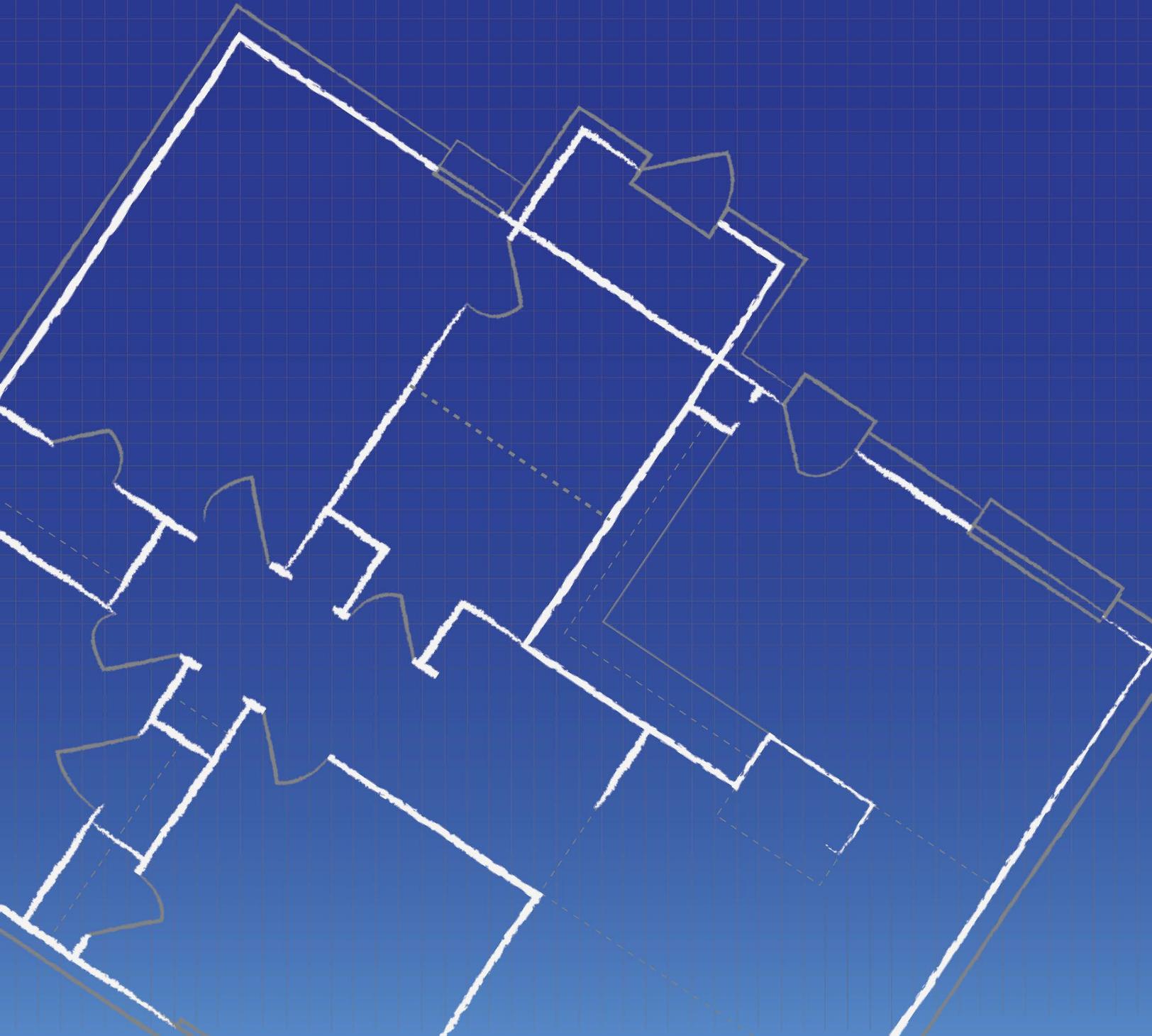




ICT

BLUEPRINT

NATIONAL ICT PLAN 2018 - 2022



About the ICT Blueprint

The National ICT Plan is Trinidad and Tobago's five-year National Information Communication Technology (NICT) Plan for 2018 to 2022. The result of co-creation, the Plan is driven by the needs and priorities of the Government, business, and the citizens of Trinidad and Tobago - as well as the country's regional and international obligations. The Plan outlines the National ICT Agenda, it builds on the country's past performance in ICT, and declares a bold vision of a future, transformed through ICT and characterised by: empowered people, competitive businesses and transformational government.

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Dr. the Honourable Keith Rowley
Prime Minister of the Republic of Trinidad and Tobago

Letter

from the Prime Minister of the Republic of Trinidad and Tobago

Information and Communication Technology (ICT) continues to transform the way we live and conduct business. The Trinidad and Tobago National ICT Plan 2018-2022 underscores the importance placed by the Government of the Republic of Trinidad and Tobago on ICT as:

- A driver for economic growth and diversification;
- A critical tool for promoting competitiveness and building innovative capacity; and
- A cross-cutting enabler for sustainable development that affects all aspects of life.

The timing of the Plan could not be better. The downturn in the energy sector has served as a strong signal that we can no longer rely on our finite reserves of oil and gas for continued prosperity. While these are difficult times, I am of the strong view that such challenges also afford opportunities for exploring new approaches, while improving on existing avenues that can inform Trinidad and Tobago's quest for sustainable development. In this context, the establishment of the ICT sector is viewed as a significant component in the country's arsenal to secure international competitiveness and diversification of the national economy. This, coupled with the cross-cutting impact of ICT across all sectors, will provide our citizens with the improved standards of living that they are demanding and which they deserve.

The Government is tasked with determining the right balance between meeting immediate and compelling needs and those development goals which are medium to longer term in nature. As a critical complement to Vision 2030, the overarching National Development Strategy, the Plan addresses this dilemma. It identifies critical issues that require immediate attention while at the same time crafting the architecture needed to develop more long term solutions. In such a scenario, the role of Government as provided for in the National ICT Plan will be that of facilitator in which we would provide the enabling environment for citizens and businesses to adapt to the demands and exploit the opportunities afforded by ICT and the new economy.

We must be cognisant that Trinidad and Tobago is a small island developing state in a globalised international community. A community which has changed significantly as a result of scientific and technological development and innovation. We are now faced with hitherto unforeseen challenges as well as more familiar ones, all of which require collective responses that are developed through collaboration and cooperation with all stakeholders at the national, regional and international level

Dr. the Honourable Keith Rowley
Prime Minister of the Republic of Trinidad and Tobago

Preface

by the Honourable Minister of Public Administration



**The Honourable Marlene McDonald
Minister of Public Administration**

I am pleased to present to the national community the ICT Blueprint, the National Information and Communication Technology (National ICT) Plan 2018-2022. This is a comprehensive five-year plan, which is driven by the needs and priorities identified internally - by the Government, businesses and the people of Trinidad and Tobago, as well as externally - by the country's regional and international obligations.

The original plan, *fastforward 2003-2008*, marked the inception of national ICT planning in Trinidad and Tobago and it was aligned to Vision 2020. This Plan spoke to a 'connectivity agenda' reflecting the emphasis on connecting communities, schools, and Government, an agenda which was substantially achieved in the expected timeframe. Subsequently, a new National ICT Plan was developed in 2014, titled *smarTT*, which focused in its first phase (2014-2018) on Government's thrust to increase ICT uptake and usage within the public and private sectors and generally among citizens.

The development of the third National ICT Plan was embarked upon in 2016 with a view to ensuring alignment with Vision 2030, the National Development Strategy of the Government of the Republic of Trinidad and Tobago. Consistent with its predecessors, the ICT Blueprint will contribute to national strategic priorities as it supports, through ICT enabling policy and digital technologies, the aspirations and objectives of Vision 2030.

The national vision is that ICT will play a fundamental role as both an enabler of national development as well as a sector for economic diversification. Specifically, ICT will not only enhance service delivery to improve citizen satisfaction for both public and private sector delivered services, but will provide the means for citizens to participate or contribute for example in framing policy. Major projects such as the liberalisation of the telecommunications sector and *ttconnect* (the eGovernment Portal) have positioned the country amongst leading eGovernments in the Caribbean. With increasing digitisation of Government and businesses, and continued enhancement of ICT infrastructure, not only will public service delivery be transformed, but also ICT investments will be optimally utilised for transformation of economic sectors.

The successful attainment of the foregoing objectives will necessarily require the establishment of an appropriate ICT governance framework to support the new National ICT Plan. Such a framework will be appropriately supported by government and private sector involvement.

Accordingly, I invite all stakeholders in the public, private, and civil society sectors and indeed, all of our citizens to join me in embracing, utilising, and taking full advantage of the benefits of our National ICT Plan, the ICT Blueprint 2018-2022.

**The Honourable Marlene McDonald
Minister of Public Administration**

Foreword

The ICT Blueprint, the National Information and Communication Technology Plan of Trinidad and Tobago for the period 2018-2022 is comprised of a comprehensive system of programmes and initiatives which build upon the initial *fastforward* plan (2003-2008) – which focused on ‘connectivity’ – and its successor *smarTT* (2014-2018), where focus was shifted to uptake and usage. The common themes in the continuum of national ICT planning are directed at leveraging the power of people, innovation, industry, education and infrastructure to transform the nation into a dynamic, sustainable and prosperous future by harnessing the power of ICT.

The ICT Blueprint complements and serves as the digital enabler of the National Development Strategy, Vision 2030, which has been adopted by the Government of the Republic of Trinidad and Tobago (GORTT) as the vision and framework for the country’s sustainable development, recognising the transformation required across all segments of society to face and surmount developmental challenges.

The National ICT Working Group has noted the Government’s stated goal of transitioning the economy from its traditional dependence on hydrocarbon exploitation. In this regard, the Working Group endorses the view of the role and potential of information and communications technology (ICT) as a discrete sector and as a means of enhancing productivity and access across all sectors. This would redound to the development of new engines of economic growth and create the potential for indigenous streams of income generation.

ICT, therefore, has the potential to support the process of diversification and as such the National ICT Working Group in concert with GoRTT and informed by targeted stakeholder consultation, has moved aggressively to initiate necessary frameworks. These frameworks are supported by GoRTT enabled infrastructure and incentives which can accelerate and promote ICT-led economic prosperity and would lay the foundation for the transformation of Trinidad and Tobago into a knowledge-based economy¹.

We, the members of the Working Group, are justifiably proud of the inputs and contribution of all stakeholders, including the citizens of Trinidad and Tobago, in the development of this National ICT Plan and remain confident that with their continued inclusion and participation, there will be meaningful realisation of the country’s developmental goals through the deployment of ICTs.

National ICT Plan Working Group

¹ An economy which is directly based on the production, distribution and use of knowledge and information.

Executive Summary

Empowered People, Competitive Businesses, Transformational Government, through ICT

The ICT Blueprint is Trinidad and Tobago’s five-year National Information Communication Technology (National ICT) Plan for 2018 to 2022. The result of co-creation, the Plan is driven by the needs and priorities of Government, business, and the people of Trinidad and Tobago — as well as the country’s regional and international obligations. The Plan outlines the NICT Agenda, it builds on our past performance in ICT, and it declares a bold vision to see Empowered People, Competitive Businesses, and Transformational Government, through ICT.

Our vision of Empowered People is where citizens:

- have pervasive access to ICT;
- are connected to broadband infrastructure which provides a variety of services that are affordable, of high quality, safe, and secure; and
- are deriving high value from the use of ICT, benefiting themselves and society.

Our vision of Competitive Business is where businesses:

- are supported by robust, advanced, and secure infrastructure;
- are enabled by the requisite legislative framework;
- are supported by a technologically skilled workforce; and
- are continuously aspiring to innovate in their products, processes, and operations.

Our vision of Transformational Government is where Ministries, Departments and Agencies:

- are deploying ICT to transform operations to a state where digital becomes the default, yielding time and cost savings;
- are delivering services that are simple, fast, secure and end-to-end; and
- are achieving efficiencies within and across entities through data analytics, shared platforms, and the use of other resources to deliver better with less.

The Vision of the ICT Blueprint is ultimately to support the **National Development Strategy 2016–2030, Vision 2030**, which outlines the country's aspiration to attain developed nation status by 2030. Whilst supporting Vision 2030, the Plan is also expected to meet the country's anticipated social and economic needs. Converging these needs with the potential of ICT, five Strategic Thrusts have been identified to realise the National ICT Vision. They are:

STRATEGIC THRUSTS

1. Improving Connectivity
2. Increasing Human Capacity
3. Digital Government
4. Fostering Economic Development
5. Advancing the Environment for Societal Benefit

Headline Targets

Through the Blueprint, the objective is to achieve these main targets for Trinidad and Tobago by or before 2022:

- An increase to **5%** of the ICT Sector's contribution to GDP
- **85%** broadband access at the minimum download speed detailed within the National Broadband Plan
- **5** high demand/volume, strategically important Government services as end-to-end eServices
- **5** enterprise-wide applications operationalized to run routine functions of Government
- **50%** adoption of Government shared service
- **50%** adoption of Government shared infrastructure
- **30,000** direct jobs created
- **50,000** users participate in eForums moderated by Government
- **#1** in the Caribbean in the World Economic Forum (WEF) Network Readiness Index (NRI)
- **#1** in the Caribbean on the International Telecommunications Union (ITU) ICT Development Index (IDI)

Conclusion

Taken together, the proposed five Strategic Thrusts seek to enable Trinidad and Tobago to achieve the National ICT Vision. The strategies and programmes outlined in this Plan demonstrate the path to success.

Successful implementation of the ICT Blueprint requires collaboration among all stakeholders- particularly in the public and private sector. Alongside this, the appropriate levels of funding must be mobilised to deliver the requisite programmes and projects. Further, successful implementation also requires careful and diligent management of the Plan through an appropriate governance structure which outlines responsibility for monitoring progress and performance using benchmarks across the five Strategic Thrusts. Monitoring adoption and usage of ICT in households, businesses, and Government will be given particular attention. An implementation framework has been developed to complement this document.

INTRODUCTION



The **National Development Strategy 2016–2030, Vision 2030**, outlines Trinidad and Tobago's strategic intention to attain "first-world nation status"² by 2030. To achieve this end state, Vision 2030 sets out five Thematic Areas³:

Theme I:

- Putting People First: Nurturing Our Greatest Asset

Theme II:

- Delivering Good Governance and Service Excellence

Theme III:

- Improving Productivity through Quality Infrastructure and Transportation

Theme IV:

- Building Globally Competitive Businesses

Theme V:

- Placing the Environment at the Centre of Social and Economic Development

As the country advances, ICT will play a critical role as both a catalyst for and an enabler of national development. ICT cross-cuts each of the themes of the National Development Strategy, thus providing the opportunity for the National ICT Plan to directly contribute to the advancement of Vision 2030.

It is against this backdrop that the ICT Blueprint for 2018 to 2022 was developed. The Blueprint is a holistic five-year plan driven by the needs and priorities identified by Government, businesses, and the people of Trinidad and Tobago, as well as the country's regional and international obligations.

It outlines a prioritised suite of the programmes and projects to effectively guide ICT development over the next five years. Ongoing programmes and projects will also be seamlessly integrated to support these efforts.

ICT investments, estimated returns, and cost savings to the country will be monitored and reported to ensure that the expected outcomes are met. As part of the Plan's implementation framework, a review will be conducted in the third year. Additionally, Government will establish the appropriate ICT governance framework to support the Plan's realisation.

² National Development Strategy 2016-2030, Vision 2030 August 2016. Page 44.

³ These Goals are in alignment with the Sustainable Development Goals (SDGs) established by the United Nations

This document outlines the strategies and programmes to be implemented to achieve the national ICT vision, which, in turn, is aimed at:

- Supporting the objectives of Vision 2030;
- Enhancing the quality of life of citizens for generations present and future;
- Increasing opportunities for economic growth and diversification; and
- Improving operational efficiency and enhancing service delivery within Government

National ICT Planning 2003 - 2017

fastforward, the National ICT Strategy 2003-2008 marked the inception of national ICT planning in Trinidad and Tobago. *fastforward* supported the then National Development Strategy, Vision 2020, and focused on 'connectivity' as the foundational element of the country's ICT Agenda.

A new National ICT Plan was introduced in 2014. Titled *smarTT*, the Plan was informed by the Seven Interconnected Pillars for Sustainable Development and comprised three phases, each with its associated objectives as detailed below:

- Phase I: 2014 to 2018, focused on Government's thrust to increase ICT utilisation and uptake within the public and private sector, and among citizens.
- Phase II: 2018 to 2022, emphasised the development of specific industries to enhance Trinidad and Tobago's value proposition in regional and international markets.
- Phase III: 2023 and beyond, envisioned ICT and related sectors as significant contributors to GDP.

In 2016, work began on the development of a new National ICT Plan for 2018 to 2022. Like its predecessors, the Plan will support the National Development Agenda of Trinidad and Tobago, as outlined in the National Development Strategy 2016–2030, Vision 2030.

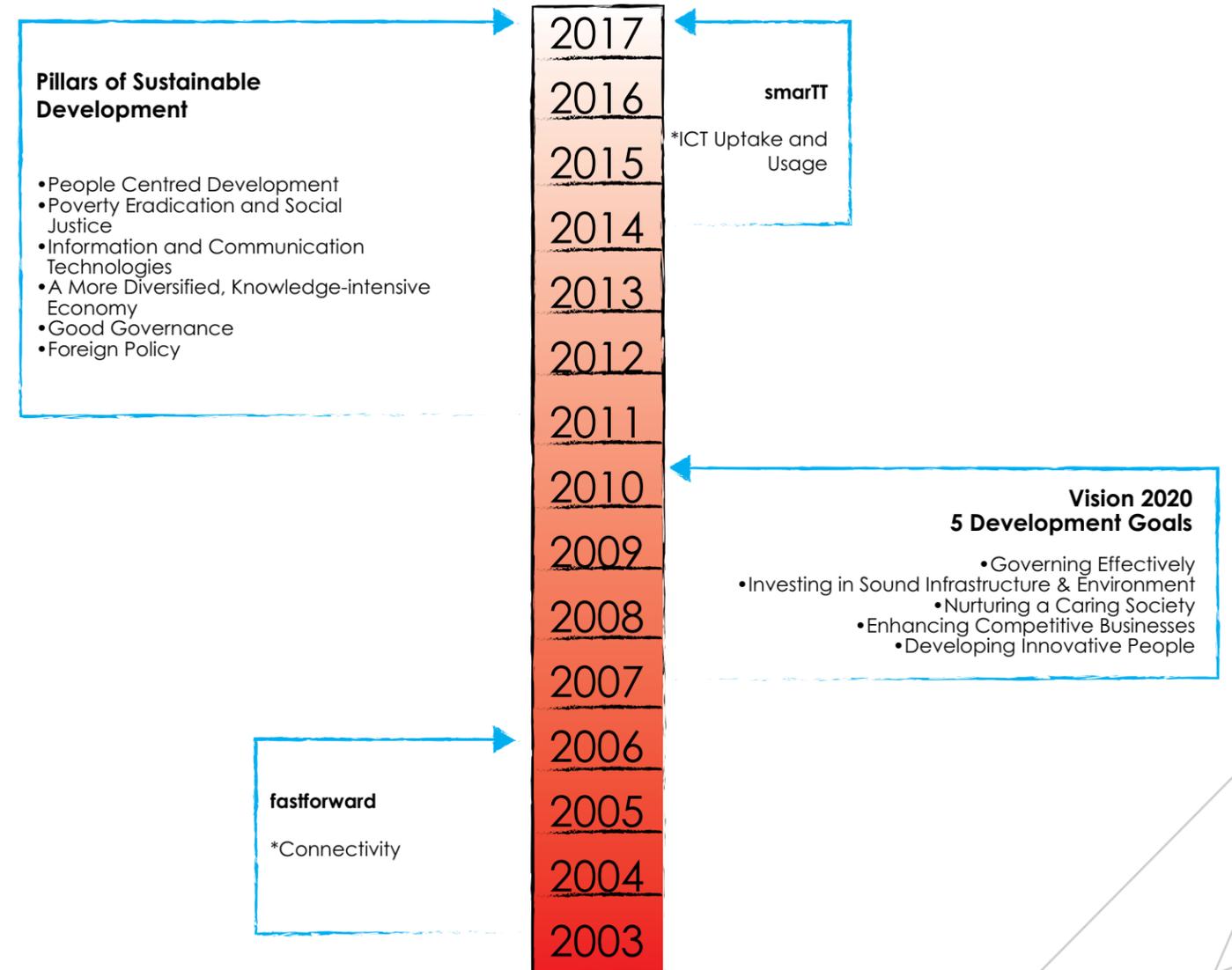


Figure 1: National ICT Planning 2003-2018



National Progress and Challenges

Since the roll out of *fastforward* in 2003, Trinidad and Tobago has made progress in developing the national ICT landscape.

Some areas of **advancement** include:

- The Growth of the Telecommunications and Broadcasting Sector:** This is a dynamic sector which continues to grow at a fast pace. Competition created by liberalisation has resulted in, *inter alia*:

 - 1) an increase in the number of service providers⁴;
 - 2) an increase in the quality and choice of services;
 - 3) a reduction in prices; and
 - 4) an increase in industry revenues from TT\$ 3.3 Billion in 2006⁵ to TT\$ 5.6 Billion in 2016⁶.

The sector is expected to continue to evolve to meet increasing demand.
- ICT Availability/Connectivity:** The country's telecommunication infrastructure has expanded significantly, as reflected in the growth in access networks which provide fast connectivity while enabling greater reliability and reach of service delivery. Further, ongoing investment plans to increase capacity are promising⁷. More robust and widespread deployment of infrastructure will support ubiquitous broadband connectivity for households and businesses, and allow the country to meet its networking needs.
- Digital Government:** All Government entities are now online and information on Government services (627 for citizens, 256 for businesses, and 118 for non-residents⁸) can be found on the government portal, *ttconnect*. Moreover, Government's single electronic window to facilitate business and trade related services, *TBizLink*, has been widely acclaimed. This online platform facilitates collaboration among multiple government entities to provide electronic approvals for over 25 Government to Business (G2B) services including certificates of origin, import/export permits and licenses, company registration and work permits.

⁴ See table in Appendix: "ICT Market Environment in Trinidad and Tobago"
⁵ The Telecommunications Authority of Trinidad and Tobago, Annual Market Report: Telecommunications and Broadcasting Sectors – 2006. Trinidad and Tobago, the Telecommunications Authority of Trinidad and Tobago, 2007. Page 7
⁶ The Telecommunications Authority of Trinidad and Tobago, Annual Market Report: Telecommunications and Broadcasting Sectors – 2016. Trinidad and Tobago, the Telecommunications Authority of Trinidad and Tobago, 2017. Page 12
⁷ See Strategic Thrust 1, "S1: Enhancing Infrastructure" for details on the investment programmes.
⁸ Trinidad and Tobago Government Online, *ttconnect*: government at your service. Government of the Republic of Trinidad and Tobago, 2008-2016.

- The progress made by Trinidad and Tobago in ICT is captured in a number of national and international indicators:
- The country ranked 67th of the 139 countries surveyed in the 2016 World Economic Forum's Networked Readiness Index—this is up from 70th position in 2015⁹.
- In 2015, mobile penetration stood at 157 per cent, one of the highest in the world¹⁰ — for all countries the average is 97 per cent¹¹.
- In 2013, 70 per cent of households had at least one computer¹² — up from 42 per cent in 2010¹³.
- Internet household penetration has jumped from 58 per cent of households in 2014 to 65 per cent in 2015¹⁴.
- Broadband usage/subscription stood at 278,000 in 2015¹⁵, compared to 46,230 in 2007¹⁶.

Notwithstanding these indicators, which demonstrate the foundation laid by Trinidad and Tobago for ICT progress, major challenges exist in advancing the country's ICT agenda. These **challenges** include:

Universal Connectivity: 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 needs. In this regard, government funding and/or regulatory intervention may be needed to ensure that such needs are met. The continued facilitation of broadband development will be marked by projects to promote widespread access to robust and secure broadband services throughout the country. This would serve as a significant driver of development, economic growth, job creation, and as a critical component of GoRTT's broader objective of attaining first world nation status.

⁹Silja Baller, Soumitra Dutta, and Bruno Lanvin, The Global Information Technology Report 2016: Innovating in the Digital Economy. World Economic Forum, Geneva: The World Economic Forum and INSEAD, 2016. Page 182

¹⁰The Telecommunications Authority of Trinidad and Tobago, Annual Market Report 2015. Page 12

¹¹ICT Data and Statistics Division, ICT Facts & Figures. Geneva: International Telecommunication Union, 2015. Page 2

¹²Telecommunications Authority of Trinidad and Tobago, The Digital Divide Survey Trinidad and Tobago, 2013. Telecommunications Authority of Trinidad and Tobago. Page 7

¹³The National Information and Communication Technology Company Limited (iGovTT), Trinidad and Tobago National ICT Plan 2012-2016: smartT National ICT Plan 2012-2016. Government of Trinidad and Tobago, The National Information and Communication Technology Company Limited (iGovTT), 2012. Page 16

¹⁴Ibid., Page 57

¹⁵The Telecommunications Authority of Trinidad and Tobago, Annual Market Report 2015, Telecommunications and Broadcasting Sectors; 10th Edition Journey Towards a Digital Society. Republic of Trinidad and Tobago: The Telecommunications Authority of Trinidad and Tobago, June 2016. Page 50

¹⁶The Telecommunications Authority of Trinidad and Tobago, Annual Market Report: Telecommunications and Broadcasting Sectors – 2007. Trinidad and Tobago, the Telecommunications Authority of Trinidad and Tobago, 2008. Page 32



ICT Skills: Although ICT penetration remains high — particularly among citizens and government — Trinidad and Tobago lags behind advanced and other developing nations in the productive and innovative use of ICT. For the ICT sector and the wider digital economy to advance, society must develop the technology skills to generate more indigenous content which can catalyse national social and economic sustainability.



Enabling Environment for ICT: Trinidad and Tobago lacks the robust legal and regulatory framework required for eBusiness, eCommerce and eServices. The full proclamation of several key pieces of ICT legislation, including the Electronic Transactions Act and the Data Protection Act, is still to be realised. Modern policies, regulations and legislation are crucial prerequisites for creating a vibrant ICT industry.



Collaboration: The country's level of maturity regarding the collaboration in the planning, designing, procurement and sharing of common ICT applications — to reduce cost, create standardisation across Government, and further enable efficiency gains through ICT — leaves room for improvement.

Trinidad and Tobago's consistent average ranking on International Development indicators proves that while advancements are being made, the above challenges must be addressed to fully realise the benefits of ICT-enabled development. Further details on the country's performance in these international indices are provided in Appendix 1.

The ICT Landscape in Tobago

The progress and challenges presented in the sections above are national in scope. While ICT development across Trinidad is not symmetrical, it is worth reflecting on some of the peculiarities that characterise the ICT landscape in Tobago. Generally, Tobago has a lower level of penetration and a unique administrative framework as set out by the Tobago House of Assembly (THA) Act. These factors, some of which are detailed below, have implications for the planning of strategies and programmes in the National ICT Agenda¹⁷:

- **Stakeholder Engagement:** The island has distinct systems/structures that extend from the district/community (Village Councils) to the national level which must be incorporated and leveraged in the development, rollout, and management of ICT programmes and initiatives.
- **Governance Framework:** The THA is to be an active partner in the planning process, if the desired outcomes are to match citizens' expectations.
- **ICT Readiness:** The islands of Trinidad and Tobago are at different stages of ICT readiness, particularly with respect to infrastructure, connectivity, skills, and access. Given the disparity in readiness, Tobago has experienced slower uptake of ICT, particularly among individuals and businesses. Therefore, ICT initiatives are to be tailored to meet the specific needs of Tobago.

¹⁷ In light of these differences the Plan has a suite of programmes that are specific to the island of Tobago, alongside programmes that are national in coverage.

Global ICT Technological Trends

In developing the ICT Blueprint it was important not only to look at the progress and challenges of ICT in Trinidad and Tobago, and the lessons learned, but also to explore global ICT trends to inform the strategic direction. Detailed in the figure below are some of the key global trends to be considered:

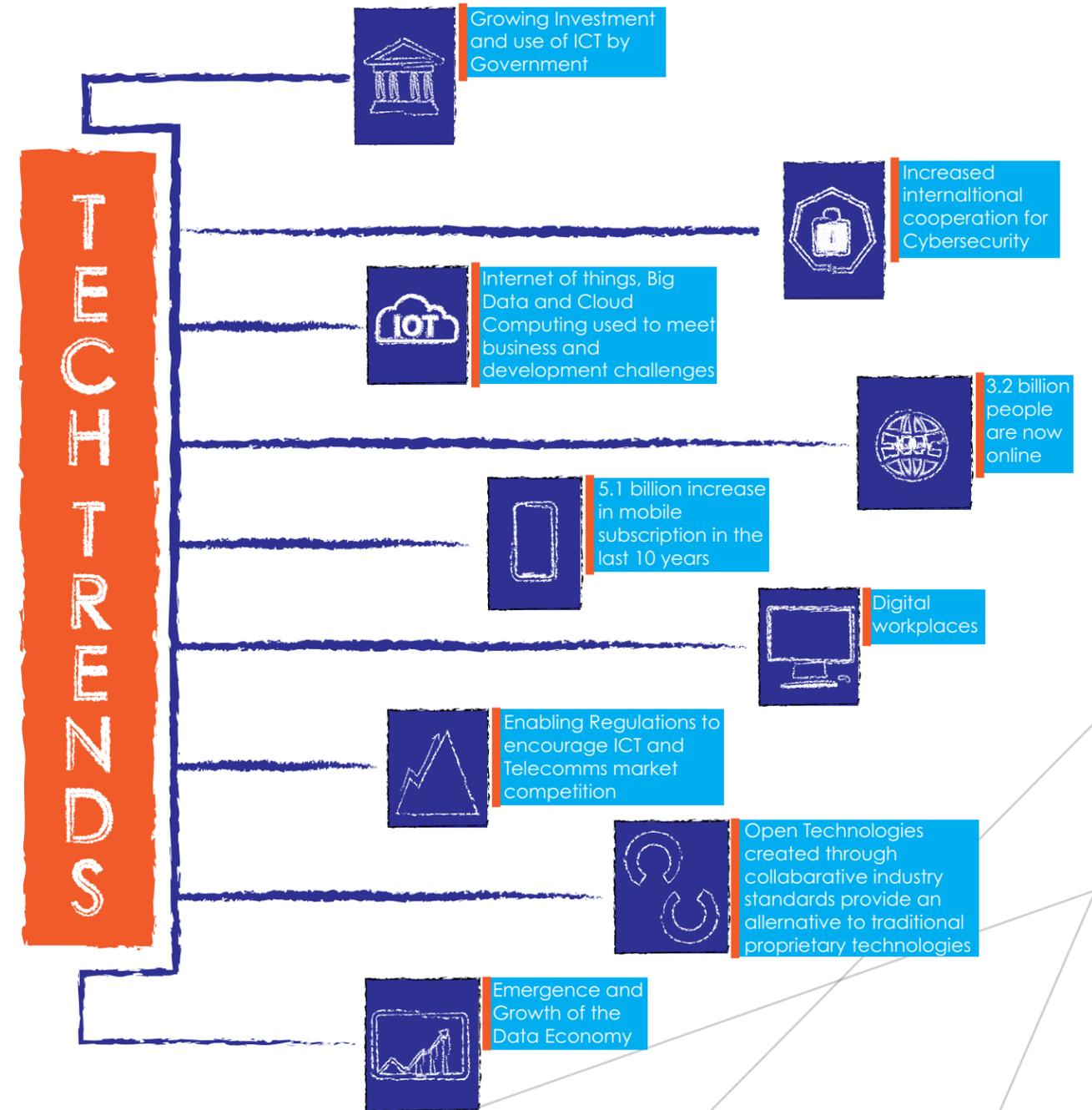


Figure 2: Global ICT Technological Trends

ICT FRAMEWORK 2018-2022

The National ICT Plan is built on a framework that consists of four components which are defined in Figure 3 below:

- 1. ICT Vision:** The National ICT goal to support the National Development Plan, Vision 2030 (and the country's regional and international obligations).
- 2. ICT Strategic Thrusts:** Strategic enablers (out of which flow programmes and projects) for achieving the National ICT Vision.
- 3. Supporting Ecosystem:** Strategic elements to support and enable the successful implementation of ICT initiatives under the Plan.
- 4. Guiding Principles:** Underlying guiding factors for ICT implementation

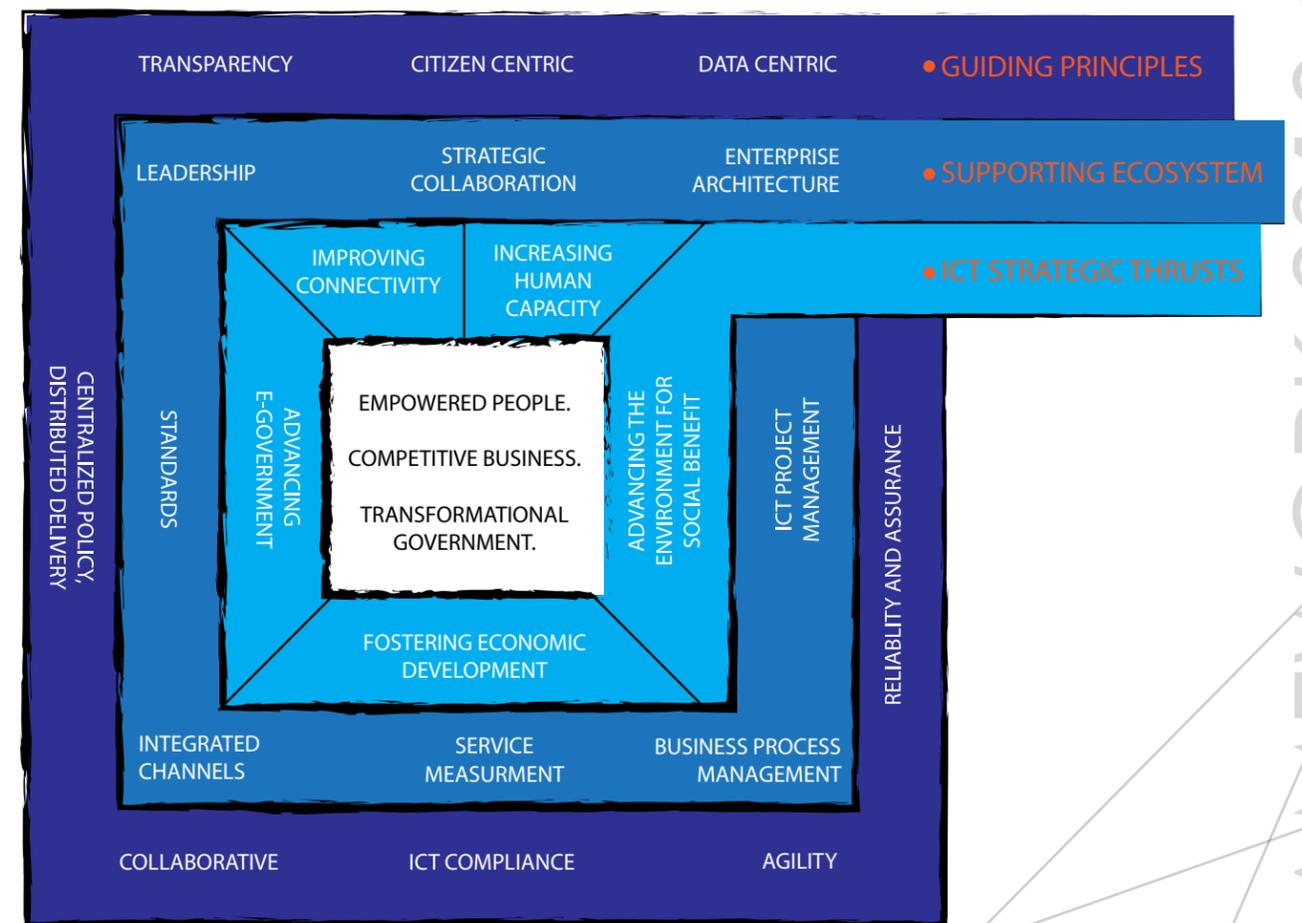


Figure 3: National ICT Planning Framework

Vision

By 2022, Trinidad and Tobago will achieve the vision of **empowered people, competitive businesses, transformational government through ICTs:**

Empowered People

where citizens:

- have ubiquitous access to ICT;
- are connected to broadband infrastructure which provides a variety of services that are affordable, of high quality, safe, and secure;
- are confident and skilled in the use of ICTs; and
- are deriving high value from the use of ICT, benefiting themselves and society.

Competitive Business

where businesses:

- are supported by robust and secure infrastructure;
- are enabled by the requisite legislative framework;
- are supported by a technologically skilled workforce; and
- are continuously aspiring to innovate in their products, processes, and operations.

Transformational Government

where Ministries, Departments and Agencies:

- are deploying ICTs to transform operations to a state where digital becomes default, yielding time and cost savings;
- are delivering services that are simple, fast, secure and end-to-end; and
- are achieving efficiencies within and across entities through data analytics, shared platforms, and other resources to deliver better with less

Strategic Thrusts

To support the National Development Goals, a comprehensive, strategic framework has been developed. It is organised into five Strategic Thrusts, which form the critical components needed to achieve the national ICT vision:

1. Improving Connectivity

Advancing the deployment of ICT infrastructure to support securely connected people, businesses, and government

Improving Connectivity focuses on national infrastructure development (including addressing gaps in the Government's telecommunications grid), creating access and service ubiquity, fostering usage, and maintaining an effective regulatory environment. A key aim of this Thrust is to facilitate and incentivise private sector investment and market actors to advance the national ICT infrastructure.

2. Increasing Human Capacity

Enhancing digital literacy and developing the skills to enable productivity and innovation

Increasing Human Capacity focuses on enhancing digital literacy and developing the skills to enable productivity and innovation within an e-ready society. Empowering citizens with ICT skills and competencies and growing awareness of ICTs for doing things better, doing things differently, and doing new things, in order to increase productivity, create new lifestyles and drive success in all forms of enterprise.

3. Digital Government

Ensuring the use of ICT to transform the delivery of public goods and services and strengthen institutional capacity.

Digital Government focuses on working as an integrated Government with well governed processes and quality outcomes directed at improving operational efficiency and customer service satisfaction. An integral part of this will be the strengthening of public institutions with staff having increased ICT capacity and enhanced capability.

4. Fostering Economic Development

Creating an environment for an innovative, entrepreneurial, and vibrant ICT Sector

Fostering Economic Development focuses on building a pro e-Enterprise environment within Trinidad and Tobago. Important elements of this Thrust are increasing e-Business and e-Commerce adoption both within the Business-to-Business (B2B) and Business-to-Consumer (B2C) realms, and facilitating competitive trade along with driving effective import and export mechanisms.

5. Advancing the Environment for Societal Benefit

Managing the use of ICT to minimise possible damage to the natural environment of the islands of Trinidad and Tobago,

Valuing the environment focuses on protecting, and in some cases maintaining and improving, the capacity of the environment to serve successive generations. For ICTs, this means managing their use and disposal and mitigating any negative environmental impacts. For ICT deployment, this means using technology as an enabler to change the way government and businesses operate in providing services and how best they can realise efficiency while protecting the environment through compliance with standards and best practices.

Supporting Ecosystem

A conducive ecosystem is required to support and enable successful implementation of the Plan. The key components of this ecosystem are discussed below.

Enterprise Architecture: Effective ICT planning will provide the roadmap through which necessary infrastructure, systems, and policies can be implemented to support current and future business needs. A government-wide Enterprise Architecture (EA) development exercise is a systematic way to accomplish this. An EA will serve as a framework for designing, planning and approving the build out of Government's ICT infrastructure for physical connectivity, shared platforms and processing systems that will enable the delivery of government services internally and externally. A supporting set of standards and guidelines are combined to ensure the reliability and integrity of the cross-ministry enterprise. Moreover, international interconnectivity will be a key consideration, enabling interface with specialised entities. Additionally, upfront planning with respect to demand aggregation for ICT goods and services would produce economies of scale and streamline procurement.

ICT Programme Management: A function that operates in concert with the EA is the Programme Management Office (PMO), which is the implementation arm for the EA artefacts and networking. The PMO will constitute a consistent and robust mechanism for executing programmes and projects with minimum bureaucratic intervention and using vital cost and risk management techniques.

Business Process Management (BPM): This will be another vital function necessary for ushering in re-engineered processes across Government. The Change Management component of BPM addresses the natural human fear of change. Change sometimes evokes the strongest of opposition and the resulting resistance can become a major barrier to progress. The influence of ICT upon Government's outdated procedures and processes requires robust and effective change management.

Strategic Collaboration: To achieve efficiencies in Government operations, strategic collaboration among all entities is required. This is fundamental in formulating end-to-end service strategies, especially to encourage measures such as: resource sharing; spreading the benefits of valuable experience; accessing an array of internal expertise; and learning through best practices. Internal committees and councils are being established to share experiences in key functional areas of Government. The concept of Government as a single business supports the judicious distribution of competencies that only strategic collaboration as a standard practice can manage to bring into being. In the emerging connected world of networking disparate resources, capacity for collaboration across the entire globe will become an inevitable tool that aids important global geo political, humanitarian and environmental thrusts.

Integrated Channels: For Government to provide multiple channels through which digital services are delivered to citizens and customers, integration and interoperability of systems is imperative. The concept of integrated government does not merely require

the integration of many common functionalities within Government operations, it will demand it.

Service Measurement: Measuring the results and benefits of all projects implemented through pre- and post-implementation reviews is designed to provide information on the suitability of projects through evaluating how well they achieved the desired outcomes. Measurements must therefore be performed and data generated and evaluated at different levels (implementation, output, and strategic) to ensure the successful implementation of ICT programmes and projects along the whole ICT developmental value chain.

Industry Standards: Interconnectivity and interoperability in the private sector constitute the foundation for B2B transactions. Industry standards, including those for hardware are currently heavily subject to manufacturers' proprietary standards. Common industry standards are therefore needed to minimise interconnectivity and interoperability costs. Government will share standards with the private sector to enable G2B interconnectivity. Private sector collaboration must persevere among the diverse industry associations and the Business Chambers to ensure costs and barriers caused by proprietary standards are minimised. Additionally, appropriate taxonomies for data to be stored need to be agreed upon, to support the development of repositories that can bolster business analytics, and other forms of big data sharing.

Leadership: Leadership at the different contributory levels of activity is critical. In the past, the private sector has always been alerted by Government of plans to stimulate development and fuel growth, only to see such plans shelved due to lack of political will or financial incapacity on the part of government. Government, in turn, has often tried to use its suasion to divert instances of supply side inflation and high interest rates and or charges accruing to private sector lenders only to have recessionary conditions fall upon the economy. A collaborative agenda, through which each sector takes leadership of specific milestones and achievements, is certainly one way that measurable progress can be singled out and tenaciously approached. The power of effective leadership by each sector remains a realisation that must be had if our ICT programmes are to be executed, and more than this, be put to the right use within the scheme set out for this Plan.

The **University of Cambridge – Consultation on Technological Foresight Report** published on August 2017 in support of Trinidad and Tobago's economic diversification strategy to enhance the competitiveness of non-hydrocarbon sectors, recommended areas in which to establish Centres of Excellence, including in ICT. These Centres of Excellence for ICT can catalyse the development of an innovation system and stimulate investment in R&D in Trinidad and Tobago (see Appendix 6). It is noteworthy that most of these areas were taken into consideration within the National ICT Plan.

Guiding Principles

The Guiding Principles¹⁸ below provide a general framework for the development and implementation of the Plan. These principles are critical to success and form the basis for decisions and actions by stakeholders. The principles must be embraced and practised to ensure advancement of the national ICT agenda.

Citizen/Customer Centric: Design and deliver services based on the needs of our citizens/customers.

Data Centric: Manage data as an asset and share data to provide added value to services and operations.

Reliability and Assurance: Gain confidence and trust of citizens/customers with reliable and secure digital services.

Transparency: Data, information, processes and decisions on the Information Society must be public and be made understandable without prejudice to any stakeholder.

ICT Compliance: Compliance with the Acts, policies and guidelines as well as ICT best practices.

Collaboration and Inclusiveness: Ensure that initiatives follow collaborative and cooperative practices which take into account the interests and inputs of stakeholders.

Agility: Adjust, where and when needed, to changes in the demand for ICT to ensure that the National ICT Plan remains relevant and up to date.

Centralised Policy, Distributed Delivery: The Plan will establish a shared national vision for ICT Policy and Strategy in order to maximize efficiency and effectiveness, while minimizing unnecessary duplication. Implementation of individual ICT projects and initiatives will however be the responsibility of the particular MDA responsible for its implementation.

¹⁸ Many of these principles have been globally endorsed through various conventions on the Information Society such as the WSIS Geneva Principles, Tunis Agenda, and NetMundial.

The Way Forward 2018-2022

Two considerations that have significantly influenced the Roadmap for the National ICT Plan 2018-2022 are:

1 The Plan builds on its predecessors, and in doing so incorporates a considerable body of ongoing work.

2 One consistent theme emerging from the National Consultations on the Plan was the importance of implementation. Many stakeholders felt strongly that Trinidad and Tobago has a long tradition of producing excellent National Strategic and Sectoral Plans, but also has a modest record for successful implementation.

The following approach is proposed for the implementation of the Plan: →

- The National ICT Plan 2018-2022 will be accompanied by an Implementation Plan that will be developed through ongoing collaboration with the key stakeholders responsible for the execution of various elements of the Plan. The Implementation Plan will be subject to continuous review.
- It is envisioned that the Plan will be reviewed in the third year of implementation. Each year of implementation will build upon the achievements of its predecessor and lay the necessary foundation for the achievement of the national Vision for ICT.
- Over the period 2018 to 2022 the Plan will focus on further development in the areas of connectivity, infrastructure and legislation. The Government, in partnership with the private sector, will increase its transactional service offering, leveraging ICT to do so. Service users will be enabled and encouraged towards ICT take-up — in many instances through the sheer momentum of government and business uptake and innovations
- The Plan will also seek to optimise the potential of ICT as a cross-cutting enabler for sustainable development, and in particular for the implementation of Vision 2030. This will, among other things, include leveraging ICT to:
 - Improve openness and transparency in Government; increase accountability in the Public Sector; and facilitate the engagement of citizens in the business of Government
 - Ensure synergies between the National ICT Agenda and Government's Public Service Transformation Agenda
- In the long run the Plan seeks to move from transactional engagement to transformational engagement. This would see ICT-based services facilitating two-way communications, including G2G, G2B, G2C, B2C, and B2B. Government aims to take the leadership role in this process of transformation.

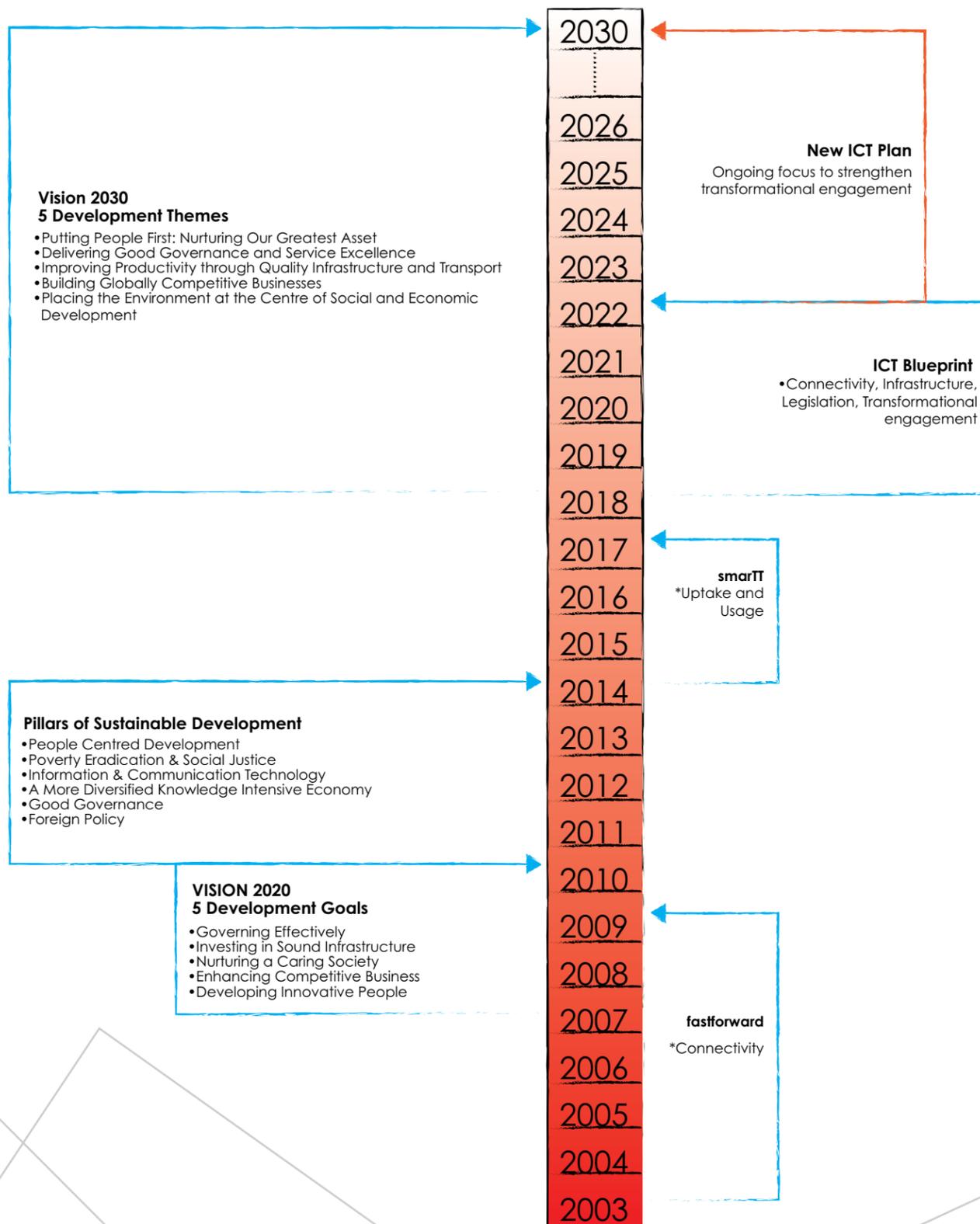


Figure 4: The Way Forward 2018 - 2022

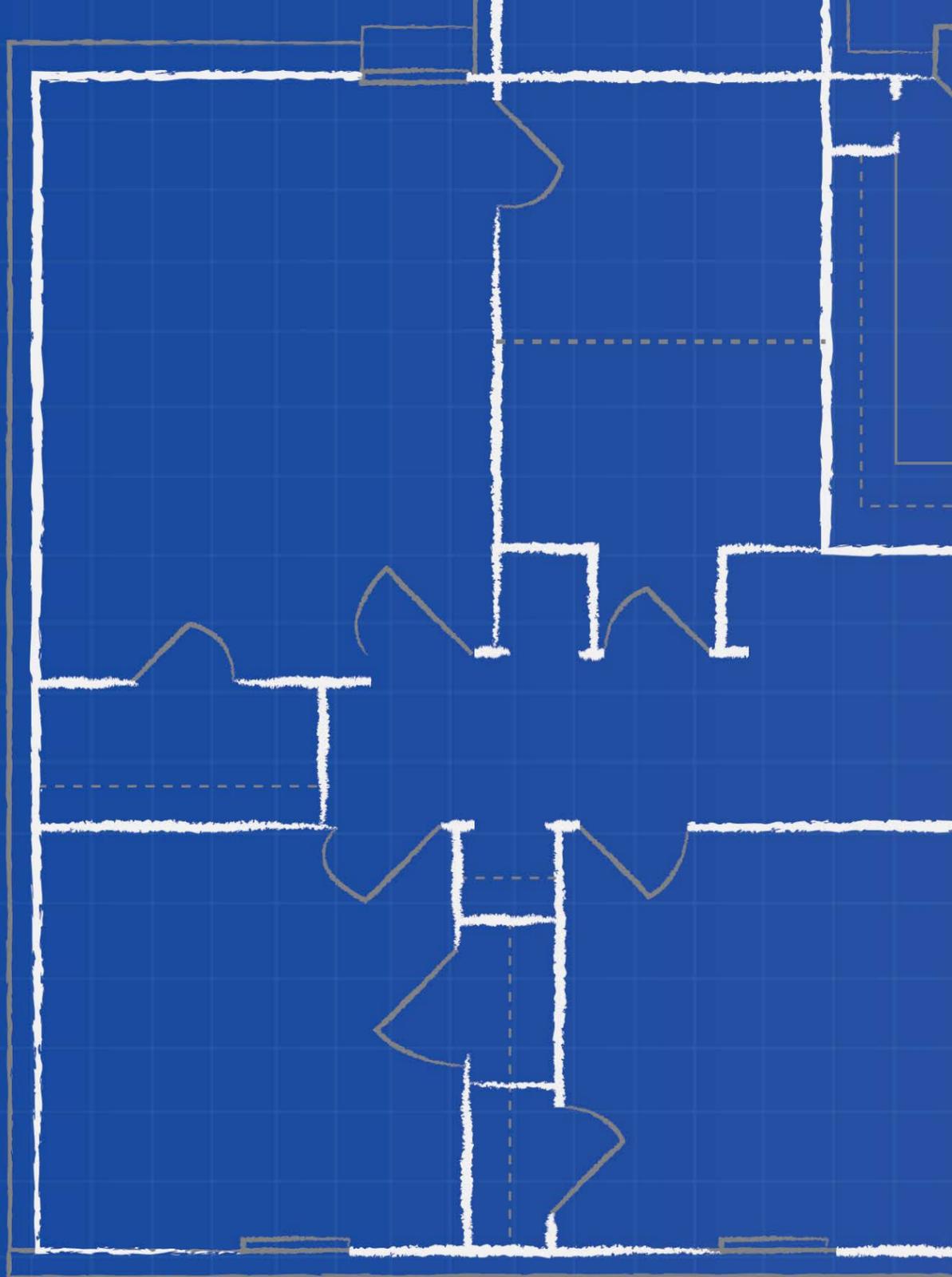
Targets

In aspiring to the National ICT Vision, Trinidad and Tobago will aim to achieve the following macro-economic ICT-related targets by 2022:

- Increase of **5%** of the ICT Sector's contribution to GDP
- **85%** broadband access at the minimum download speed detailed within the Government's National Broadband Plan
- **5** high demand/volume, strategically important Government services as end-to-end eServices¹⁹
- **5** enterprise-wide applications operationalised to run routine functions of Government²⁰
- **50%** adoption of Government shared services
- **50%** adoption of Government shared infrastructure
- **30,000** direct jobs created
- **50,000** users participate in eForums moderated by Government
- **#1** in the Caribbean on the World Economic Forum (WEF) Network Readiness Index (NRI) with the following sub-goals:
 - **30%** increase in the NRI Political and Regulatory Environment Pillar
 - **40%** increase in the NRI Government Usage pillar
 - **50%** increase in the NRI Social Impact pillar
 - **15%** increase in the NRI Business Usage pillar
 - **15%** increase in the NRI Economic Impact pillar
- **#1** in the Caribbean in the International Telecommunications Union (ITU) ICT Development Index (IDI) with improvements in the sub-indices detailed below:
 - **20%** increase in the IDI Access Sub-Index Value
 - **35%** increase in the IDI Skills Sub-Index Value
 - **45%** increase in the IDI Use Sub-Index Value

¹⁹ Including: Drivers Permits, Filing of Income Tax, Filing of Value Added Tax, Business Registration

²⁰ Including: Payroll, ePayments, Human Resource, Appointment scheduling



Summary of Strategic Thrusts

Figure 5 provides a summary of the **five Strategic Thrusts** identified to support the achievement of the National ICT Vision.

The following sections outline the Strategic Thrusts in greater detail.

Drawing upon the best practices and lessons learnt from national ICT planning, ICT is most effectively harnessed in five key dimensions: **Capacity, Infrastructure, Business, Government, and Community/Environment**. These are areas in which ICT is best used as a catalyst for transformation. These 'key dimensions' are reflected in the tables. Also included in the tables are details on the alignment of the Strategic Thrust to Vision 2030 and Sustainable Development Goals (SDGs)²¹.

²¹ See table on the SDGs at Appendix 2

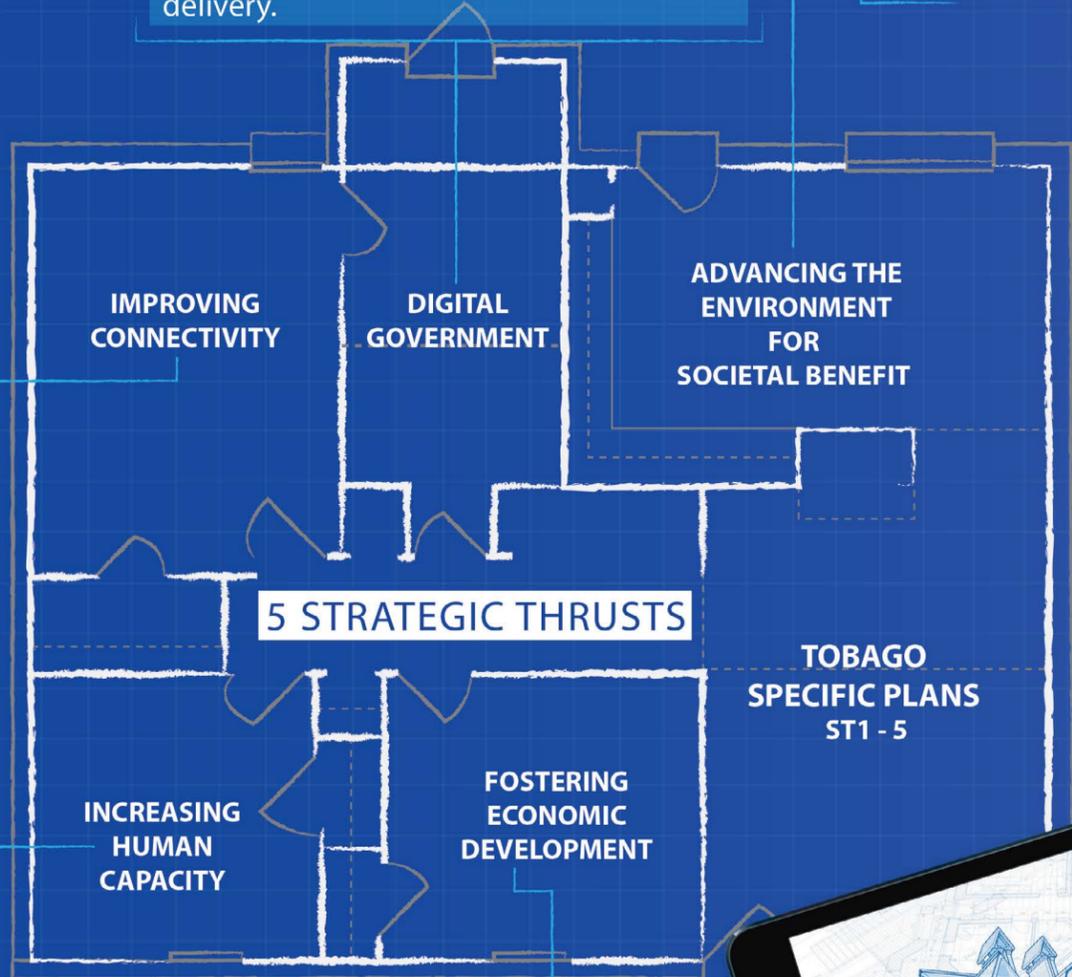
ST1 Continued deployment of ICT infrastructure to support securely connected people, businesses and government.

ST3 Ensuring the use of ICT to transform the delivery of public goods and services and strengthen institutional service delivery.

ST5 Managing the use of ICT to minimise possible damage to the natural environment of the islands of Trinidad and Tobago.

ST2 Enhancing digital literacy and developing skills to enable productivity and innovation.

ST4 Creating an environment for an innovative, entrepreneurial, and vibrant ICT Sector.



14 STRATEGIES | 48 PROGRAMMES

1. IMPROVING CONNECTIVITY

- S1 - Enhancing ICT Infrastructure
- S2 - Modernising the Legal and Regulatory Framework
- S3 - Strengthening Safety, Security, Resilience and Risks

11 Programmes

2. INCREASING HUMAN CAPACITY

- S4 - Building ICT Human Capital
- S5 - Improving Access to ICT Human Capital
- S6 - Promoting Digital Inclusion

8 Programmes

3. DIGITAL GOVERNMENT

- S7 - Offering End-to-End eServices
- S8 - Driving User Adoption
- S9 - Increasing Government Efficiency
- S10 - Promoting Open Government

12 Programmes

4. FOSTERING ECONOMIC DEVELOPMENT

- S11 - Advancing eCommerce
- S12 - Diversifying the Economy Through ICT Sector Development
- S13 - Advancing Digital Content Production

10 Programmes

5. ADVANCING THE ENVIRONMENT FOR SOCIETAL BENEFIT

- S14 - Promoting Green ICT

7 Programmes

Figure 5: Summary of Strategic Thrusts & Strategies

Strategic Thrust 1: Improving Connectivity

Advancing the deployment of ICT infrastructure and modernising the legal and regulatory framework to support securely connected people, businesses, and government.

Key Dimension: Infrastructure

Vision 2030 Alignment: **Goal 3:** Improving Productivity through Quality Infrastructure and Transportation

SDG Alignment: **SDGs 6, 7, 10 and 9**

Desired Outcome: Trinidad and Tobago will have a modern and well-maintained ICT system. This would see affordable, robust, and pervasive broadband connectivity enabling widely recognised economic and social benefits. This system will facilitate the integration of ICT into health, education, businesses, and homes.

Strategies (with Programmes)	Outcomes	KPI / Measures
1. Enhancing ICT Infrastructure		
<ol style="list-style-type: none"> Next Generation Connectivity for Government Next Generation Private Sector Connectivity: Ubiquitous Broadband Development Modernisation of Spectrum Management Universal Service Implementation 	<ul style="list-style-type: none"> Increased number of citizens connected Increased number of households/business with broadband/wireless broadband access 	<ul style="list-style-type: none"> ICT Development Index (IDI): 20% increase in the IDI Access sub-index value
2. Modernising the Legal and Regulatory Framework		
<ol style="list-style-type: none"> eCommerce Regulations policies, laws and regulations Information Society and Consumer Protection policies, laws and regulations Cyber security policies, laws and regulations Other regulatory issues (Internet Governance, Telecommunications Act, International Agreements) 	<ul style="list-style-type: none"> Development of ICT digital markets and ICT products and services ICT-based innovation, creativity and discovery for advancement Regulatory certainty, fostered investment in cyber security Competition, lifestyle improvements and growth 	<ul style="list-style-type: none"> World Economic Forum (WEF) Network Readiness Index (NRI): 30% increase in the NRI Political and Regulatory Environment pillar CT Development Index (IDI): 20% increase in the IDI Access sub-index value
3. Strengthening Safety, Security and Resilience		
<ol style="list-style-type: none"> Cyber Security Governance and Infrastructure: Creating an enabling environment to effectively address evolving online threats Disaster Recovery and Business Continuity Management within the public and private sectors ICT for Crime Fighting: Prevention; Detection; Prosecution 	<ul style="list-style-type: none"> Citizens and businesses equipped with knowledge and skills to cope with the risks of the online world International collaboration and coordination as part of global security framework Critical social and economic services are maintained in the event of disruption 	<ul style="list-style-type: none"> Citizen and Business Awareness on Internet Safety WEF NRI: 50% increase in the NRI Social Impact Pillar

Introduction

Connectivity is a critical component of Trinidad and Tobago's ICT Agenda. Building out the country's ICT infrastructure is therefore a main emphasis of the National ICT Plan. The aim over the next five years is to create a world class ICT infrastructure which should allow for the following:

- Increased availability
- Improved speed in connectivity
- Increased affordability of telecommunications and broadcasting services to the end users
- A stable, open and enabling climate that encourages confidence in ICT
- A safe and resilient environment both online and in the real world

The following strategies will be undertaken to support this Thrust:

Strategy: 1. Enhancing ICT Infrastructure

For the national digital agenda to be achieved, the underlying infrastructure needs to support ICT and ICT-enabled services. Next Generation Networks providing fibre optic connectivity to the home and business, use of mobile broadband technologies such as Long Term Evolution (LTE) among others would be made available, ubiquitously. This would be supported by Government and institutional ecosystems which are both critical to success. Broadband connectivity of target speeds established by the National Broadband Plan will allow the productive use of technology for socio-economic development. Meeting these objectives will require significant public and private sector capital investment and partnership. The enactment of the Telecommunications (Universal Service) Regulations, 2015 has opened the door for the utilisation of the Universal Service Fund to bridge the digital divide. Projects aimed at increasing ICT availability among under-served communities will be rolled out, thereby creating the opportunities for digital inclusion throughout the country necessary for participation in the digital society and economy.

The following programmes will be implemented, among others:

- Key infrastructure programmes of private sector actors for, inter alia, the establishment of broadband service provider network in Trinidad and Tobago over the five year period, 2018-2022.
- Infrastructure programmes in the Public Sector: Enhancing the GovNeTT backbone will facilitate the build out of the Government's eServices platform thus providing multi-channel access to online services. In Tobago, 32 sites of the THA are connected to GovNeTT and it is anticipated that full connectivity of the entire THA will be achieved by 2019. Once completed, eServices will be delivered over GovNeTT to citizens and residents in Tobago.
- Universal Service projects, in the short to medium term, to support ubiquitous broadband development, closing the access gap, provision of assistive technologies to persons with disabilities and the conduct of a digital divide survey every 3-5 years.

- Deployment of free public WiFi coverage at locations throughout Trinidad and Tobago
- Periodic review of the Spectrum Management Framework to include considerations for contemporary and future policies to inform the efficient and effective management of the national spectrum resource.

Strategy: 2. Modernising the Legal and Regulatory Framework

Government is committed to establishing an enabling environment for ICT, a key component of which is the e-Legislative Agenda. This Agenda provides for the elaboration and delivery of a body of policies, harmonised legislation and regulations that underpin the electronic delivery of products and services by Government (Digital Government) and the electronic facilitation of business processes (e-Business), including the electronic sale and procurement of goods and services (e-Commerce). Over the next five years, Government will remain focused on ensuring the full proclamation of critical pieces of eLegislation and instituting the related supporting regulations, inclusive of the following:

- The Electronic Transactions Act (ETA)
- The Data Protection Act
- Electronic Funds Transfer Regulations

With respect to jurisdictional responsibility, attention will be paid to the specific role of the Tobago House of Assembly (THA) and its discrete areas of control. Such an approach will avoid or reduce duplication or overlap of authority while providing for certainty. The encouraged pervasiveness of ICT is intended to stimulate the creation of a digital economy. Traditional financial structures are evolving and new paradigms are emerging, such as Mobile Money and Financial Inclusion. The Government will undertake initiatives to address digital financial services, in addition to e-transaction and e-payments. Tax incentives to promote the use of ICTs will also be explored. Such actions will both enable and drive G2C, G2B, B2C, and B2B eServices and ePayments.

In addition to the full proclamation of the aforementioned legislation, attention will also be paid to the Cybercrime Bill which seeks to provide for the definition of offences related to cybercrime. This bill is another key component of the eLegislative agenda as it sets the legal framework for the protection of citizens from cyber threats as they participate in the digital society and economy.

Moreover, Government recognises that the Internet, its governance, and the policies for its use constitute critical success factors in determining the benefits that society derives from ICT. Therefore, key focus will be placed on the development of a National Internet Policy, which will guide critical issues such as governance, management of the country code top level domain (i.e. '.tt' domain), net neutrality and treatment of "Over the Top" (OTT) services, Information Security Policy and Cloud Policy. Another key

regulatory issue is the Telecommunications (Amendment) Bill, which seeks to amend the Telecommunications Act Chapter 47:31 to provide for improved regulation of the telecommunications and broadcasting sectors through international best practice and international treaty obligations.

Strategy: 3. Strengthening Safety, Security and Resilience

The programmes under this strategy focus on the dual facets of technology as it relates to safety and security. The first two programmes directly address issues of safety, security and resilience in cyber space while the third programme explores how technology can be used to improve safety and security in the physical environment.

The Cyber Security Governance and Infrastructure programme seeks to put the requisite framework in place so that citizens are protected from varied and evolving cyber threats. In this regard, the implementation of an overarching national cyber security framework and governance structure will be prioritized in order to ensure the protection of citizens in cyberspace and to instil confidence in the market as the country's digital economy grows.

Complementing this initiative is the second programme, Disaster Recovery Planning and Business Continuity Management which aims to strengthen the resilience and reliability of services provided online. With the implementation of plans and procedures to facilitate the quick recovery of online services in the event of a disruption (manmade or natural, cyber or physical), consumer and industry confidence in the integrity of digital market will continue to grow. For both programmes to be successful, significant collaboration between the public and private sectors is required.

The third programme, ICT for Crime Fighting, seeks to leverage technology to facilitate the protection of citizens in the physical environment and to improve the operational efficiency of the national justice infrastructure. Efforts will be directed to the key components of crime fighting prevention, detection and prosecution, as detailed below:

- **Prevention:** use of surveillance and body cameras coupled with policing on the beat, methods for rapid police presence and back up vehicular support, day and night patrols of crime hot spots identified through analysis of crime data. Road blocks, hotline information and other face-to-face policing techniques intended to destabilise crime spots are examples of preventive measures that can be assisted by ICT.

- **Detection:** Crime Scene Investigation (CSI) tools and techniques will be grafted into the Police Service firstly through use of foreign expertise and on-the-job training for local officers, then through the development of a full Local Capacity and Learning framework throughout the T&T Police Service. eForensics that better support, gather and preserve evidence during CSI will be implemented. Different strategies for communications interception will aid in the discovery of criminal intent and action. Cybercrime is already an initiative addressed in the Plan and will be boosted by police capacity and interconnectivity to other Government cyber monitoring and surveillance agencies and facilities e.g. transportation, airports, customs, immigration.
- **Prosecution:** ICT that facilitates the justice system, such as video conferencing at court sessions, reduces transportation costs for prisoners and reduces the time for conducting court. Procedures that speed up the justice system, as already defined in the legislative reform, will accommodate this eJustice initiative. Creation of databases for retaining information and evidence (including searchable databases) are powerful tools used by forensic laboratories. These databases can be divided into two broad categories: national databases and in-house/internal databases. National databases can be created for DNA, fingerprints, and ballistics data to provide unique and unchangeable biometric information that distinctly identify an individual. Similarly, ballistics databases would contain information that can link projectiles and casings to firearms used in crimes. In most countries, there is national legislation which defines legal and technical requirements for these databases.
- Government, as the largest repository of public and citizen data, will seek to adopt an overarching risk management process which is the fourth programme to ensure that the information security controls continue to meet the country's information security needs on an ongoing basis.

As the operations, workflow, or technologies within GoRTT's ICT environment change, periodic reviews must be conducted to analyse 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 organisational 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.

Strategic Thrust 2: Increasing Human Capacity

Key Dimension: Capacity

Vision 2030 Alignment: **Goal 1: Putting People First: Nurturing Our Greatest Asset**

SDG Alignment: **SDGs 1, 2, 3, 4, 5, 6, 10 and 11**

Desired Outcome: Citizens of Trinidad and Tobago demonstrate an increased capacity to engage productively with ICT as well as exhibit the ability to innovate using technology

Strategies (with Programmes)	Outcomes	KPI / Measures
4. Building ICT Human Capital		
12. eEducation and eLearning 13. Infocomm Training Framework and the development of Employment and Productivity related skills 14. Research and Development	<ul style="list-style-type: none"> • Increased ICT usage in education • Increased comfort level, trust and capability of citizens with regards to ICT usage 	<ul style="list-style-type: none"> • ICT utilisation level in schools and teaching curriculum • ICT Literacy rate • IDI Index: 35% increase in the IDI Skills sub-index value
5. Improving Access to ICT Human Capital		
15. Skills Bank / Repository for ICT Professionals 16. Improving Collaboration for the Development of ICT Solutions	<ul style="list-style-type: none"> • Better and more efficient access and use of ICT Human Resources 	<ul style="list-style-type: none"> • Number of jobs referenced from skill banks and repositories • Diversity of eligible conscripts generated in skill data base • Statistical adequacy of ICT workforce regarding demand and supply areas
6. Promoting Digital Inclusion		
17. Delivering affordable computers to low income households 18. Widening access to the Internet and Internet-enabled service 19. Increasing opportunities to use different ICTs	<ul style="list-style-type: none"> • Increased productive usage of Internet access for citizens in the less developed areas • Provision of computers with basic configurations to lower income households 	<ul style="list-style-type: none"> • IDI Index: 45% increase in the IDI Use sub-index value

Introduction

The National ICT Plan envisages a lifelong approach to ICT learning which will ultimately enhance lifestyles and build an eReady workforce. As such, the Plan:

- outlines a training framework from primary to tertiary level; tailored for both public and private sector employment as well as entrepreneurship;
- provides for a register of ICT human resources to facilitate improved manpower planning and allows all sectors to access skilled personnel when needed; and
- ensures that all citizens have the skills to participate in the digital society and economy.

This Thrust features the following strategies:

Strategy: 1. Building ICT Human Capital

The Government is committed to advancing a digitally literate population. Thus, one key programme under this strategy will be the implementation of a national ICT training framework that comprises:

- capability development from primary school to tertiary level; and
- workforce training for ICT professionals that facilitates better alignment between their career development and the needs of employers, both in the private and public sectors.

Given the rate of technological advancement in the wider society, this ICT training framework will be updated through periodic reviews to focus upon both traditional ICT as well as emerging ICT and applications.

The Government will expand on existing human capital development programmes (such as the On the Job Training and National Scholarship programmes) to place human resources in institutions with a view to advancing ICT research and development along specific streams of national interest. This expansion will encourage innovative thinking and develop local and regional solutions, both to address national problems as well as to export ICT knowledge and skills for economic benefit. Embedded in this strategy would also be the promotion of ICT-enabled learning platforms.

Strategy: 2. Improving Access to ICT Human Capital

Fostering the development of the ICT Sector and other sectors in Trinidad and Tobago usually depends on how efficiently human capital can be accessed. Towards this end, a repository informing of the skill sets existing ICT human professionals as well as a repository on the national demand for ICT professionals will be created. These repositories will be aligned to the areas of focus in which ICT expertise is generally sought, for e.g. entertainment, sports, and travel. Through such repositories, there would be increased awareness of available ICT human resources, a facility for accessing these resources by national stakeholders, as well as a facility to foster a data-driven approach to national

Strategy: 3. Promoting Digital Inclusion

ICT must be made accessible and affordable to all, and there have been tremendous strides at the national level. This Strategy therefore aims to further bridge the digital divide in Trinidad and Tobago by ensuring all members of society have equal access to ICT infrastructure, content and services with increasing opportunities to leverage ICT innovations to address national challenges. Infrastructure (basic utilities and network connectivity) must be enhanced in underserved regions to allow citizens to gain access to and benefit from the Internet and Internet enabled services. This Strategy aims to adopt different strategies for the two segments of the population, the abled and the differently-abled, to bridge the digital divide by providing the means for basic ICT literacy skills and the tools for digital inclusion. While bridging the divide, it is also recognised that threshold ICT literacy would evolve with the ICT training framework to incorporate more advanced skills as well as to continue the promotion of local digital content and service

Strategic Thrust 3: Digital Government

The use of digital technologies to create public value in an interconnected role of governments' modernisation policies and initiatives. It is dependent on government's modernisation ecosystem comprised of government actors, non-governmental organisations, businesses, citizens' associations and individuals which supports the production of and access to data, services and content through interactions with government.

Key Dimension: Government

Vision 2030 Alignment: **Goal 2: Promoting Good Governance and Service Excellence**

SDG Alignment: **SDGs 10,11,16 and 17**

Desired Outcome: Digital government is about putting people first and creating public value for the benefit of society, which includes the following:

- goods or services that satisfy the desires of citizens, residents and business;
- public sector activity that meet citizen expectations of justice, fairness, efficiency and effectiveness;
- citizen-centric modernised, productive public institutions that reflect citizens' desires and preferences;
- fairness and efficiency of distribution of goods and services;
- accountability and transparency in the use of resources to accomplish public purposes - ICT is employed to support the best efforts in transparency, accountability, value for money and integrity in all relevant government affairs and operations; and
- agility in innovation and adaptability to changing preferences and demands.

Strategies (with Programmes)	Outcomes	KPI / Measures
7. Offering End-to-End Digital Services		
20. eService Development Programme (G2C) 21. eService Development Programme (G2B) 22. Standardise Architecture and Processes (eServices Framework // eServices Guidelines // Government Payment Platform)	<ul style="list-style-type: none"> • Increased electronic delivery of government services to citizens and business (including end-to-end) • Increased demand and citizen capacity for electronic government services and technology solutions • Government services ecosystem –PPP, outsourcing, off shore business processing, e-procurement options 	<ul style="list-style-type: none"> • Number of end-to-end G2C and G2B e- and M-services on tconnect (and other platforms) portal • WEF NRI: 40% increase in the NRI Government usage pillar
8. Driving User Adoption		
23. Internal: Strengthen the capability of Public Sector Workers / Change Management 24. External: User education and promotion programme / Digital communication policy	<ul style="list-style-type: none"> • More digitally-oriented Public Service • Increased demand and citizen capacity for electronic government services and technology solutions 	<ul style="list-style-type: none"> • Greater job satisfaction and job enrichment score on Public Service internal surveys. • Higher participation levels on ICT eServices • Improved customer feedback and satisfaction levels

9. Increasing Government Efficiency

25. Service Transformation with ICT
26. G2E e-Services Delivery
27. Increase the sharing of ICT resources through a centralised and structured initiative
28. Strengthen leadership and governance of ICT initiatives
29. Promote use of digital technologies across policy areas and levels of government

- Increased number of integrated e-Services
- Reduced operating costs and cost savings accruing to Government
- Growing satisfaction with utility value of the electronic platforms being deployed for public officers to do their jobs
- More motivated performance based public service and modernised management techniques and realigned structures
- Integrating the digital government strategy in overall public administration reforms
- Alignment of various GoRTT strategies with the digital government strategy and other relevant sector strategies

- Number of integrated e-Services
- Number of shared ICT systems and processes
- Percentage of cost savings from sharing ICT Systems and Processes, and Demand aggregation
- Customer satisfaction ratings on usefulness of Government Intranet and other internal government e-Services
- WEF NRI: 40% increase in the NRI Government usage pillar

10. Promoting Open Government

30. eDemocracy Platform
31. Create a data-driven culture in the public sector

- Increased electronic delivery of government services to citizens and business (including end-to-end)
- Increased demand and citizen capacity for electronic government services and technology solutions
- Government services ecosystem–PPP, outsourcing, offshore business processing, e-procurement options
- Establish data standards across GoRTT
- Promote Data Governance and Data Sharing
- Integration of legacy IT systems

- WEF NRI: 50% increase in the NRI Social Impact pillar

Introduction

Digital government is about putting people first. The elaboration of GoRTT's Digital Strategy (GDS) is intended to provide a framework to enable the consolidation and coordination of the Digital Government initiatives.

The aim of this Plan is to support the development and implementation of digital government strategies that bring the public sector closer to citizens, residents, visitors and businesses. It recognises that today's technology is not only a strategic enabler for improving public sector efficiency, but also supports effectiveness of policies and create more open, transparent, innovative, participatory and trustworthy government. And while the plan seeks, in conjunction with public sector transformation, to enable a necessary shift from citizen-centric approaches (government anticipating the needs of citizens and businesses) to citizen-driven approaches (citizens and businesses formulating and determining their needs in partnership with government), the proliferation of technological options introduces new risks and greater stakeholder expectations that government must be prepared to address.

Another important objective of the Agenda is to leverage the Public Sector ICT spend in supporting the development of the Trinidad and Tobago ICT Sector. Towards this objective Government will build on the advancements already made — in terms of penetration levels of personal computers and mobile telephones, Internet connectivity, organisational web presence and business investments in local data-centres — to widen the number of online services available to all stakeholders while at the same time promoting the uptake of GoRTT's Digital Services. Supported by the requisite policies, governance, infrastructure and processes, the focus will be placed on having multiple Service Delivery Channels. Citizens and businesses alike will be provided with choice and the convenience of use, thus aiming at enhancing their satisfaction. In parallel with the expansion of GDS there will be initiatives that support user adoption and change management programmes.

This Thrust features the following strategies:

Strategy: 1. Offering End-to-End eServices

This Strategy will focus on increasing the number of eServices offered by Government. In Phase I of the Plan a select suite of high in-demand (high traffic) public services (and enhancements to current ones) will be made available completely online.

In the short term, an eServices development middleware will be implemented which will facilitate the deployment of end-to-end government services online. Projects to achieve this will include an audit and analysis of current government services and their empirical levels of utility to citizens. This audit will allow for the prioritisation of services based on: the needs of the public; volume of transactions; utilisation rate; and delivery benefits. Following this, a schedule for implementing eServices will be developed outlining a timeframe for moving services online and as well as making those that are already there end-to-end.

Finally, templates will be developed to reduce the development and deployment times for future services. This will be accompanied by updates to appropriate existing

policies and guidelines, including an eServices development framework, and technical processes for bringing a service online, eService redesigning guidelines and eService user experience (touch and feel) guidelines.

Strategy: 2. Driving User Adoption

While Strategy 1 attends to the 'supply' of eServices, this Strategy focuses on assuring the 'demand' for such services. The goal is for 50% of key government transactions to be conducted online. The key to achieving this is to promote these services and educate users on the assurance of completing transactions in a secure manner, and the many benefits of accessing services online.

The Government, in rolling out a suite of highly used (high traffic) public services (and enhancing current ones) will institute various projects to stimulate user adoption and uptake, including a user education and promotion programme, mandated use, and incentive programmes. Further, both a Data Privacy Policy and a Digital Communication Policy are to be implemented. The Data Privacy Policy will foster trust in Digital Government by ensuring that personal information is used in an appropriate manner and not compromised. The Digital Communication Policy will promote a deliberate shift away from printed paper communication, toward email and SMS, and set out guidelines for Government-user communications.

Strategy: 3. Increasing Government Efficiency

The siloed operations of Ministries as they currently are — each maintaining their own ICT infrastructure and operations — does not optimise the use of Government's resources while increasing complexity for future integration. Future ICT plans must therefore address contemporary solutions such as:

- Data architecture, to maintain taxonomies that allow for complex data analysis and service processing
- Cloud computing to provide and manage storage and compute availability, remote access and reduce cyber security costs.
- Enterprise Infrastructure comprising interoperability and interconnectivity of hardware artefacts that integrate operational functionalities across all geographic office locations.

Demand aggregation of ICT goods and services is another area where efficiencies of cost and effort can be achieved. Reusable software application for functions that are common throughout a range of Ministries and the use of tools for internal and external communication such as Intranet G2E and Document and Information Management are two examples.

Altogether, through greater streamlining of infrastructural design, logistical improvements, and technology-use selection and planning for deploying ICT within Government, it is expected that continuing cost savings will accrue to lower the cost of Government operations and/or allow for higher productivity and greater output. Government efficiencies will create positive externalities with roll on effects, including higher trust and confidence in Government as an entity for furthering public interests and well-being.

Strategy: 4. Promoting Open Government

As the paradigm shifts towards digital government, the aim is to increase transparency through an e-Democracy programme. Technology will be used as a medium to facilitate this dialogue through eParticipation and eConsultation. Citizens will feel more engaged with Government and feel satisfied that their opinions are heard. Government, on the other hand, will feel confident it has sought a wide range of views while making important decisions. eParticipant and eConsultation will entail a demonstrated commitment by Government to engage citizens via the Internet, online fora, via emails, and using social networking sites to promote participation and interact with the public. To support dialogue, Government will take steps to prudently publish data that is in demand in a timely manner.

Utilising this open concept of governance and participation, Government will ensure greater transparency, openness and inclusiveness of processes and operations by:

- adopting open and inclusive processes, accessibility, transparency and accountability among its main goals;
- updating accountability and transparency regulations recognising different contexts and expectations brought about by digital technologies and technology-driven approaches;
- taking steps to address existing “digital divides” and avoid the emergence of new forms of “digital exclusion” (i.e. not being able to take advantage of digital services and opportunities);
- addressing issues of citizens’ rights, organisation and resource allocation, adoption of new rules and standards, use of communication tools and development of institutional capacities to help facilitate engagement of all age groups and population segments; and
- identifying and engaging non-governmental organisations, businesses or citizens to form a digital government ecosystem for the provision and use of digital services

As Government continues to fully engage citizens, it is cognisant of the potential benefits that can be derived from collecting and analysing usable data or Data Analytics (D&A). D&A can help to offer improved and targeted services to the citizens. However, careful steps must be taken to overcome policy, cultural and organisational issues in order for Government to gain the greatest value from the vast data it has at its disposal.

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

OECD Digital Government Agenda (2014) Definitions:

- **E-Government** refers to the use, by the governments, of information and communication technologies (ICTs), and particularly the Internet, as a tool to achieve better government
- **Digital Government** refers to the use of digital technologies, as an integrated part of governments’ modernisation strategies, to create public value. It relies on a digital government ecosystem comprised of government actors, non-governmental organisations, businesses, citizens’ associations and individuals which supports the production of and access to data, services and content through interactions with the government.
- **Digital technologies** refer to ICTs, including the Internet, mobile technologies and devices, as well as data analytics used to improve the generation, collection, exchange, aggregation, combination, analysis, access, searchability and presentation of digital content, including for the development of services and apps.
- **Public value** refers to various benefits for society that may vary according to the perspective or the actors, including the following:
 1. goods or services that satisfy the desires of citizens and clients;
 2. production choices that meet citizen expectations of justice, fairness, efficiency and effectiveness;
 3. properly ordered and productive public institutions that reflect citizens’ desires and preferences;
 4. fairness and efficiency of distribution;
 5. legitimate use of resources to accomplish public purposes; and
 6. innovation and adaptability to changing preferences and demands.

Strategic Thrust 4: Fostering Economic Development

Creating an environment for eBusiness and ICT Sector advancement.

Vision 2030 Alignment: Goal 4: Building Globally Competitive Businesses

SDG Alignment: SDGs 8,9 and 12

Desired Outcome: : A pro e-Enterprise environment in which e-Business and e-Commerce adoption in the Business-to-Business (B2B) and Business-to-Consumer (B2C) realms are well established and contribute more significantly to the national economy.

Strategies (with Programmes)	Outcomes	KPI / Measures
11. Advancing eCommerce		
<ul style="list-style-type: none"> 32. Raising awareness and increasing eCommerce, eBanking and eFinancing tools and services 33. Business ICT adoption and promotion 34. Single Electronic Window (SEW) (Second Generation) 35. Trade portal (G2B, B2B) 	<ul style="list-style-type: none"> • Increase in eCommerce • Increase in ICT usage and expenditure • Enhanced efficiency of the Government and businesses • Increased number of ICT business incubator projects emanating from national incubators • Availability of post business incorporation services (TTBizLink) • Increased proportion of Government procurement (of contract value less than \$1m) from ICT Micro and Small Enterprises (MSEs) 	<ul style="list-style-type: none"> • Number of Local Firms engaged in eCommerce • Ranking in World Economic Forum's Global Competitiveness Report • Ranking in World Bank's Ease of Doing Business Survey • Increase in number of ICT businesses transitioning from concept to market • Proportion of Government procurement from ICT MSEs • WEF NRI: 15% increase in the NRI Business Usage pillar
12. Diversifying the Economy Through ICT Sector Development		
<ul style="list-style-type: none"> 36. Drive demand for ICT and ICT Related Services 37. Tax incentives for increased ICT availability and accessibility 38. Create opportunities for capacity building and strengthening of ICT Micro and Small Enterprises (MSEs) 39. Extend business alliances 	<ul style="list-style-type: none"> • Increase in ICT usage and ICT related business development • Increased number of joint ventures with foreign partners • Increased competitiveness and efficiency of SMEs • Thriving SME environment consistently increasing its contribution to GDP. 	<ul style="list-style-type: none"> • Number of joint ventures with foreign partners • Improvement in the WEF rankings for ICT usage for both government and business • Increase in the number of net foreign exchange earners • Increase in T&T's productivity levels • WEF NRI: 15% increase in the NRI economic impact pillar • Increase in WEF business sophistication indicators • Increase in technological readiness indicators

13. Advancing Digital Content Production

- 40. Digitisation of Heritage and Social related Content
- 41. Establishing a Records Management System and implementing an integrated Archival Management System

- Transformation of the country from a "Download" to an "Upload" culture that celebrates the ingenuity of its people
- Promotion of effective government by expanding access to government-owned content and services

- Awareness of the availability of local digital content through surveys and metrics
- Volume of local digital heritage /social-related content created over a measured period

Introduction

The pervasiveness of ICTs has created a global digital economy in which traditional financial structures are evolving. Government will continue to foster the development of a positive environment to drive the development and growth of an innovative and vibrant ICT Sector. As such, initiatives will focus on digital financial services - e-transactions, e-payments and tax incentives to promote the use of ICTs. Of particular focus will be the Small Medium Enterprises which comprise 91% of business establishments in Trinidad Tobago, 75% of these being Microenterprises. The ICT Sector as a whole stands to gain from national level programmes that support the Micro and Small Enterprises (MSEs) and help to increase their contribution to the sector and economy.

The following strategies are central to this Thrust:

Strategy: 1. Advancing eCommerce

A National eCommerce Policy will be developed and investment undertaken in a suite of systems such as e-signatures, authentication systems, and a Government business portal and ePayment system. This strategy aims to facilitate an online B2B and B2C marketplace, which is expected to drive a higher rate of ICT use.

eCommerce has a definite externality of raising government's business transacting efficiency. The additional ease of doing business online, for SMEs, will bring them into the state of eligibility for contracting and procurement opportunities with Government. eCommerce's knock-on effect will elevate the whole eBusiness ecosystem.

Strategy: 2. Diversifying the Economy Through ICT Sector Development

More education and training for SME's about entrepreneurship and its opportunities, coupled with a stronger drive to promoting a pro-business environment in Trinidad and Tobago will set the stage for opening up the economy to new and more effective enterprise. The National Integrated Business Incubator System (IBIS) and similar programmes, will be a key player in this modernisation strategy. The IBIS programme is "created to provide a unique mix of business development support, infrastructure, operational and financial assistance that will assist in the growth and success of new and existing micro and small enterprises (MSEs). Specifically, IBIS will assist SMEs by providing assistance in the areas of mentoring, infrastructural support, Information Technology, operational support, financing, as well as networking opportunities for access to local and foreign markets."²²

Another key enabler is Government fulfilling its policy setting agenda with regards to its procurement practices.²³ These practices are to create fair opportunities for wider engagement of SMEs in Government contracts and providing services to Government. Also, through the setting of new conditions of contracting, foreign investment can be encouraged to use local resources and content e.g. skills and capacity for the provision of ICT services.

²² <http://www.molsmed.gov.tt/Services/EnterpriseDevelopmentDivision/NationalIntegratedBusinessIncubatorSystemIBIS/tabid/453/Default.aspx>
IBIS –Ministry of Labour

²³ New Procurement Act-2015 partially proclaimed

ICT expansion requires increasing network build out. In the new construction of highways and transportation systems that link business centres and residential communities within the country, consideration must be given to the construction of utility corridors to facilitate fibre deployment and facilities of other utility distribution grids. Proliferation of ICT SMEs can be harnessed into a powerful productive force through the development of ICT clusters. The objective of the cluster is to "increase the usability of ICT in other economic sectors of domestic and foreign exporting markets. Through this, the aim is to foster the development of new solutions, the creation of new products, and to improve the companies' competitive ability in the international market spaces."²⁴ This is key because the uplifting of the local capacity is not only about skills but also the readiness of SME type businesses to embrace opportunities for these type of partnerships with foreign investors and /or expansion of their businesses.

Strategy: 3. Advancing Digital Content Production

Digital content refers to everything on the Internet, from news and emails to videos. For Trinidad and Tobago, becoming creators of electronic content means inculcating an "upload" culture that celebrates development and shares the ingenuity of our people and the richness of our diverse heritage. Technologies will be sought to facilitate the promotion of this culture of collaborative creation that leverages local talent and fosters indigenous expression. Through targeted interventions by Government such as developing online collaborative networks for the flow and exchange of ideas and artistic contributions, digital content will become a key instrument by which ICT will be proliferated to the benefit of our economy and diversification of our markets. Independent digital content production in the form of digitized academic research and cultural and heritage artefacts is another way through which digital content would be increased. Advancing digital content production will also be spurred on by other initiatives contained within the National ICT Plan, in addition to implementing advanced ICT infrastructure and increasing broadband availability and usages. Cultivation of a T&T identity that encourages the expression of what is the true T&T essence, and what we advantageously have to offer the world that is uniquely Trinbagonian and of real value to the rest of the world: lifestyle, talent, entertainment, sport, intellect, social attitude to name a few.

²⁴ E Estonia.com the digital city <https://e-estonia.com/meet-the-industry/ict-cluster/>

Strategic Thrust 5: Advancing the Environment for Societal Benefit

Managing the use of ICT to minimise possible damage to the natural environment of the islands of Trinidad and Tobago, as well as to tackle key social challenges faced by the country.

Key Dimension: Environment / Community

Vision 2030 Alignment: **Goal 5: Valuing and Enhancing Our Environment**

SDG Alignment: **SDGs 3, 6, 7, 9, 11, 12, 13, 14 and 15**

Desired Outcome: ICTs are deployed in optimal ways to reduce environmental impact and are effectively used by citizens, businesses, and government. Additionally, technology is utilised as an enabler to change the way government, industry and businesses operate in providing services and in realizing efficiency while protecting the environment through compliance with standards, best available technology and best practices.

Strategies (with Programmes)	Outcomes	KPI / Measures
14.. Promoting Green ICT 42. Environment Impact Assessment of ICT and ICT usage 43. Green ICT Policy and Standards 44. Develop skills and capacities in the area of Green ICT 45. Public awareness and education on the role of ICTs in improving environmental benefits 46. e-Waste Policy 47. Teleworking Policy 48. Green ICT Portal	<ul style="list-style-type: none"> • Opportunities to develop and practice preventive measures against environmental abuse. • Citizens, businesses and government have clear and accessible guidelines on environmental behaviour expectations set by society. • Citizen participation enabled through organisation of public movements and groups to curb and detect environmental abuse. • Clear roles and responsibilities easily promulgated and communicated to wider population. • Green lifestyles adopted and green lifecycle management actively practised by all sectors of society • Extended Producer Responsibility (EPR) and Eco-Design of Energy Using Products (EuP) are key considerations in the procurement, use and disposal of ICT • Reduced Emissions from Vehicular Traffic • Healthier, more efficient workforce 	<ul style="list-style-type: none"> • Increase in Green ICT Procurement • Increase in number of requests for Certificates of Environmental Clearance • Reduction in Waste Electrical and Electronic Equipment (WEEE) stockpiles • Increase in recycling of disposed ICT equipment • Improvement in Green Performance Indicators (GPI) such as Energy Impact and Usage Metrics

Introduction

Globally, it is recognised that ICTs play a dual role in respect of environmental issues. On the one hand, the rapid deployment of ICTs contributes, in part, to the environmental problem with the resources and energy it consumes generating significant greenhouse gas emissions. On the other, ICT is an enabler that can change the way in which government and businesses operate and provide services. This, in turn, provides an avenue for realising efficiency and environmental improvements on a much wider scale.

In this way, ICTs play a key role in supporting the greening of operations by enabling new and more efficient ways of working within organisations and transforming the way services (public and private) are delivered. Although ICTs require energy resources, they also offer a number of opportunities to advance global environmental research, planning and action. This includes monitoring and protecting the environment as well as mitigation of and adaptation to climate change.

By definition 'e-Environment' [1] refers to:

1. The use and promotion of ICTs as an instrument for environmental protection and the sustainable use of natural resources;
2. The initiation of actions and implementation of projects and programmes for sustainable production and consumption and the environmentally safe disposal and recycling of discarded hardware and components used in ICTs; and
3. The establishment of monitoring systems, using ICTs, to forecast and monitor the impact of natural and man-made disasters, particularly in developing countries, least developed countries (LDCs) and small economies.

The Government is committed to advancing e-Environment efforts in Trinidad and Tobago as part of its ongoing commitment to enhancing the environment for societal benefit. Toward this end, the country has signed on to numerous international agreements, inclusive of The United Nations Framework Convention on Climate Change (UNFCCC), Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, and the Paris Agreement.

This Thrust tackles advancing the environment for societal benefit through the following strategy:

Strategy: 1. Promoting Green ICT

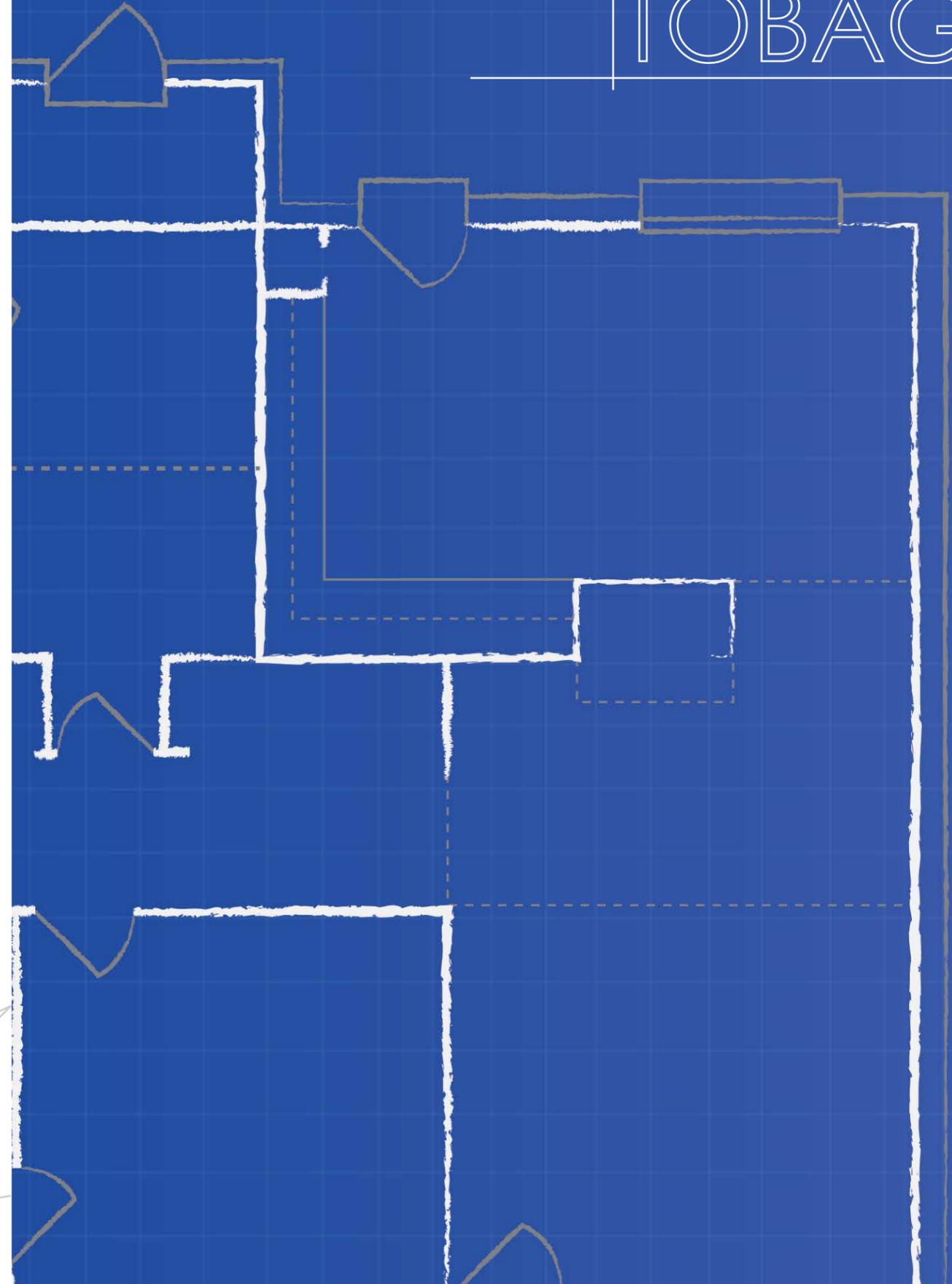
The impact of ICT on the environment occurs in direct and indirect ways. Direct impact occurs through the incorrect disposal of ICT products contributing to the degradation of the environment: air, earth and water. Indirectly, ICT has value added impact through the contribution of ICT applications, when used by the workforce. Applications change the way we work. They can improve the quality of decisions and add an efficiency gain factor to our outputs. But there is also a negative cumulative effect caused by the direct and indirect impacts of ICTs acting together such as increased energy consumption and greenhouse gas emissions.

The programmes selected for Green ICT cover a range of areas and disciplines. These include a Communication Plan to raise awareness on green ICT and training initiatives to build capacities useful for prevention and detection of environmental abuse.

In 2011, GoRTT approved a Green Government Policy providing recommendations to Ministries on 'greening' their everyday operations in areas of energy conservation, material conservation, green procurement, green interaction and communications. Other substantive focus areas will include energy saving behaviours, electrical and electronic waste recycling and waste management.

See Appendix 4 for the full suite of programmes and projects.

STRATEGIES AND PROGRAMMES TOBAGO



5. Tobago Specific Plans

The preceding discussion on the five Strategic Thrusts addressed strategies for both islands, Trinidad and Tobago. This section provides an additional perspective on Tobago in view of the different rates of developments across the twin islands. Generally, Tobago has a lower level of ICT penetration as well as other factors which have implications for planning both strategies and programmes in the National ICT Agenda²⁵.

The discussion below outlines the key special considerations given to the ICT landscape in Tobago, across each of the Strategic Thrusts

Strategic Thrust 1: Improving Connectivity

Strategy: 1. Enhancing ICT Infrastructure

By the end of 2018 fixed broadband connectivity of up to 100Mbps will be accessible across the island with an accompanying wholesale market. Similar to Trinidad, Tobago service-based networks using wholesale access network facilities will deliver innovative services and devices through service-based competition and new niche markets. There is already fixed wireless broadband across the majority of the island and mobile broadband is soon to be complete with the area of Crown Point to Scarborough already completed. Therefore, the stage is being set to accommodate higher levels of residential, business and institutional connectivity while laying a wide ranging foundation for the next milestones of ICT development and demand-side market growth.

Strategy: 2. Modernising the Legal and Regulatory Framework

This Strategy will run the same path in Tobago as in Trinidad, so that there will be no difference in legislative readiness or commercial impact in either island, once the requisite legislation has been enacted. The network topology for Trinidad and Tobago is of a single network for mobile GSM network operators, with no distance-sensitive price variants being included. Cost and price of calls between the islands under the existing and future regulatory regime will remain consistent.

Strategy: 3. Strengthening Safety, Security, Resilience and Risks

The national cyber security configuration rollout will have sufficient capability to extend to Tobago. Risk assessments will be used to identify and prioritise the sensitive security issues likely to fall within the Tobago segment of the national configurations. Consequently, Tobago will be an important part of the national ICT cyber security landscape with either island serving as business continuity and disaster recovery backup locations for the other.

²⁵In light of these differences the Plan has a suite of programmes that are specific to the island of Tobago, alongside programmes that are national in coverage. These programmes appear in Appendix 4, marked by an asterisk (*).

Strategic Thrust 2: Increasing Human Capacity

Strategy: 1. Building ICT Human Capital

This Strategy will run the same path in Tobago as it will in Trinidad. The ICT growing landscape in Tobago would see a stronger push to increase ICT diffusion and building critical mass in ICT take-up. Towards this end ICT training projects in secondary school and tertiary institutions, as well as at the community level, will be delivered across the island. Similar initiatives will also be introduced in the adult learning and continuing education space. Further, the trend towards forming ICT learning groups combining young and mature ICT users together to foster unique interactions that can lower ICT learning curves for mature users will be explored to advance this Strategy.

Strategy: 2. Improving Access to ICT Human Capital

A more targeted approach must be taken towards digitisation and automation in Tobago. Many of the island's activities centre on tourism and hospitality. Therefore, the hotel, travel and hospitality sector must be targeted for use as a driving force to induce local industry workers to engage ICTs. Automation and digitisation of the hospitality industry should progress as a vehicle to encourage citizen ICT involvement. Government and the tourism and hospitality industry will work collaboratively through a partnership funding or investment facility that will see the industry accessing ICT investment funding for innovation and business development.

Strategy: 3. Promoting Digital Inclusion

This Strategy will run the same path in Tobago as it will in Trinidad.

Strategic Thrust 3: Digital Government

Strategy: 1. Offering End-to-End eServices

The development of ICT in Government will be on the principle of parity across both islands. In this way the ascent of Digital Government will see parallel progression for Tobago. Infrastructure for developing an ecosystem that interconnects schools, Tobago Health Authority and THA administration among other institutions will be a priority for development. Further, collaboration with the THA and TSTT through E-IDCOT initiative will be advanced, fostering the development of Digital Government systems of central government towards full interconnectivity and interoperability with the THA. This would directly integrate Tobago with central government.

Strategy: 2. Driving User Adoption

This Strategy will run the same path in Tobago as it will in Trinidad.

Strategy: 3. Increasing Government Efficiency

In order to foster synergy and reduce duplication between Central Government and the THA as well as across the THA itself, enterprise-based and interoperable network services will be deployed across the THA entities. Two options would be explored: direct connectivity and interoperability with the Trinidad backbone (32 THA sites to date) or an interconnection to a Tobago oriented VPN. Cost and security considerations among other strategic rationalisations, will determine the best way of linking long term

operations. The introduction of these new services and approaches are set to radically improve efficiency of Government operations in Tobago.

Strategy: 4. Promoting Open Government

This Strategy will run the same critical path in Tobago as it will in Trinidad.

Strategic Thrust 4: Fostering Economic Development

Strategy: 1. Advancing eCommerce

This Strategy will run the same path in Tobago as it will in Trinidad with a focus on relevant enabling legislation. For Tobago, the tourism and hospitality industries would provide much impetus for the development of eCommerce. On the Government side, the THA will act on legislative changes (when instituted) to adopt electronic payment as a method for disbursing and receiving payments for official transactions. The move towards mobile payments and mobile point of sale transactions are capabilities both islands must pursue in tandem.

Strategy: 2. Diversifying the Economy Through ICT Sector Development

Some avenues are available for Tobago to diversify its local economy both on the level of trade with Trinidad and at the regional and international level. For instance, while Tobago may continue to focus on expanding its tourism product (the main economic driver), ICT related artistic tools may be leveraged to simulate an entire historical event experience in animated video portrayal to convey the actual event as it occurred in the past. These historical event reproductions can be consumed on hotel movie screens and entertainment rooms as video features that showcase the culture and history of the island. Investments or ventures can be solicited subsequently to bring these events to live performances on the island as tourism holiday experience packages where a lot more activity can be generated as revenue creation events.

Strategy: 3. Advancing Digital Content Production

The Strategy is to create a local digital content creation hub in Tobago where artists and content makers drawing on the 'Tobago Story, its background and history, and its tourism character will develop marketable products showcasing the different forms of audio-visual arts. Essentially, this will be using the tourism industry as the platform for consumption of our digital art, animation, short videos, movies and documentaries' content as a marketable product.

Strategic Thrust 5: Advancing Environmental and Societal Benefit

Strategy: 1. Green ICT

This Strategy will run the same critical path in Tobago as it will in Trinidad. The Plan addresses this, both in the context of Trinidad and Tobago, so collaboration with the THA is critical as the THA Act bestows environmental custodian status to the House of Assembly. As such green ICT in Tobago will be embedded in the administration of the THA. The Assembly will use ICT to monitor and evaluate sustainability standards and challenges will be overseen through a robust ICT assisted framework administered by the THA.

IMPLEMENTATION ROADMAP

The roadmap outlines the approach to implementing the Plan — it is designed to be ambitious but achievable. Conceptually, the initial focus is on implementing the enabling factors (foundational pillars), particularly infrastructure and legislation which are imperatives for service and sector expansion. The focus is then shifted to developing and increasing eServices, whilst promoting high rates of engagement/adoption. The final years of the Plan will see a continued focus on the uptake of eServices and, importantly, promoting integration, collaborations, and standardisation across Government.

The National ICT Plan Implementation Roadmap - Phase | 2018-2022

STRATEGIC THRUST	STRATEGIES	YEAR				
		2018	2019	2020	2021	2022
1 Improving Connectivity	S1 - Enhancing ICT Infrastructure	█	█	█		
	S2 - Modernising the Legal and Regulatory Framework	█	█	█		
	S3 - Strengthening Cyber Safety and Security				█	█
2 Increasing Human Capacity	S4 - Building ICT Human Capital	█	█	█	█	█
	S5 - Improving Access to ICT Human Capital				█	█
	S6 - Promoting Digital Inclusion	█	█	█	█	█
3 Digital Government	S7 - Offering End-to-End eServices				█	█
	S8 - Driving User Adoption				█	█
	S9 - Increasing Government Efficiency					█
	S10 - Promoting Open Government				█	█
4 Fostering Economic Development	S11 - Advancing eCommerce			█	█	█
	S12 - Diversifying the Economy Through ICT Sector			█	█	█
	S13 - Advance Digital Content Production		█	█	█	█
5 Advancing Environmental and Societal Benefit	S14 - Promoting Green	█	█	█	█	█

GOVERNANCE AND ENSURING SUCCESS

Governance is a fundamental issue in the development and successful implementation of the National ICT Plan. It is recognised that ICTs constitute not only a cross-cutting enabler of development across all sectors but also lay the foundation for new power dynamics thereby rendering ICTs and the ecosystems they create multidimensional, increasingly complex and decentralised. Consequently, the proposed governance system is one which recognises the central role of government in rule making. Management and control will transition from a top-down hierarchical approach to a more multistakeholder approach in which the issue of governance is more distributed and networked and provides for the inclusion of stakeholders who are both institutionalised and non-institutionalised.

The foundation for a contemporary approach to ICT governance within Trinidad and Tobago lies within the following international instruments:

- Geneva Principles (2003) and the Tunis Agenda (2005) of the World Summit for the Information Society (WSIS);
- Goal 16 of the United Nations Sustainable Development Goals (SDGs; 2015-2030): Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

These processes, as well as trends drawn from previous experience identify two governance priorities, namely

- (i) effective multi-stakeholder processes; and
- (ii) enhanced participation and collaboration.

To address these priorities, the new framework for governance in ICT will need to focus strongly on function-based activities that will ensure that along each phase of the current ICT plan:

- There is an improved understanding of the roles and regulatory responsibilities of all stakeholders, moving beyond the attributes of each group and rooted more so in the functions that each one performs in this governance approach;
- Engagement formally extends to both institutional and non-institutional actors alike so that greater value can be realised within the practical aspects of governance;
- Greater attention is paid to linking policy themes with actors and corresponding ecosystems; and
- Rules, practices, norms and regulations are shared among stakeholders, and remain relevant to the current state of ICT development.

Noting that there will be a need to transition from the traditional to a more contemporary approach to ICT governance, detailed below are the key principles which have been globally endorsed through various conventions on the Information Society, and which will serve as the basis for the work to be undertaken in co-developing shared practices, norms and values:

Openness: The planning, organisation and development of public policies and governance arrangements must be open to any stakeholder with demonstrated interest and competence to take part in these activities.

Transparency: Data, information, processes and decisions on the Information Society must always be public and be made comprehensible without prejudice to any stakeholder.

Accountability: All stakeholders involved in the development and governance of public policies must be held accountable to actions. Governments maintain the highest responsibility for legislative and political decisions and actions. Accountability may be assured through multi-stakeholder mechanisms for independent checks and balances.

Multi-stakeholder: Governance of ICT issues must involve the demonstrated interest of multiple stakeholders and built on democratic processes that ensure meaningful participation. Stakeholders include Government, the private sector, the technical community, academia, civil society and end users of the Internet. Stakeholder interactions must focus on functions, roles and responsibilities as opposed to characteristics and preconceived notions concerning each stakeholder group.

Consensus-driven: Decisions taken on public policy and governance issues in ICT must be made by consensus and predicated on meaningful, balanced participation of all stakeholders with a demonstrated interest.

Inclusion and equity: Processes and decisions on ICT public policy must involve all stakeholders in a balanced way, ensuring that no stakeholder group is disadvantaged.

Meaningful participation: Participation in good governance mechanisms and practice must go beyond extending political opportunity for stakeholders. It must be based on making data and information on ICT publicly available and ongoing sensitisation initiatives explaining trends and concepts to various publics in ordinary language. Government will particularly promote and facilitate participation by both institutionalised and non-institutionalised stakeholders.

Collaborative: Good governance mechanisms and practice for ICTs must be collaborative and cooperative, taking into account the interests and inputs of various stakeholders.

Agility: Any mechanism designed to deal with ICTs including the Internet must be inclusive and quick to respond to the exponential growth and rapid evolution of the

ICT Governance Structure

Development of an ICT governance structure is essential to ensuring the successful implementation of the National ICT Plan. The structure seeks to ensure participation across the GoRTT, business, and respective experts from various fields. It must support decision-making, communications and consultation. The Governance Structure is proposed to evolve over two (2) Phases in the years 2017 to 2021 and 2022 to 2026 respectively.

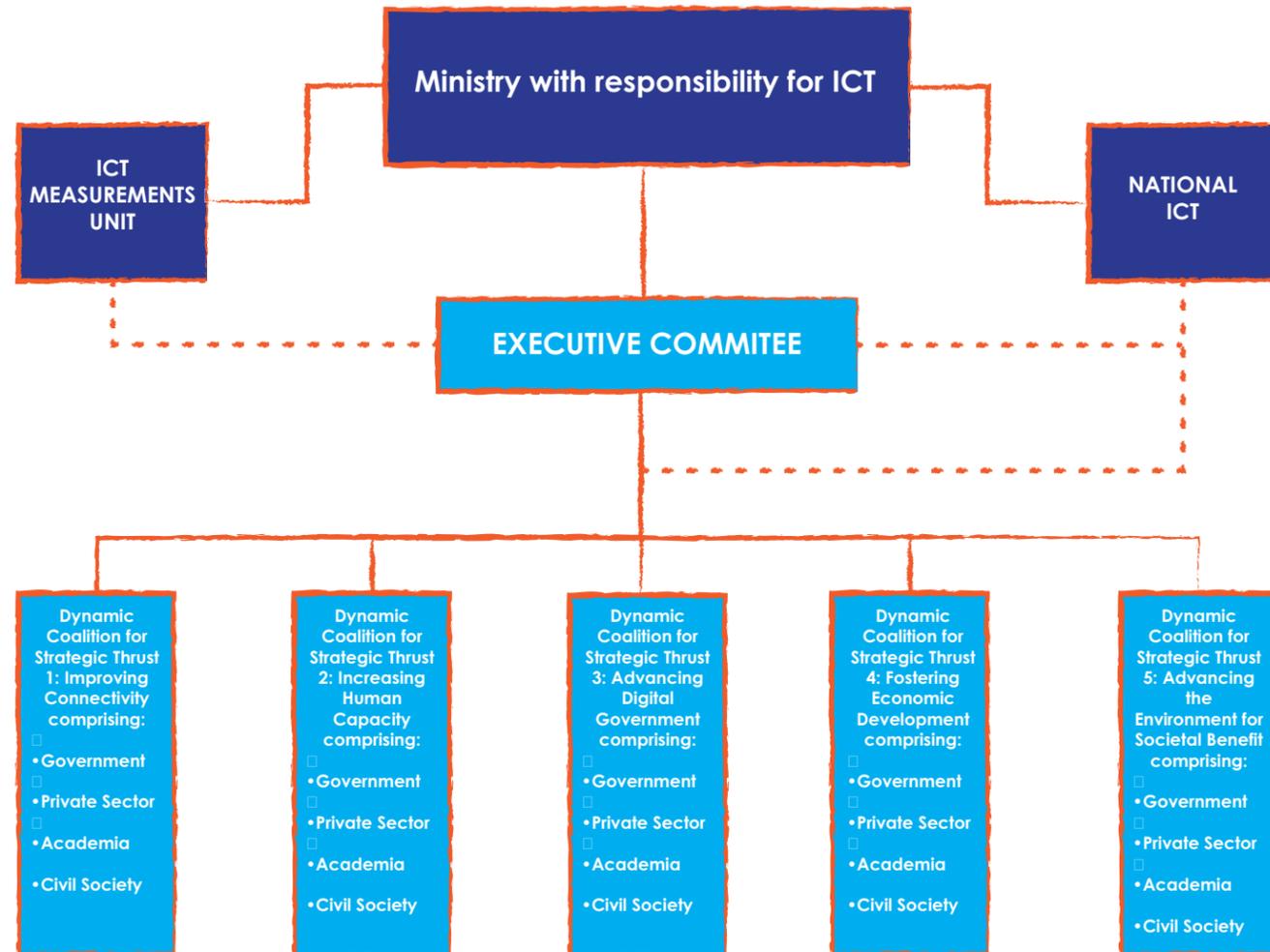
ICT Governance Structure - Phase I

In Phase I, it is important to establish a framework that engages stakeholders in key sectors that have demonstrated consistent commitment to innovation and transformation of respective sectors for the improvement of the delivery of services.

Within the Phase 1 governance framework it is essential that there is a cross-sector stakeholder committee with membership who are committed to drive development and adoption of Digital transformation projects within the Private Sector, Academia, and Social/general Citizen Welfare Services and Government.

Digital Government Projects, because of their transformative imperative, require cross-ministry participation. As a consequence, the ownership responsibilities for such projects must be decided on criteria that, inter alia, includes a programme/project capacity, transformation competencies, BOM capabilities and ICT Planners and Architects. A monitoring, measurement and evaluation capacity is critical to supplement the aforementioned capabilities to improve success in the implementation of the National ICT Plan - to review performance through the measurement of key indicators set as targets for accomplishment.

The recommended ICT Governance Structure (Phase 1) for implementation of National ICT Plan is illustrated below.



Financing

Achieving the vision of the *National ICT Plan* will require the mobilisation of significant financial resources. Funding for the Plan will come from Government, International Development Partners, and private sector institutions.

Funding allocations by Government would be guided by the benchmark set by ICT progressive developing countries. These countries allocate .5% to 1.5% of Gross Domestic Product (GDP) to ICT investment annually²⁶. This investment is sub-divided into 50% on hardware, 30% on software, and 20% on services.

With a GDP of US\$28 billion, Trinidad and Tobago's average anticipated budgetary allocation for ICT would be US\$ 140 million / \$TT1Bn annually or roughly 0.5% of GDP. This allocation would enable implementation of the programmes and projects outlined in the Plan, over the next five years. Government financing would be drawn upon when approval is granted by Cabinet for programme recommendations that come through the ICT Governance Structure, as outlined above.

The Universal Service Fund would be drawn upon to finance designated programmes. Private sector led initiatives will be financed through private capital. Additionally, support from International Development Partners would be leveraged to advance priority areas of the Plan.

Overall, the goal is to transition from the current decentralised approach to funding to set up a central fund which would allow financing to be ring-fenced and rolled over. Thus, the uncertainty of depending on annual budgetary allocation would be avoided and the risk of losing political will for implementing the Plan would be significantly reduced. Monies in the central fund would be used to finance Ministry-led projects (particularly the foundational infrastructure for shared service items) and co-finance Public Private Partnerships (PPPs) projects. In both instances, Cabinet approval for spending will be sought and expenditure for certain categories of items will remain within the purview of individual MDAs. Guidelines and standards would be used to streamline all procurements and ensure seamless integration and interoperability.

²⁶ World Bank statistics of ICT investment as percent of GDP in Developing Countries, Developed Countries led by the UK account for as high as 4% of GDP.

Monitoring and Assessing Progress

A monitoring and evaluation system is mandatory for assessing the progress of the ICT Blueprint against key indicators. The ICT Programme Management Office (PMO)²⁷ will finalize benchmarks and a system for tracking and assessing the progress of critical projects under each of the five Thrusts. These metrics are to be guided by international benchmarks.

Further, the PMO will conduct empirical work (surveys, self-led or in partnership with Ministries and Agencies) to monitor performance, adoption, and usage of ICT in homes, businesses, and the government sector. The information gathered will support, among other things: yearly comparison; corrective action; realignment of strategies; resource control; and better reporting on international indices. Further, the information gathered will support a major review of the plan to come in the third year of implementation

Next Steps

Formalise the ICT Governance Structure

Effective governance is critical to the achievement of the vision of the NICT Plan and maximising the value of ICT investments. Therefore, the proposed ICT governance structure needs to be established to provide for successful implementation of the Plan

Develop the Communications Plan

A Communications Plan must be developed to inform all stakeholders of key information regarding the Plan. This includes, the Plan's vision, objectives, strategic thrusts, approach, benefits, and timelines.

Communication of the National ICT Plan is required at different levels:

- To get buy-in for the Plan from various stakeholder groups whose support is required for successful implementation;
- To highlight the impact of the Plan on the various stakeholder groups who will benefit from the deliverables; and
- To advance the country's ranking on various international benchmarks.

The Communications Plan details the delivery and execution of a communications calendar and the development of necessary communication kits. The Communications Plan should instil a high level of awareness of the Plan within Trinidad and Tobago and internationally. Marketing and awareness campaigns would target all stakeholder groups – community, businesses and the Government, and feature engagement events, promotions and awards. In promoting the adoption of Digital Government, electronic media would be considered important for mass education on Digital Government services. The aim is to highlight the many benefits of available Government service offerings.

²⁷ The PMO comprises: the Government CIO Officer, the Execution and Monitoring Level, and the Operation Level of the Governance Structure

The Communications Plan should be monitored and progress should be communicated to the office of the GCIO.

Develop a Detailed Implementation Plan

An elaborated version of the implementation roadmap provided in this document is to be developed by the PMO to guide implementation of the Plan. That Plan would outline, among other things, specific timelines and funding projections.

Conclusion

As a successor to *fastforward* and *smarTT*, the Plan incorporates both remedial and proactive interventions to create opportunities for the people, businesses, and Government of Trinidad and Tobago. The Plan addresses the gaps in implementation of past National ICT Plans, capitalises on opportunities and trends, and catalyses the transformation of the following five dimensions/Strategic Thrusts:

1. Infrastructure - *Improving Connectivity*;
2. Capacity - *Increasing Human Capacity*;
3. Government – *Digital Government*;
4. Business - *Fostering Economic Development*; and
5. Environment/Community - *Advancing Environmental and Societal Benefits*.

For successful implementation of the Plan to meet the desired outcomes and achieve the National ICT vision, the recommended governance structures, legislative changes and processes must be in place. Strong governance ensures that changing priorities and needs of the country are effectively managed.

Acknowledgements

Upon the request of the Minister of Public Administration, through formal country member protocol, assistance for the development of the National ICT Plan was sought from the International Telecommunications Union's (ITU) through its Area Representative in the ITU Area Office for the Caribbean.

In the various stages of development, the Plan benefitted richly from the collective wisdom of the people of Trinidad and Tobago, including a diverse group of individuals representing their communities, organisations, industries and Government. These individuals acted 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 Public Administration, the Project Working Group comprising officers of the Ministry of Public Administration, the Ministry of Public Utilities, the Telecommunications Authority of Trinidad and Tobago, the National ICT Company Limited (iGovTT), the e-Business Roundtable and members of the Specialised 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 ICT sector experts for providing their insight on the Plan.

APPENDICES

APPENDIX 1: Trinidad and Tobago's Key ICT Indicators

- Service providers in the domestic market have increased

ICT Market Environment in Trinidad and Tobago

Service Provided	Numbers of Operators 2006	Numbers of Operators 2016
Mobile Telecommunications	2	2
Fixed Telephone	6	7
Fixed Internet	11	11
Pay Television	7	13
Free-to-air Television Broadcasting	6	6
Television Broadcasting Service via Cable	3	7
Free-to-air Radio Broadcasting	30	37

- Trinidad and Tobago's performance on international benchmarks that gauge the viability and ease of doing business in the country remains moderate.

Benchmarking by International Bodies

International Body	Ranking
United Nations eGovernment Survey 2016 ²⁸	70th out of 193 countries
WEF Global Information Technology Report 2016 ²⁹	67th out of 139 countries
EIU e-Readiness Rankings 2010 ³⁰	48th out of 70 countries
World Bank's Doing Business 2016 Report ³¹	88th out of 189 countries
ITU Measuring the Information Society 2016 ³²	67th out of 167 countries
UNCTAD B2C E-commerce Index ³³	67th out of 137 countries

²⁸ Department of Economic and Social Affairs, United Nations, United Nations E-Government Survey 2016: E-Government in Support of Sustainable Development. New York, UN, 2016. Page 153

²⁹ Baller, Dutta, and Larvin, The Global Information Technology Report 2016. Page 182

³⁰ Economist Intelligence Unit, Digital economy rankings 2010 Beyond e-readiness, The IBM Institute for Business Value, 2010, Page 4

³¹ World Bank Group, Doing Business 2016: Measuring Regulatory Quality and Efficiency. Washington DC, International Bank for Reconstruction and Development / The World Bank, 2016. Page 5

³² International Telecommunication Union, Measuring the Information Society Report 2016. Geneva, Switzerland, International Telecommunication Union, 2015. Page 13

³³ United Nations Conference on Trade and Development, UNCTAD B2C E-commerce Index 2016, UNCTAD Technical Note on ICT for Development, 2016. Page 23.

- The same holds for the country's performance on Network Readiness which is an assessment of the country's propensity to exploit ICT related opportunities. The table below reflects the country's ranking for 2012 and 2016.

The World Economic Forum (WEF) – Network Readiness Performance

Sub-index	2012 ³⁴	2016 ³⁵	Pillar	2012	2016
Environment Sub-index	76	96	1st pillar: Political and Regulatory Environment	90	104
			2nd pillar: Business and Innovation Environment	72	77
Readiness Sub-index	43	35	3rd pillar: Infrastructure	44	37
			4th pillar: Affordability	64	44
			5th pillar: Skills	37	43
Usage Sub-index	52	69	6th pillar: Individual Usage	43	59
			7th pillar: Business Usage	81	79
			8th pillar: Government Usage	81	94
Impact Sub-index	91	88	9th pillar: Economic Impacts	89	78
			10th pillar: Social Impacts	90	90

- This trend is also observed in the ICT Development Index (IDI) which is an assessment of the level and evolution over time of ICT development within the country. This Index highlights the development potential of ICT and the extent to which countries can make use of them to enhance growth and development in the context of available capabilities and skills. The table below reflects the country's ranking of the sub-indices for 2012 and 2016 as well as the value of the indicators for the same period.

³⁴ Dutta, Bilbao-Osorio, The Global Information Technology Report 2012. Page 302

³⁵ Baller, Dutta, and Larvin, The Global Information Technology Report 2016. Page 182

The International Telecommunications Union (ITU) – ICT Development Index (IDI) Performance

Sub-index	2012 ³⁶	2016 ³⁷	Indicators	2012 ³⁸	2016 ³⁹
IDI Rank	61	67			
Access Sub-Index	62	55	Fixed-telephone subscriptions per 100 inhabitants	20.7	20.1
			Mobile-cellular subscriptions per 100 inhabitants	135.6	157.7
			International Internet bandwidth Bit/s per Internet user	19,753	122,703
			Per centage of Households with computer*	56.3	67.9
			Per centage of households with Internet*	35	65.0
Usage Sub-Index	61	68	Per centage of individuals using the Internet*	55.2	69.2
			Fixed-broadband subscriptions per 100 inhabitants**	11.5	20.7
			Active mobile broadband subscriptions per 100 inhabitants**	1.2	32.2
Skills Sub-Index	91	103	Gross enrolment ratio, secondary*	89.9	85.5
			Gross enrolment ratio, tertiary*	11.5	12.0
			Adult Literacy Rate (2012)	98.7	
			Mean years of schooling (2016)		10.9

* Priority areas for improvement that can be accomplished in the short term through improved data collection and submission to the respective United Nations institution.

** Priority areas for improvement that can be accomplished in the medium term through increased availability and affordability of ICTs.

- The International Telecommunications Union also develops ICT Price Baskets to assess the price and affordability of all key ICT services. The table below highlights the country's rank for the ITUs ICT price sub-baskets for the period 2012 to 2016.

³⁶ International Telecommunication Union, Measuring the Information Society Report 2012. Geneva, Switzerland, International Telecommunication Union, 2011. Pages 21, 38, 42 and 48

³⁷ International Telecommunication Union, Measuring the Information Society Report 2016. Geneva, Switzerland, International Telecommunication Union, 2015. Pages 12 to 15

³⁸ International Telecommunication Union, Measuring the Information Society Report 2012. Geneva, Switzerland, International Telecommunication Union, 2011. Pages 208 to 213

³⁹ International Telecommunication Union, Measuring the Information Society Report 2016. Geneva, Switzerland, International Telecommunication Union, 2015. Pages 240 to 251

The International Telecommunications Union (ITU) – ICT Price Basket Performance

Sub Basket	2012 ⁴⁰	2016 ⁴¹
Mobile Cellular	30	61
Fixed Broadband	23	53
Mobile Broadband Prices, prepaid handset based, 500MB	-	91
Mobile Broadband Prices, postpaid computer based, 1GB	-	26

- Trinidad and Tobago's performance has also been moderate in terms of E-commerce readiness as measured by the UNCTAD B2C E-commerce Index. This Index identifies a set of key facilitating factors that determine the extent to which enterprises and consumers are able to engage in online commerce. The table below highlights the country's value for each indicator included in this Index for the period 2015 to 2016.

United Nations Conference on Trade and Development - UNCTAD E-commerce Index Performance

Sub-index	Indicator	2015 ⁴²	2016 ⁴³
UNCTAD E-commerce Index value		43	67
INTERNET USE	Share of individuals using Internet	59.5	65
PAYMENT	Share of individuals with credit card (15+)	15.3	15
B2C WEB PRESENCE	Secure Internet servers per 1 million people	73.8	71
DELIVERY	Share of population having mail delivered at home (2014)	93	
	UPU postal reliability score (2016)		39

⁴⁰ International Telecommunication Union, Measuring the Information Society Report 2012. Geneva, Switzerland, International Telecommunication Union, 2011. Pages 82 and 88

⁴¹ International Telecommunication Union, Measuring the Information Society Report 2016. Geneva, Switzerland, International Telecommunication Union, 2015. Pages 107, 120, 136 and 137

⁴² United Nations Conference on Trade and Development, Information Economy Report 2015: Unlocking the Potential of E-commerce for Developing Countries, 2015. Page 101.

⁴³ United Nations Conference on Trade and Development, UNCTAD B2C E-commerce Index 2016, UNCTAD Technical Note on ICT for Development, 2016. Page 23.

APPENDIX 2: Sustainable Developmental Goals

Both the ICT Blueprint and **Vision 2030** are informed by the *Sustainable Development Goals (SDGs)* of the 2030 Agenda for Sustainable Development which are highlighted below:



APPENDIX 3: Five-Stage Planning Methodology

A five-stage highly consultative approach was adopted for developing the Plan.

Stage 1: Plan The project kicked off with the establishment of governance structures and related processes to oversee and guide the entire planning exercise.

Stage 2: Discover analysed the present state – its strengths, weaknesses, opportunities and threats, and feedback from engagement of key stakeholders.

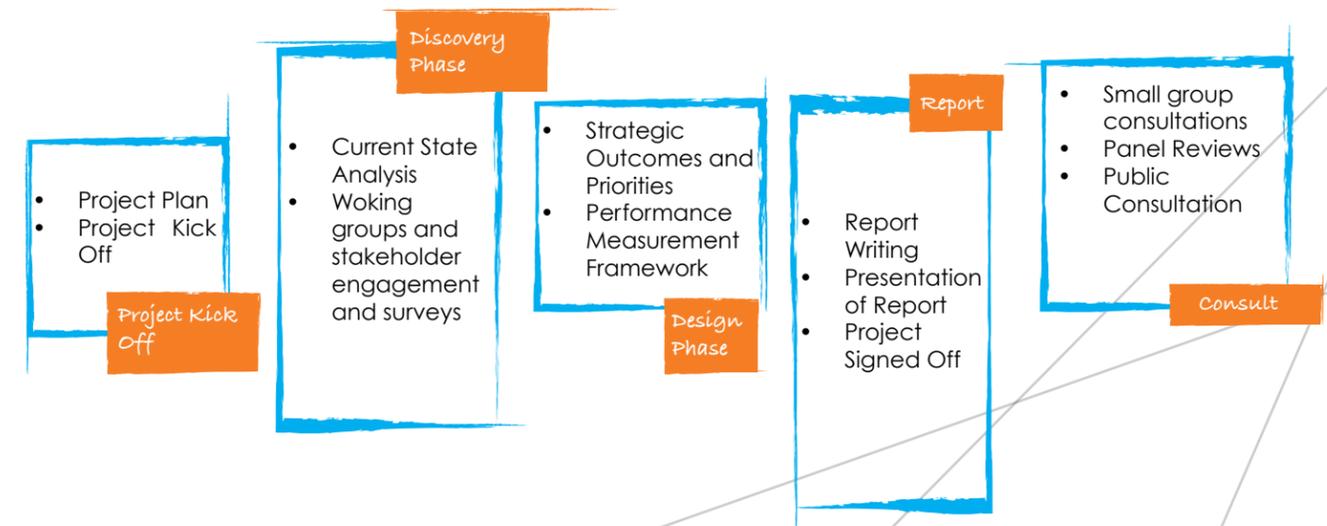
Stage 3: Design developed the strategic and performance measurement frameworks. The Discovery and Design phases under Stage 2 and Stage 3 were iterative and resulted in validated frameworks that form the basis for the development of the draft Plan.

Stage 4: Compiled information and designed frameworks were put together into a draft Plan.

Stage 5: The Draft Plan was provided for consultation through a series of small group consultations, panel reviews (and online public consultation)) in order to hear and incorporate the concerns and recommendations

5-Stage Planning Methodology⁴⁴

Stage 1 → Stage 2 → Stage 3 → Stage 4 → Stage 5



⁴⁴ This methodology was adopted from IDA International, which was generated for a national ICT planning exercise in Trinidad and Tobago in 2012.

APPENDIX 4: Programmes and Projects

Note: Programmes and Projects marked with an asterisk (*) also have a defined Tobago component and/or version, whereas all other Programmes and Projects have national coverage (i.e. inclusive of both Trinidad and Tobago).

Strategic Thrust 1: Improving Connectivity

Strategies	Programmes/projects	Driving Agencies
S1: Enhancing ICT Infrastructure	Government Backbone: Government Network Infrastructure development and rollout	Ministry of Public Administration & Communications Office of the Chief Secretary, Tobago House of Assembly
	Cloud Computing: Software as a Service, Platform as a Service and Infrastructure as a Service.	Ministry of Public Administration & Communications Office of the Chief Secretary, Tobago House of Assembly iGovTT e-IDCOT
	Middleware Platform: Shared services infrastructure that ties together data, devices and applications which can result in new applications being deployed, with more efficient and faster rollout.	Ministry of Public Administration & Communications Office of the Chief Secretary, Tobago House of Assembly iGovTT e-IDCOT
	Provision of countrywide Wi-Fi connectivity at public places throughout Trinidad and Tobago: Installation of wireless Internet access points in public places such as, town plazas, parks, government offices, health units, and transport terminals.	Ministry of Public Administration & Communications Settlements, Urban Renewal and Public Utilities Division Or Education Innovation and Energy Division, Tobago House of Assembly

		Telecommunication Authority of Trinidad and Tobago
	Universal Service Project: To Facilitate the rollout of infrastructure projects in under-served communities and assistive technologies for persons with disabilities	Ministry of Public Administration & Communications Settlements, Urban Renewal and Public Utilities Division, Tobago House of Assembly Telecommunication Authority of Trinidad and Tobago Tobago Information Technology Limited
	Private Sector investment programmes: <ul style="list-style-type: none"> Broadband including mobile broadband development Undersea cable facility and backhaul expansion 	Telecommunication Authority of Trinidad and Tobago Internet Service Providers
	Establish second landing station: Following from the work completed by the World Bank Group to produce a study for the establishment of a second subsea cable system landing point, this work shall be progressed to foster the establishment of such, in order to improve international connectivity capacity and redundancy.	Telecommunication Authority of Trinidad and Tobago Finance and the Economy Division, Tobago House of Assembly
	IPv6 adoption: Ensures the longevity of the Internet and devices that connect to it. The adoption of IPv6 relies heavily of the readiness of Internet Service Providers to allow the routing of such IP addresses. The Internet of Things will also rely on the adoption of IPv6, as it is predicated on every device having a unique IP address.	Telecommunication Authority of Trinidad and Tobago Tobago Information Technology Limited
	*IXP and Data Centre Capacity: To further the work accomplished via the co-regulatory approach with the ISPs to establish an IXP, the establishment of data centers to support the hosting of content locally will be undertaken.	Telecommunication Authority of Trinidad and Tobago e-IDCOT

Strategies	Programmes/projects	Driving Agencies
S2: Modernising the Legal and Regulatory Framework	Data Protection Act provides for the protection of personal information and privacy	
	Data Protection Act Regulations provide for procedures for implementing (i) Mandatory Codes of Conduct regarding General Privacy Principles in the private sector; (ii) Privacy Impact Assessments in public and private sectors	Office of the Information Commissioner/ Ministry of Public Administration & Communications Office of the Chief Secretary, Tobago House of Assembly
	Electronic Transactions Act gives legal effect to electronic documents, electronic records, electronic signatures and electronic transactions	Office of the Information Commissioner/ Ministry of Public Administration & Communications Office of the Chief Secretary, Tobago House of Assembly
	Electronic Transactions Act Regulations provide for creation of a Designated Authority to regulate Electronic Authentication Service Providers (EASPs) and procedures of registration of EASPs and authentication of electronic signatures	Office of the Information Commissioner / Ministry of Public Administration & Communications Telecommunication Authority of Trinidad and Tobago Office of the Chief Secretary, Tobago House of Assembly
	Exchequer and Audit Act Amendments and Exchequer and Audit (Electronic Funds Transfer) Regulations: provide for the implementation of electronic payments and electronic signatures in G2B/B2G and G2C/ C2G transactions	Treasury Division, Ministry of Finance Central Bank of Trinidad and Tobago Finance and the Economy Division, Tobago House of Assembly
	Electronic Transfer of Funds Crime Act regulates the transfer of money by electronic terminal through use of an electronic card.	Finance and the Economy Division, Tobago House of Assembly Office of the Chief Secretary, Tobago House of Assembly

Telecommunications Act and Telecommunications Amendment Bill 2017 provide more robust framework for continued build out of infrastructure, ubiquitous provision of telecommunications and broadcasting services, and more efficient regulation of competition in relevant markets	Ministry of Public Administration & Communications Telecommunications Authority of Trinidad and Tobago Settlements, Urban Renewal and Public Utilities Division, Tobago House of Assembly
Cybercrime Bill: -to provide for offences related to cybercrime including hacking of computer and information networks, unauthorized access to and removal of computer or system data and electronic breaches of communications	Ministry of National Security
Computer Misuse Act: prohibits the unauthorized access, use or interference with a computer [intended to be superseded by proposed Cybercrime legislation]	Ministry of National Security
Consumer Protection Regulation (TATT) or Code	Telecommunication Authority of Trinidad and Tobago
Modernising of Spectrum Management Framework Modernization of the Spectrum Management Framework to include considerations for contemporary future policies and principles to inform the efficient and effective management of the national spectrum resource.	Telecommunication Authority of Trinidad and Tobago
Digital Financial Inclusion The pervasiveness of ICTs has created a digital economy. Traditional financial structures are evolving and new paradigms are emerging, such as Mobile Money and Financial inclusion.	Central Bank of Trinidad and Tobago Ministry of Finance Telecommunication Authority of Trinidad and Tobago Finance and the Economy Division, Tobago House of Assembly
Treatment of Net Neutrality Net Neutrality is based on the principle of an open and indiscriminate network	Ministry of Public Administration & Communications

		Telecommunication Authority of Trinidad and Tobago Office of the Chief Secretary, Tobago House of Assembly
	Management of the ccTLD The Government of Trinidad and Tobago has determined that a more inclusive governance structure should be established for the management of this country code resource.	Telecommunication Authority of Trinidad and Tobago
Strategies	Programmes/projects	Driving Agencies
S3: Strengthening Safety, Security, Resilience and Risks	National Cyber-Security Strategy sets out policy and implementation plan for protection of computer and information networks and facilitating secure communications	Ministry of National Security
	National Cyber Security Governance: strengthening cyber security institutions and improving collaboration among them to create a more secure and trusted environment. Such institutions include: <ul style="list-style-type: none"> National Cyber Security Policy Unit, Ministry of National Security National Cyber Security Incident Response Team (CSIRT), Ministry of National Security Cyber Crime Unit, Trinidad and Tobago Police Service Industry (Energy, Financial & Banking, Commerce etc.) Cyber Security Incident Response Teams 	Ministry of National Security Private Sector
	Information Security Policy	
	Cyber Security Awareness Programme	
	Cyberbullying policies for schools	Ministry of National Security Ministry of Education Ministry of Public Administration Education, Innovation and Energy Division, Tobago House of Assembly

	Business Continuity Management and Disaster Recovery Planning to improve service and business recovery times in the event of natural / manmade disruptions	Ministry of Public Administration Office of the Chief Secretary, Tobago House of Assembly Office of Disaster Preparedness and Management Tobago Emergency Management Agency Private Sector
	eJustice programmes and projects designed to increase the accessibility and timely delivery and reduce the cost of justice to individual and corporate persons. Programmes include: <ul style="list-style-type: none"> e-filing: filing of documents electronically at Court Office e-service: service of document electronically on parties e-storage: electronic storage of documents at Court Office e-litigation: conduct of trials and hearings via electronic methodologies 	Judiciary Ministry of Public Administration iGovTT Office of the Chief Secretary, Tobago House of Assembly
	Automated Palm and Fingerprint Identification System (APFIS)	
	Automate system to check drivers' licenses, vehicle ownership etc.	Infrastructure, Quarries and the Environment Division, Tobago House of Assembly
	Infra-red equipment to track fleeing criminals and missing people in the dark including those of the drug trade crossing into TT borders	
	Predictive analytics and GPS maps which show crime hotspots	
	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.	Ministry of Public Administration iGovTT

Strategic Thrust 2: Increasing Human Capacity

Strategies	Programmes/projects	Driving Agencies
S4: Building ICT Human Capital	Advancing ICT training and infrastructure in primary and secondary schools: <ul style="list-style-type: none"> • Training of Teachers in keeping with the UNESCO ICT Competency Standards Framework • Approval of the ICT in Education Policy • Improving ICT infrastructure in primary and secondary schools. • Roll out of Commonwealth of Learning Aptus devices to remote schools 	Ministry of Education Education, Innovation and Energy Division, Tobago House of Assembly
	FLOSS multi-channel learning management system for national training and in support of primary and secondary education systems	Ministry of Education Education, Innovation and Energy Division, Tobago House of Assembly
	Review and amendment of ICT Training Framework, aligned with current and emerging technological developments	Ministry of Education Ministry of Public Administration Ministry of Labour and Small Enterprise Development Education, Innovation and Energy Division, Tobago House of Assembly Private Sector Academia
	*ICT-based knowledge management framework for Government services	Ministry of Public Administration Office of the Chief Secretary, Tobago House of Assembly
	Extending collaborative R&D work within and outside the region in line with identified technology areas	Ministry of Education Ministry of Planning and Development

	Ministry of Public Administration Finance and the Economy Division, Tobago House of Assembly Education, Innovation and Energy Division, Tobago House of Assembly
	Department R & D in ICT Ministry of Public Administration Tobago Information Technology Limited
	ICT Awards and Incentives scheme focused upon national challenges Ministry of Public Administration Office of the Chief Secretary OR Finance and the Economy Division, Tobago House of Assembly
	Awareness campaigns to educate the business community on ICT Developments in the country Ministry of Public Administration Ministry of Trade and Industry Finance and the Economy Division, Tobago House of Assembly Tobago Information Technology Limited Private Sector

S5: Improving Access to Human Capital	National skills bank with ICT-based linkages between government, citizens, and businesses for access to services	Ministry of Public Administration Ministry of Labour and Small Enterprise Development Ministry of Education Tobago Information Technology Limited Private Sector Academia
	Policy for targeted, ICT-based use of human resource outputs from national training and education programmes (including OJT and National Scholarship Awardee Placement)	Ministry of Education Education, Innovation and Energy Division, Tobago House of Assembly
	Database of national/regional challenges with ICT-based system to encourage innovative thinking in developing local/regional, contextual solutions	Ministry of Public Administration Education, Innovation and Energy Division, Tobago House of Assembly OR Tobago Information Technology Limited Academia Private Sector
	OJT and scholarship awardee placement system with allocations to institutions conducting research and development activities in line with identified technology areas	Ministry of Education Ministry of Public Administration Education, Innovation and Energy Division, Tobago House of Assembly Academia
	Attract and retain ICT and related technology professionals	Office of the Chief Secretary, Tobago House of Assembly

S6: Promoting Digital Inclusion	Provision of assistive technologies to persons with disabilities The objectives of this project will ensure that PwDs have access to basic telecommunications mobile services through the provision of assistive mobile devices, whilst reducing the digital divide by promoting digital inclusion of ICTs to PwDs.	Telecommunications Authority of Trinidad and Tobago
	Design and Implementation of a National Digital Divide Survey every 3-5 years This survey will inform the universal service projects that are developed towards closing this access gap and making broadband access ubiquitous.	Telecommunications Authority of Trinidad and Tobago
	Use of Universal Service Funds on projects to foster digital inclusion in accordance with the provisions of the Universal Service Regulations	Ministry of Public Administration Telecommunications Authority of Trinidad and Tobago
	Awareness, Outreach & Training programmes to targeted groups: <ul style="list-style-type: none"> • Persons with disabilities • Girls and young women • Boys and young men 	Education, Innovation and Energy Division, Tobago House of Assembly

Strategic Thrust 3: Digital Government

Strategies	Programmes/projects	Driving Agencies
S7: Offering End to End eServices	<p>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. As such the following will be required:</p> <ul style="list-style-type: none"> • Middleware Platform • Audit and Analysis of current eServices • Implementation eServices Roadmap 	<p>Ministry of Public Administration</p> <p>iGovTT</p>
S8 – Driving User Adoption	<p>Government service delivery has to reach and go beyond 'transactional' to 'personalised'. Government will ensure that personal information is used appropriately through:</p> <ul style="list-style-type: none"> • A data Privacy Policy and Digital Communications Policy • A User and Promotion Programme 	<p>Ministry of Public Administration</p> <p>iGovTT</p>
S9 – Increasing Government Efficiency	<p>This area focuses on leveraging ICT to improve the efficiency of government processes, enhance the effectiveness of government policies, and ensure sound ICT investment.</p> <p>By consolidating the ICT infrastructure requirements of GoRTT, the Government as a whole stands to:</p> <ul style="list-style-type: none"> • reap cost savings, • build in redundancy, • exercise better control by enforcing ICT infrastructure standards and government-wide ICT policies. <p>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.</p> <p>Enterprise Architecture: the deployment of common ICT infrastructure, systems and policies calls for a clearly articulated position on GoRTT's</p>	<p>Ministry of Public Administration</p> <p>iGovTT</p>

	<p>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.</p>	
S10 – Promoting Open Government	<p>This would allow citizens to participate more fully in Government which can increase transparency through:</p> <ul style="list-style-type: none"> • eParticipation • eConsultation • Data Analytics 	<p>Ministry of Public Administration</p> <p>iGovTT</p>

Strategic Thrust 4: Fostering Economic

Strategies	Programmes/projects	Driving Agencies
S11: Advancing e-Commerce	More Government business online <ul style="list-style-type: none"> Development of e-Procurement System Provision of end to government services 	Ministry of Public Administration Ministry of Finance Finance and the Economy Division, Tobago House of Assembly OR Office of the Chief Secretary, Tobago House of Assembly
	Develop and implement an e-Commerce strategy <ul style="list-style-type: none"> Creation of a framework for the use of e-Commerce in government 	Ministry of Trade and Industry Ministry of Public Administration Finance and the Economy Division, Tobago House of Assembly
S12: Diversifying the Economy through the ICT Sector	*Facilitate SME e-commerce awareness, education and training programme <ul style="list-style-type: none"> Policy, Strategy and Institutional Framework for Micro Small Enterprise (MSE) Development <p>The Policy, Strategy, and Institutional Framework for MSE Development aims to integrate existing business support services to create a cohesive ecosystem for promoting both entrepreneurship as well as small business growth.</p>	Ministry of Labour and Small Enterprise Development Ministry of Public Administration Community Development, Enterprise Development and Labour Division, Tobago House of Assembly
	Promote and Facilitate Increases in the Availability of Funding for SME e-Business Adoption <ul style="list-style-type: none"> The Global Services Programme <p>The Global Services Programme is an Inter-American Development Bank (IDB) funded programme, which aims to support the advancement of Trinidad and Tobago's positioning as a renowned location for global provision of Information Technology enabled Services (ITeS). This will</p>	Ministry of Labour and Small Enterprise Development Ministry of Public Administration Ministry of Planning and Development Community Development, Enterprise

	promote exports, employment and foreign direct investment in the global services industry in Trinidad and Tobago	Development and Labour Division, Tobago House of Assembly / Finance and the Economy Division , Tobago House of Assembly
	*Facilitate a Pro Business Environment <ul style="list-style-type: none"> Strengthen of the Single Electronic Window for Trade and Business Facilitation (an IADB fund programme)- 	Ministry of Trade and Industry Finance and the Economy Division, Tobago House of Assembly
	Promote ICT Cluster Development <ul style="list-style-type: none"> Development of a Framework for Cluster in alignment with eTeck's Mandate 	Ministry of Trade and Industry Finance and the Economy Division, Tobago House of Assembly
	Develop and promote the National Integrated Business Incubator System <ul style="list-style-type: none"> The CARIRI CED Project <p>The Centre for Enterprise Development (CED) was established with the core purpose of building capacity and capability for enterprise creation, consistent with Government's strategic priorities of Economic Growth, Job Creation, Competitiveness and Innovation</p>	Ministry of Planning and Development Office of the Chief Secretary, Tobago House of Assembly
	Programme for the Development of ICT within other Sectors	Ministry of Public Administration Ministry of Trade and Industry
	Update of the Special economic Zone Policy	Ministry of Trade and Industry InvestT
	The establishment of an ICT Finishing school to increase the attractiveness of graduates	Ministry of Public Administration Ministry of Education

	Tax incentives for increased ICT Availability and Accessibility.	
S12: Diversifying the Economy through the ICT Sector	<p>*Assess the mandate and expand the capacity of the e-Business Roundtable</p> <ul style="list-style-type: none"> The e-Business Roundtable is a private sector led partnership with Government that aims to articulate strategy for Trinidad and Tobago's economic growth through the use of Information and Communications Technologies in business. 	<p>Ministry of Public Administration</p> <p>Office of the Chief Secretary, Tobago House of Assembly</p>
	<p>Develop ICT Linkages to Key Sectors</p> <ul style="list-style-type: none"> Programme for development of ICT within other sectors e.g. Agriculture, Health and Tourism 	<p>Ministry of Public Administration</p> <p>Office of the Chief Secretary, Tobago House of Assembly</p>
	<p>Award of 3rd Mobile Operator Concession</p> <ul style="list-style-type: none"> The successful conclusion to the tender process to recommend the award of a concession to the third mobile operator will see the increase in competition in the mobile market, bringing with it further innovations for this market, new technologies and benefits for the consumer (e.g. affordability and expanded services). 	Telecommunications Authority of Trinidad and Tobago
	<p>International agreements Economic Partnership Agreement (EPA) between EU and CARIFORUM, incorporated into domestic law of T&T via Economic Partnership Agreement Act of 2013 (EPA Act): provides, inter alia, for more open authorization framework for telecommunications and broadcasting services</p> <p>Update of the Special economic Zone Policy</p>	<p>Ministry of Trade and Industry</p> <p>Ministry of Public Administration</p> <p>Telecommunications Authority of Trinidad and Tobago</p> <p>Finance and the Economy Division, Tobago House of Assembly/Office of the Chief Secretary, Tobago House of Assembly</p>
S13: Advancing Digital Content Production	Facilitation of digitisation of academic research	Ministry of Education

	Digitisation of Heritage, Indigenous and Social Content: Transformation of the country from a "Download" to an "Upload" culture that celebrates the ingenuity of its people	Ministry of Public Administration
	<p>Establishing a Records Management System and Implementation of an integrated Archival Management System</p> <ul style="list-style-type: none"> The Media Asset Management/Digital Asset Management (MAM/DAM) project involves the design, specification, and implementation of an integrated solution to organize, preserve and provide continued access to the Government Information Services Limited's (GISL) information resources. It also involves managing the media migration of broadcast recordings from an analogue tape format to a digital file format. The Automation and Digitization of the National Archives project aims to promote more effective government by expanding access to government-owned content and services. The project involves: <ul style="list-style-type: none"> establishing a digitization lab establishing the Records Management System digitizing the core collections at National Archives of Trinidad and Tobago implementing an integrated Archival Management System <p>Facilitation of Digital Content for Learning for all levels of education</p>	<p>Ministry of Public Administration</p> <p>Office of the Chief Secretary Tobago House of Assembly Ministry of Education</p> <p>Education, Innovation and Energy Division, Tobago House of Assembly</p>

Strategic Thrust 5: Advancing the Environment for Societal Benefit

Strategies	Programmes/projects	Driving Agencies
S14: Green ICT	*Green ICT Roadmap	Ministry of Planning and Development Ministry of Public Administration Infrastructure, Quarries and the Environment Division, Tobago House of Assembly iGovTT
	*Communication Plan to Raise Awareness	
	*Training Programmes for Building Capacities in the Field of Green ICT	
	*Establishment of a Green ICT Community of Expertise/ Practice	Ministry of Public Administration
	*Establishment of baseline statistics which provide foundation for measurement	Ministry of Planning and Development
	*e-Waste Policy and Legislation	Ministry of Public Administration Ministry of Public Utilities
	E-Waste Sustainable Management Programme	Ministry of Planning and Development Ministry of Public Utilities Ministry of Public
	*Guidelines for the inclusions of private sector and NGOs in e-waste management	Ministry of Planning and Development Ministry of Public Utilities Ministry of Public Administration Private Sector Civil Society

	*Green ICT Policy and Standards for Trinidad and Tobago	Ministry of Public Administration Ministry of Planning and Development
	*Teleworking Policy *Green ICT Portal as a knowledge repository	Ministry of Public Administration Ministry of Planning and Development

APPENDIX 5: National Governance Framework

In order for a smooth transition to a national governance framework, secure leadership and political commitment, through a combination of efforts aimed to promote inter-ministerial co-ordination and collaboration is required. Moreover in pursuing the digital government agenda, there should be engagement and co-ordination of relevant agencies across levels of government.

The objectives of the governance framework are as follows:

- to co-ordinate the implementation of the digital strategy within and across levels of government;
- to identify clear responsibilities to ensure overall co-ordination of the implementation of the digital government strategy;
- to establish a system for "check and balances" of governments' decisions on spending on technology to increase the level of accountability and public trust, and to improve decision-making and management to minimise risks of project failures and delays.

APPENDIX 6:

ICT PRODUCTS AND SERVICES

A National Centre of Excellence in ICT capabilities for T&T

Potential Missions

Sector Coordination

Support SMEs creation

Promotion of R&D in SMES

Promotion of ICT adoption

Productivity improvement

ICT skills development

Investment attraction

Potential Areas of Specialisation

ICT Services for non-energy sector

Energy based digital services

Cyber security

Data science and analysis

Virtual & augmented reality and AI

Financial technology

Potential Innovation Functions and Services

- R&D in specialisation areas
- Sectoral network building and industrial dialogue
- Digital skills training
- Access to expertise and advice for SMEs (technological, business, marketing, funding, intellectual property, etc.)
- Access to R&D facilities for key technology platforms
- Technology and market foresight



Government of the Republic of Trinidad and Tobago

Ministry of Public Administration