR ONE TO TWO 2014 – 2015	5.3.2 Frameworks for efficient operation, governance and standardisation of the infrastructure	e-Government Interoperability Framework and Omnibus Technical Standards approved by the beginning of fiscal year 2014
		e-Government Interoperability Framework and Omnibus Technical Standards fully implemented by the end of fiscal year 2014
	5.4.2 Information Security Policy	Development and adoption of an Information Security Policy Manual for GoRTT by first quarter of fiscal year 2014
		Promotion of information security standards across the private sectors launched by second quarter 2014
		Internal Information Security Awareness Programme for GoRTT employees formulated and implemented by end of fiscal year 2015
		Public sensitization campaign on information security conducted each year from 2015 onward
		Best-practice security standards adopted by Government and greater awareness of information security implications at a national level

	Programme	Outputs and Outcomes
YEAR ONE TO THREE 2014 – 2016	1.1.1 Computers and Connectivity for All	Upgrade and expansion of ICT infrastructure for school networks and learning portals to begin by fiscal year 2014
		Devices made available to students at the tertiary level by end of fiscal year 2014
		Early childhood, primary and secondary school ICT curriculum streamlined by the end of fiscal year 2014
		ICT curriculum standards for tertiary level institutions developed by beginning of fiscal year 2016
		Integration of ICT in education at all levels (primary, secondary and tertiary)
	1.1.5 Integrate human capital / education/ training with industry needs	National ICT Skills Diagnostic completed by the end of fiscal year 2015
		Accreditation Framework for ICT courses approved by second quarter of fiscal year 2015
		ICT Training Framework for ICT professionals approved by end of fiscal year 2015
		Alignment of ICT human resources to meet industry needs
	1.3.2 Regional Research Forum	Regional Research Forum hosted by the University of Trinidad and Tobago and the Caribbean Knowledge and Learning Network launched by end of fiscal year 2014
		ICT driven research linked to national and regional development
	Tobago – 1.2 ICT Leaders to Foster Paradigm Shifts	Three Public Sensitization Campaigns developed and executed each fiscal year from 2014-2016
		Greater awareness and uptake of ICTs
	Tobago – 1.4 ICT Training for the Public Sector	Training Plan developed and implemented by the end of fiscal year 2016
		All staff of the Tobago House of Assembly and Ministry of Tobago Development trained in basic ICT skills by end of fiscal year 2016
	Tobago – 2.2 Increased and affordable ICT education for digital inclusion	Free ICT courses at community centres piloted in 5 districts by the end of fiscal year 2014
		Programme formalized and extended throughout Tobago by end of fiscal year 2016

	Programme	Outputs and Outcomes
YEAR ONE TO THREE 2014 – 2016	3.1.3 Develop and strengthen B2B and B2C online marketplaces	Business Trade Portal strengthened by second quarter of fiscal year 2014
		Strategy to engage SME's finalized by end of fiscal year 2015
		30 per cent increase in businesses utilizing e-business as a core economic driver by end of fiscal year 2016
	Tobago – 3.1 Micro and Small Enterprise ICT Sensitization	Three ICT business sensitization workshops and forums held each year from 2014 onward
		Business Incubator Programme aimed at enhancing ICT use in business established by end of fiscal year 2015
		Tobago SMEs sensitized on benefits of ICTs to business
		20 percent increased uptake of ICTs by businesses by 2014 and 50 percent uptake by end of fiscal year 2016
	5.3.1 Shared Storage and Shared Infrastructure	Enhance shared storage and infrastructure facilities established by end of fiscal year 2015
		Efficient use of government ICT infrastructure leading to reduced expenditure

	Programme	Outputs and Outcomes
YEAR ONE TO FOUR 2014 – 2017	2.1.1 Development of e-Services that ensure digital inclusion	e-Services designed to ensure utilisation of all ICT platforms (web, mobile, SMS) by end of fiscal year 2015
		A minimum of 10% annual increase in uptake of e-Services among underserved communities
	3.2.1 Facilitate SME e-commerce awareness, education and training programmes	Three workshops per year targeting SMEs over a three year period
		A minimum of 10% increase in ICT usage by SMEs yearly by start of fiscal year 2015
	3.4.1 Develop and promote the National Integrated Business Incubator System (IBIS)	Expand incubator system for ICT start-ups over the lifespan of the Plan
		Increase in the number of ICT start-ups
	Tobago – 3.2 Develop and Implement an e- commerce strategy for the Tourism Sector	e-Commerce Strategy for Tourism Sector developed by end of fiscal year 2014
		e-Commerce solution for Tourism Sector implemented by fiscal year 2015
		e-Commerce solution for Tourism Sector fully utilized by fiscal year 2016
		Increased use of e-Commerce mechanisms among businesses in the Tourism Sector
	Tobago – 5.1 Collaborating to implement shared ICT systems and processes	All THA divisions migrate onto GovNeTT by end of fiscal year 2014
		Government Interoperability Framework developed for Tobago by end of fiscal year 2014
		THA intranet established by end of fiscal year 2016
		All divisions of the Tobago House of Assembly connected by fiscal year 2017 (*phased approach to deployment starting in fiscal year 2014*)

	Programme	Outputs and Outcomes
YEAR ONE TO FIVE 2014-2018	1.1.4 Develop ICT training framework	ICT Training Framework developed by end of fiscal year 2015
		Clear approach for ICT skills development
	1.3.1 Offer scholarships in identified areas of research	Annual increase in ICT scholarships
		ICT On-the-Job Trainee (OJT) Programme launched by the end of fiscal year 2014
		Increase in number of ICT graduates
	3.1.1 Move Government business online	ICT infrastructure for G2B Portal installed by end of fiscal year 2016
		G2B Portal introduced by second quarter fiscal year 2016
		G2B Portal fully functional by first quarter fiscal year 2018
		e-Procurement implemented for all of GoRTT by end of fiscal year 2018
		Increased number of businesses transacting electronically with Government
	3.2.2 Promote and facilitate increases in the availability of funding for SME e-Business adoption	Two awareness campaigns conducted annually on venture capital incentives, loan facilities, entrepreneurial funding, T&T Free Zones, innovation financing, enterprise wide solutions
		Increased funding incentives provided to SMEs from 2014 onward
		Increased e-Business adoption amongst SMEs
	3.3.2 Promote ICT cluster development	Foreign Investment Act and intellectual property laws revised by first quarter 2015
		Incentives for cluster formation identified and provided by end of fiscal year 2016
		Increased Foreign Direct Investment in the ICT Sector

	Programme	Outputs and Outcomes
YEAR ONE TO FIVE 2014 – 2018	4.1.2 Broadband Acceleration Plan	Competition Policy Framework developed by end of fiscal year 2015
		Increase the percentage of the population with broadband access speeds of 10 Mbps as follows: 2014 ∞ 60%, 2015 ∞ 70%, 2016 ∞ 80%, 2017 ∞ 90%, 2018 ∞ 98%
		Strategies aligned to Universality Policy approved and implemented by start of fiscal year 2015
		Resilient infrastructure projects to improve off-island connectivity initiated by first quarter 2015
		Identification of locations to facilitate IXP and data centres completed by first quarter 2015
		Central body established to obtain approvals for towers by start of fiscal year 2016
		New cable landing station and carrier hotel to increase inter-island infrastructure capacity and redundancy will be 60 percent completed (i.e. all planning and design work and the commencement of implementation) by the end of fiscal year 2018
		77 percent fixed broadband penetration in excess of 10 Mbps by end of fiscal year 2018
		95 percent mobile broadband penetration in excess of 5 Mbps by end of fiscal year 2018
		Harmonized wireless connectivity for increased broadband access nationally by end of fiscal year 2018
	4.1.3 Development of the Internet Infrastructure	IXP and F-root Server to be established by first quarter fiscal year 2014
		IPv6 Readiness Assessment and migration plan completed by second quarter of fiscal year 2015
		Conversion to IPv6 standards by first quarter 2017
		Guaranteed long-term connectivity to the Internet by end of fiscal year 2017
	4.3.1 Information Society Legislation-tt (eL –tt)	e-Legislative ecosystem fully established and enabled by start of fiscal year 2018
		Creation of a legal environment that facilitates a culture of transparency, accountability and consumer/business empowerment

YEAR ONE TO FIVE
2014 – 2018

Programme	Outputs and Outcomes
Tobago 4.1 Broadband and Connectivity	Enhancement of submarine link with Tobago by end of fiscal year 2014
	The terrestrial primary backbone network needed to improve connectivity implemented by end of fiscal year 2015
	Redundancy measures implemented by end of fiscal year 2015
	63 percent households with broadband penetration in excess of 5 Mbps by end of fiscal 2016
5.1.1 G2C e-Service Delivery	G2C e-Services Policy developed by first quarter of 2014
	Business process re-engineering completed by end fiscal year 2014
	Promotion and awareness programmes launched first quarter of fiscal year 2015
	90 percent of government services available to citizens electronically by end of fiscal year 2018
5.1.2 G2B e-Service Delivery	G2B e-Services Policy developed by first quarter of 2014
	Business process re-engineering completed by end fiscal year 2014
	Promotion and awareness programmes targeted at MSMEs launched first quarter of fiscal year 2015
	100 percent of government services available to businesses electronically by end of fiscal year 2018
5.3.3 Middleware Platform	Middleware Platform implemented by third quarter fiscal year 2014
	70 e-Services deployed by end of fiscal year 2018
	Increased efficiency in end to end transaction times for government services

YEAR ONE TO FIVE
2014 – 2018

Programme	Outputs and Outcomes
5.4.1 National Cyber-Security Strategy	Cyber Crime Bill developed and approved by end of fiscal year 2014
	National Cyber-Security Strategy developed and approved by beginning of fiscal year
	2015Cyber Threat Monitoring Centre established by the second quarter of fiscal year 2015
	Decreased incidents of cybercrime
5.4.3 Information Security Awareness Programme	ISAP for GoRTT developed for all Ministries, Agencies and State Bodies by start of fiscal year 2014
	On-going Security Awareness Programme for public servants to commence by second quarter fiscal year 2014
	ISAP for citizens and residence of Trinidad and Tobago developed by second quarter fiscal year 2014
	On-going Security Awareness Programme for citizens to commence by end fiscal year 2014
	Increased overall awareness of ICT security issues, improved vigilance and decreased cyber-victimisation
5.4.4 Risk Management Programme	Programme to identify, assess and report on risks established by start of fiscal year 2014
	Robust monitoring of ICT related risks to commence by end of fiscal year 2014
	Increased risk mitigation and improved oversight of ICT related risks
Tobago – 5.1.1 Government to Citizen e-Services Delivery	Strategy developed for **ttconnect** Tobago by first quarter of fiscal year 2014
	Business process re-engineering completed by end fiscal year 2014
	Reduction in travel time between Trinidad and Tobago in order to transact with government

	Programme	Outputs and Outcomes
YEAR TWO TO THREE 2015 – 2016	1.2.2 Create digital content for use at all levels of education	Primary and secondary level e-curriculum polices to promote the creation of digital content developed by second quarter of fiscal year 2014
		Open source educational software made available at all levels of education by end of fiscal year 2015
		Student Connect platform developed and implemented by first quarter of 2016
		Increased benefits derived from optimal use of technology
	1.2.4 Leverage diaspora and wider Caribbean to fund/promote digital content	Media campaign to facilitate outreach to the diaspora launched by second quarter of fiscal year 2015
		Increase in the number of partnerships between local companies and the diaspora annually
	1.3.5 Establish ICT awards and incentives schemes	Launch community grants for ICT solutions by first quarter of fiscal year 2015
		Provide grants to learning institutions to establish computer clubs by first quarter fiscal year 2015
		Innovation Technology competitions for students launched by the second quarter of fiscal year 2015
		Increase in number of person producing local digital content
	Tobago – 2.1 Computers and Connectivity for Digital Inclusion	Community Access Centres fully functional in Tobago by start of fiscal year 2015
		Increase in number of persons with access to technology
	3.4.2 Develop and implement an e-Commerce strategy for the agriculture sector as a model for other key sectors	e-Commerce strategy developed for the agriculture sector by start of fiscal year 2015
		Roll-out of the e-commerce strategy by second quarter 2015
		A minimum of 40 percent of businesses in the agriculture sector with operations in alignment with the e-Commerce strategy by end of fiscal year 2016

	Programme	Outputs and Outcomes
YEAR TWO TO THREE 2015 – 2016	4.2.2 National Infrastructure Taskforce	National Infrastructure Taskforce fully operational by the first quarter fiscal year 2015
		ICT Infrastructure strategies aligned to the Universality programme, and implemented by the end of the first quarter 2015
		Implementation of superior quality ICT infrastructure
	5.4.5 Disaster Recovery & BCP Framework for GoRTT	GoRTT policy on business continuity planning approved by the start of fiscal year 2015
		ISO Standards – ISO/EC 24762:2008 and ISO/IEC 27031:2011 fully implemented by end of fiscal year 2016
		Reduced likelihood of data loss across Government

	Programme	Outputs and Outcomes
YEAR TWO TO FOUR 2015 – 2017	1.1.3 m-Learning	Mobile Phone Education Policy developed and implemented by end of fiscal year 2015
		M-Learning infrastructure implemented by third quarter of fiscal year 2015
		M-Learning pilots and programmes developed and executed for youths and adults by end of fiscal year 2016
		Increased reach, greater efficiency, and improved environment to promote innovation
	1.3.3 Department of R&D in ICT	Innovation Strategy and Plan implemented by end of fiscal year 2015
		Department of R&D established by first quarter of fiscal year of 2017
		Increased investment in R&D and improved ranking on the international indicator; “Capacity for Innovation”
	1.3.6 Establish incubator for technology/solution transfer and commercialization	TT ICT innovation centre initiative launched by end of fiscal year 2015
		Greater government influence over technology led diversification of Trinidad and Tobago’s economy
	2.2.1 Computers and connectivity for digital inclusion	Subsidies for broadband internet connection offered to underserved populations by the start of fiscal year 2015
		Tax exemptions offered to Internet Service Providers (ISP’s) who make services affordable to underserved populations by start of fiscal year 2015
		Software tools offered to underserved populations on a sliding scale by the start of fiscal year 2017
		Training on software tools offered to underserved populations by the start of fiscal year 2017
		Increased technology access for underserved populations
	2.4.1 R&D focused on digital divide	Grants for researchers who focus on topics related to digital exclusion offered by start of fiscal year 2015
		Awards for research related to digital exclusion offered by the start of fiscal year 2017
		Increased understanding of the corrective measures required to close the digital divide

	Programme	Outputs and Outcomes
YEAR TWO TO FOUR 2015 – 2017	3.3.1 Facilitate a pro-enterprise environment	Expansion of the Single Electronic Window (SEW) completed by end of fiscal year 2015
		Expansion of ASYCUDA completed by end of fiscal year 2015
		Creation of a seamless interactive experience for the business customer
	4.2.1 Cross Utility Sector Collaboration	Cross Utility Sector Collaboration Committee established by first quarter 2015
		High levels of coordination among providers and improved inter-utility sharing arrangements
	5.1.3 Multi-channel Access	Channel Management framework developed and implemented by end of fiscal year 2015
		Franchising Policy for ttconnect Service Centres developed by the end of fiscal year 2017
		Business model for integrated channel service delivery developed by second quarter 2015
		Increased access to government services through the ttconnect multi-channel service delivery vehicle
	5.1.4 e-Democracy Platform	Policy to govern the sharing of information and the rules of engagement for the e-Democracy Platform developed by the third quarter fiscal year 2015
		Design for the e-Democracy Platform completed by end fiscal year 2015
		Pilots of the e-Democracy Platforms in small scale environments completed by end fiscal year 2016
		e-Democracy Platform available for various applications across Government and other stakeholders by third quarter fiscal year 2017
		e-Democracy Platform fully deployed by the end of fiscal year 2017
		Increased transparency and improved information flow between Government and citizens

	Programme	Outputs and Outcomes
YEAR TWO TO FOUR 2015 – 2017	5.2.1 Enhancements to GovNeTT and VoIP	Channel Management Framework developed by second quarter fiscal year 2015
		Constituent Management Framework developed by second quarter fiscal year 2015
		Architecture and deployment for the 3rd phase of GovNeTT completed by second quarter fiscal year 2017
		Improved Wide Area Network (WAN) connectivity, greater availability of remote computing, and a streamlined platform for the deployment of e-services.
	5.2.3 National Geographic Information System (GIS) Plan	GIS policy developed by end of fiscal year 2015
		Data Management System developed and implemented by first quarter of fiscal year 2017
		GIS system fully functional by end of fiscal year 2017
		Improved decision-making in key areas such as urban planning, transportation logistics, crime and security etc.
	5.2.6 Cloud Computing	Develop and implement Cloud Computing Policy by the end of fiscal year 2014
		Preliminary requirements for the Government cloud (G-cloud) will be initiated by second quarter fiscal year 2014
		Reduced capital and recurrent expenditure and increased computing efficiency

	Programme	Outputs and Outcomes
YEAR TWO TO FIVE 2015 – 2018	1.3.4 Attract and retain ICT professionals	Regional Compensation Survey completed by the first quarter of fiscal year 2015
		Strategy to attract and retain ICT professionals developed by end of fiscal year 2015
		Strategy to attract and retain ICT professionals rolled-out by first quarter fiscal year 2016
		Increased human resource capability and capacity in the national ICT sector
	2.3.1 Increased and affordable ICT education and training toward digital inclusion	ICT scholarships offered to traditionally excluded segments of the population by start of fiscal year 2015
		Community ICT training and certification provided to traditionally excluded segments of the population by end of fiscal year 2015
		ICT up-skilling of traditionally excluded segments of the population
	4.1.1 Universality	Telecoms legislation to support infrastructure expansion enacted by end of fiscal year 2015
		Subsidies for the underserved and un-served areas offered by end of fiscal year 2016
		ICT services ubiquitously available to all geographic locales and for all social-economic strata

	Programme	Outputs and Outcomes
YEAR THREE TO FOUR 2016 – 2017	5.2.2. Smart Card Development	Smart Card Policy developed by second quarter of fiscal year 2016
		Client data hosting established by first quarter fiscal year 2017
		Infrastructure integrated by end fiscal year 2017
		Improved tracking of citizen data
		Enhanced convenience and security for transactions; inclusive of a reduction in the likelihood of identity theft

	Programme	Outputs and Outcomes
YEAR FOUR 2017	3.3.3. Develop a Localised Search Engine for Marketing Businesses Online	Local search engine for businesses implemented by start of fiscal year 2017
		Online Carnival Hub established by start of fiscal year 2017
		Greater exposure and marketing of local businesses as well as increased accessibility to information on local businesses
		Increased promotion of Trinidad and Tobago Carnival