fastforward II

Trinidad and Tobago's Draft National ICT Plan 2017 – 2021

Empowered People. Competitive Businesses. Transformational Government.

March 2017

About fastforward II

fastforward II is Trinidad and Tobago's five-year National Information Communications Technology (NICT) Plan for 2017 to 2021. The result of co-creation, fastforward II 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, transformational government.

Draft National ICT Plan 2017 - 2021

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Executive Summary

Empowered People, Competitive Businesses, Transformational Government, through ICT.

fastforward II is Trinidad and Tobago's five-year National Information Communications Technology (NICT) Plan for 2017 to 2021. The result of co-creation, *fastforward* II is driven by the needs and priorities of the 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 one where the citizens of Trinidad and Tobago:
  - 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 one where businesses in Trinidad and Tobago:
  - 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 both their products, processes, and operations.

- Our vision of Transformational Government is one where Ministries and Agencies in Trinidad and Tobago:
  - 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 *fastforward II* is ultimately to support the National Development Strategy 2016–2030, Vision 2030, which outlines the country's aspiration to attain "first world nation status" by 2030. Whilst supporting Vision 2030, *fastforward II* is also expected to meet the country's anticipated social and economic needs. Converging these needs with the potential of ICT, five Strategic Thrusts are proposed to realise the National ICT Vision. They are:

1. Improving Connectivity
2. Increasing Human Capacity
3. Enhancing Public Service Delivery
4. Fostering Economic Development
5. Advancing Environmental and Societal Benefit

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 incentivize private sector investment and market actors towards the advancement of national ICT infrastructure.

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 ICT for doing things better, doing things differently, and doing new things, all with the view of increasing productivity, creating new lifestyles and driving success in all forms of enterprise are at the center of this Thrust.

Enhancing Public Service Delivery

Ensuring the use of ICT to transform the delivery of public goods and services and achieve institutional strength and capacity

Enhancing Public Service Delivery 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 would be a focus on strengthening public institutions with staff having increased capacity in the area of ICT.

Fostering Economic Development
Creating an environment for eBusiness and ICT Sector advancement

Fostering Economic Development focuses on building a pro eEnterprise environment within Trinidad and Tobago. Important elements of this Thrust are increasing eBusiness and eCommerce adoption both within the Business-to-Business (B2B) and the Business-to-Consumer (B2C) realms.

Advancing Environmental and Societal Benefit
Managing the use of ICT to minimize environmental impact and to tackle the most pressing social challenges facing the country

Advancing Environmental and Societal Benefits focuses on deploying ICT in environmentally optimal ways and leveraging ICT to fight crime, the most pressing societal challenge facing the country. Deploying ICT in optimal ways means ensuring usage and disposal in a manner that reduces environmental impact, and also using it as an enabler to change the way government and businesses provide services, with a view to realizing greater environmental sustainability and efficiency. Leveraging ICT to tackle the challenge of crime would see extensive integration of ICT into the national crime fighting regime—in prevention, detection, and prosecution. In terms of public utilities, ICT will be utilized to improve the performance of our public utility entities and positively influence user conservation and efficiency.

Headline Targets

Through *fastforward II*, the aspiration is to achieve these main targets for Trinidad and Tobago by or before 2021:

- Increase to 5% in the ICT Sector's contribution to GDP
- 85% broadband access of a minimum download speed of 100 Mbps for households and businesses
- 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 services
- 50% Adoption of shared infrastructure
- 30,000 direct jobs created
- 500,000 Users participate in eForums moderated by Government
- # 1 in the Caribbean on Relevant increases 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 aforementioned National ICT Vision. The strategies and programmes outlined in this Plan demonstrate the path to success.

Successful implementation of the National ICT Plan requires collaboration between all stakeholders—particularly the public and private sector. Alongside this, the appropriate levels of funding must be mobilized 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 StrategicThrusts. Monitoring adoption and usage of ICT in households, businesses, and the Government will be given particular attention. An implementation framework has been developed to follow this document.

1. Introduction

Overview

Countries around the world are leveraging Information and Communication Technologies (ICT) for transformation and their next leap towards national development. For Trinidad and Tobago, the next leap will take the country to "first world nation status".[1]

As the country advances, ICT will play a critical role as both a catalyst and an enabler of national development. The vision is for ICT to connect Trinidad and Tobago and become further integrated into the lives of citizens, and the operations of businesses and Government. Notably, Government services will be enhanced through electronic delivery, from end-to-end. This will be complemented by one-stop service centres supported by a multi-channel delivery approach, business process reengineering, and system integration within and across Ministries, Departments, and Agencies (MDAs).

Major projects such as the liberalisation of the Telecommunication and Broadcasting Sectors and *ttconnect* (the Government's Portal) have positioned the country amongst leading eGovernments in the Caribbean. With increasing computerization within the Government and businesses, as well as enhancements to ICT infrastructure, the country is well-poised to transform public service delivery to customers (both citizens and business), creating catalytic effects that would lead to optimal utilisation of ICT investments and transformation of economic sectors.

It is against this backdrop that *fastforward II*, the National ICT Plan for 2017 to 2021 (the Plan) was developed. *fastforward II* is a comprehensive 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.

The Plan outlines a prioritised suite of the programmes and projects to effectively guide development over the next five years towards the intended targets and vision. Ongoing programmes and projects will be seamlessly integrated into the Plan 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. To facilitate the achievement of its goals, the Government will establish the appropriate ICT governance framework to support the Plan.

This document outlines the strategies and programmes to be implemented to achieve the national ICT vision. Ultimately, this National ICT Plan:

- Supports the objective of Vision 2030;
- Aligns the use of ICT with the strategic direction of the Public Service and the ICT Sector;
- Ensures a healthy return on ICT investment through structured and well planned implementation and evaluation; and
- Focuses on productivity and efficiency.

[1] National Development Strategy 2016-2030, Vision 2030 (Draft) August 2016. Page 44.

Our ICT Journey to Date

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

Titled *smarTT, a* new National ICT Plan was introduced in 2014. Informed by the Seven Interconnected Pillars, *smarTT* comprised three phases, each with its associated objectives.

- Phase I: 2014 to 2018, focused on Government's thrust to increase ICT utilization and uptake within the public and private sector, and among citizens.
- Phase II: 2018 to 2022, emphasized 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, the development of a new National ICT Plan for 2017 to 2021, *fastforward II*, was embarked upon. 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.

National ICT Planning to Date

Our National Development Agenda

The National Development Strategy 2016–2030, Vision 2030, outlines the 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 Goals[3]:

- Goal 1: Putting People First: Nurturing Our Greatest Asset
- Goal 2: Promoting Good Governance and Service Excellence
- Goal 3: Improving Productivity through Quality Infrastructure and Transportation
- Goal 4: Building Globally Competitive Businesses
- Goal 5: Valuing and Enhancing Our Environment

ICT cross-cuts each of these goals, thus providing the opportunity for the National ICT Plan to directly contribute to the advancement of Vision 2030.

[2] National Development Strategy 2016-2030, Vision 2030 (Draft) August 2016. Page 44.

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

2. Current ICT Landscape

National Progress and Challenges

The creation and implementation of National ICT Plans (*fastforward* and *smarTT*) have led to significant progress in the country's ICT agenda. Advancement of the ICT Agenda did, however, come with its challenges. The main areas of progress and challenges are highlighted below.

Main Areas of Progress

ICT Sector: The Telecommunications and Broadcasting Sector in Trinidad and Tobago is a dynamic sector which continues to grow at a fast-pace. Competition created by liberalization of this Sector has yielded the following consequential and related results: 1) an increase in the number of service providers[4]; 2) an increase in the quality and choice of services; 3) a reduction in prices; and 4) an increase (in real terms) in the contribution of ICT to GDP, from 3 percent (TT$ 3.3 Billion) in 2006[5] to 3.4 percent (TT$ 5.59 Billion) in 2015[6]. The Sector is expected to continue to evolve to meet increasing demand.

ICT Availability/Connectivity: The country's telecommunication infrastructure has significantly expanded; as reflected in the growth in access networks which provide fast connectivity and make service delivery more widespread and reliable. Further, ongoing investment plans to increase capacity are promising.[7] 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.

e-Government: All Government entities are now online, with MDAs having websites supported by GovNeTT[8].Further, information on services is available on Government's centralized portal, *ttconnect*: 627 services for citizens, 256 for businesses, and 118 for non-residents[9].

Environmental Conduciveness for ICT: The (partial) proclamation of several key pieces of e-Business, e-Commerce and e-Government related legislation—including the Electronic Transactions Act, the Data Protection Act, and amends to the Exchequer and Audit Act—are significant enablers of ICT transactions.

In summary, the progress made by Trinidad and Tobago in ICT is further demonstrated in numerous indicators.

- The country ranked 67 of the 139 countries surveyed in the 2016 World Economic Forum's Networked Readiness Index—this is up from 70 in 2015[10].

[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 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 7

[7] See Strategic Thrust 1, "S1: Enhancing Infrastructure" for details on the investment programmes.

[8] Gov Nett is the government backbone network that provides connectivity and supporting applications to all MDAs

[9] Trinidad and Tobago Government Online, *ttconnect: government at your service*. Government of the Republic of Trinidad and Tobago, 2008-2016.

[10] Silja 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

- In 2015, mobile penetration stood at 157 percent, one of the highest in the world[11]—for all countries the average is 97 percent[12].
- In 2013, 70 percent of households had at least one computer[13]—up from 42 percent in 2010[14].
- Internet household penetration has jumped from 58 percent of households in 2014 to 65 percent in 2015[15].
- Broadband usage/subscription stood at 278,000 in 2015[16], compared to 46,230 in 2007[17].

Notwithstanding these indicators which demonstrate the foundation laid by Trinidad and Tobago for future progress in ICT, real challenges exist in moving the country's ICT agenda forward—the main ones are outlined below.

Main Areas of Challenges

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.

ICT Skills: Although ICT penetration remains high—particularly among citizens and government—Trinidad and Tobago lags behind advanced nations in the productive and innovative use of ICT. The development of the ICT sector (and digital economy) will be constrained if citizens and organizations are limited in their ability to participate because they lack understanding and the appropriate competencies or confidence to do so.

ICT Uptake: Currently, there exists limited awareness of eServices and the benefits of using these services. Furthermore, users have a poor perception of eServices, which negatively impact engagement with such services. This issue is made more difficult by the ICT skill level (digital literacy) of users. Different approaches can be considered to drive uptake, for example, relationship building, incentives systems, and direct mandates.

Business Environment: Trinidad and Tobago lacks the robust legal and regulatory framework required for eBusiness, eCommerce and eServices. The legislative Acts governing electronic transactions and data protection—including the Electronic Transactions Act and the Data Protection Act—have only been partially proclaimed and key regulations under those acts have not been passed. Modernized policies and regulations that protect the interest of both end users and investors, and attract investment and support the ease of doing business, are important perquisites for creating a vibrant ICT industry.

Collaboration: The country's record at collaborating to plan, design, procure, and share common ICT applications—to reduce cost, create standardization across Government, and further enable efficiency gains through ICT—leaves room for improvement.

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[11] The Telecommunications Authority of Trinidad and Tobago, *Annual Market Report 2015*. Page 12

[12] ICT Data and Statistics Division, *ICT Facts & Figures*. Geneva: International Telecommunication Union, 2015. Page 2

[13] Telecommunications Authority of Trinidad and Tobago, *The Digital Divide Survey Trinidad and Tobago, 2013*. Telecommunications Authority of Trinidad and Tobago. Page 7

[14] The 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

[15] Ibid., Page 57

[16] The 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

[17] The 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

Trinidad and Tobago's performance remains average-to-weak on international benchmarks that gauge the viability and ease of doing business in the country. The same holds for the country's performance on the Networked Readiness Index, which assesses propensity of countries to exploit ICT related opportunities. Details on these two areas and the country's performance on Government ICT rankings are provided in Appendix 1.

The ICT Landscape in Tobago

The progress and challenges presented in the sections above are national in scope. It is, however, worth reflecting on some of the peculiarities that characterize the ICT landscape in Tobago. In particular, the different rates of developments across the twin islands. 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, among others, have implications for planning both strategies and programmes in the National ICT Agenda[18]. Below are some of the key factors given special consideration:

ICT Availability/Connectivity: The islands of Trinidad and Tobago are at different stages of ICT readiness, especially in terms of infrastructure, connectivity, skills, and access—therefore, ICT initiatives are to be tailored to meet Tobago's specific needs.

ICT Uptake: Given the inter-island disparity in readiness, Tobago has experienced slower uptake of ICT—particularly among individuals and businesses—and a higher degree of digital divide not just in technology but also in skills.

Distinctive Systems: The island has distinctive systems/structures that extend from the district/community (Village Councils) to the national level which must be incorporate and leveraged in the development, rollout, and management of ICT programmes and initiatives.

Administration Framework: The THA Act provides for a high level of self-determination for Tobago. Hence, detailed input in planning would be needed if desired outcomes are to matched residents' expectations.

Key Reflections on Past National Plans

An evaluation of the performance of the past National ICT Plans revealed some key lessons for future planning.

- The establishment of an appropriate governance structure is vital to guide and monitor the successful implementation of the National ICT Plan.
- The development of a performance measurement framework with indicators to measure success is an essential component of any National ICT Plan.
- The collection of appropriate ICT statistics is required to support the assessment of the Key Performance Indicators (KPIs) of the National ICT Plan (this will also support dissemination to regional and international bodies for benchmarking purposes).
- Public Sector transformation is an integral part of ICT development in that Government's thrust towards automation and digitisation, and the improvement of its own business models has a strong influence on public uptake.
- There is greater need within the planning and design of programmes and projects to reflect on peculiarities of the local environment, including its culture. The phrase of "adapt" and not "adopt" is clearly appropriate in reflecting on the past ICT failures.
- For eServices to truly meet users' needs and satisfaction, a system of gathering and evaluating customer feedback is required—this will enable corrective action and support service improvement and efficiency.
- Private sector investment in infrastructure seems capable of increasing capacity, thus allowing Government to invest in institutional ecosystems and eGovernment.
- There is a need to engage in continuous dialogue between MDAs and the Private Sector.

[18] 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.

- ICT uptake at the organizational level exhibits insufficient focus on citizens/customers, but rather remains focused on achieving back end efficiencies.
- ICT applications in Government entities are still in silo and lack integration—as a result, there is little or no sharing of ICT applications, standardization, and significant economies of scale.

These lessons are critical considerations in the development of a new National ICT Plan.

Global ICT Technological Trends

In developing a new National ICT Plan 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 look at the global trends in ICT to inform the strategic direction. Below are some of the key global trends considered:

- More people are online: 3.2 billion people (43% of the world's population) with the number of Internet users in developing countries almost doubling in the last five years.
- Mobile cellular subscriptions are 7.1 billion, up from 2.2 billion 10 years ago.
- The so-called Data Economy is here to stay; this is evident in everything from Analytics to Business Intelligence.
- The Internet of Things (IoT) and Big Data are being leveraged to address major development challenges.
- Cloud computing is becoming a strategic differentiator, enabling companies to more flexibly manage operations, and create and maintain products and services.
- Workplaces are becoming increasingly digital.
- Growing investments by governments in ICT is enabling, among other things, productivity and efficiency in the delivery of public services.
- A 'whole of government' approach to data, information and decision support is evident.
- Open networks/interfaces with the practice of establishing collaborative industry standards to govern technology manufacturing is being wrestled with by an alternate approach which sees manufacturers creating proprietary standards.
- Deregulation—moving markets to a competitive state—continues to be a favoured trend; although the need for regulation continues for issues such as anti- competitive behaviour.
- Cybersecurity is an imminent concern to the global digital space that requires cooperation and coordination in response at the national, regional, and international level.
- ICT has become a formidable tool in crime fighting and can be a valuable assist in developing the sustainability and efficiency of our public utilities agencies.

ICT Opportunities

In view of the foregoing, ICT ***opportunities*** for Trinidad and Tobago lie in three areas, People, Process, and Technology, and affect three key **constituents**, Citizens/Consumers, Businesses, and Government.

ICT Opportunities for Trinidad and Tobago

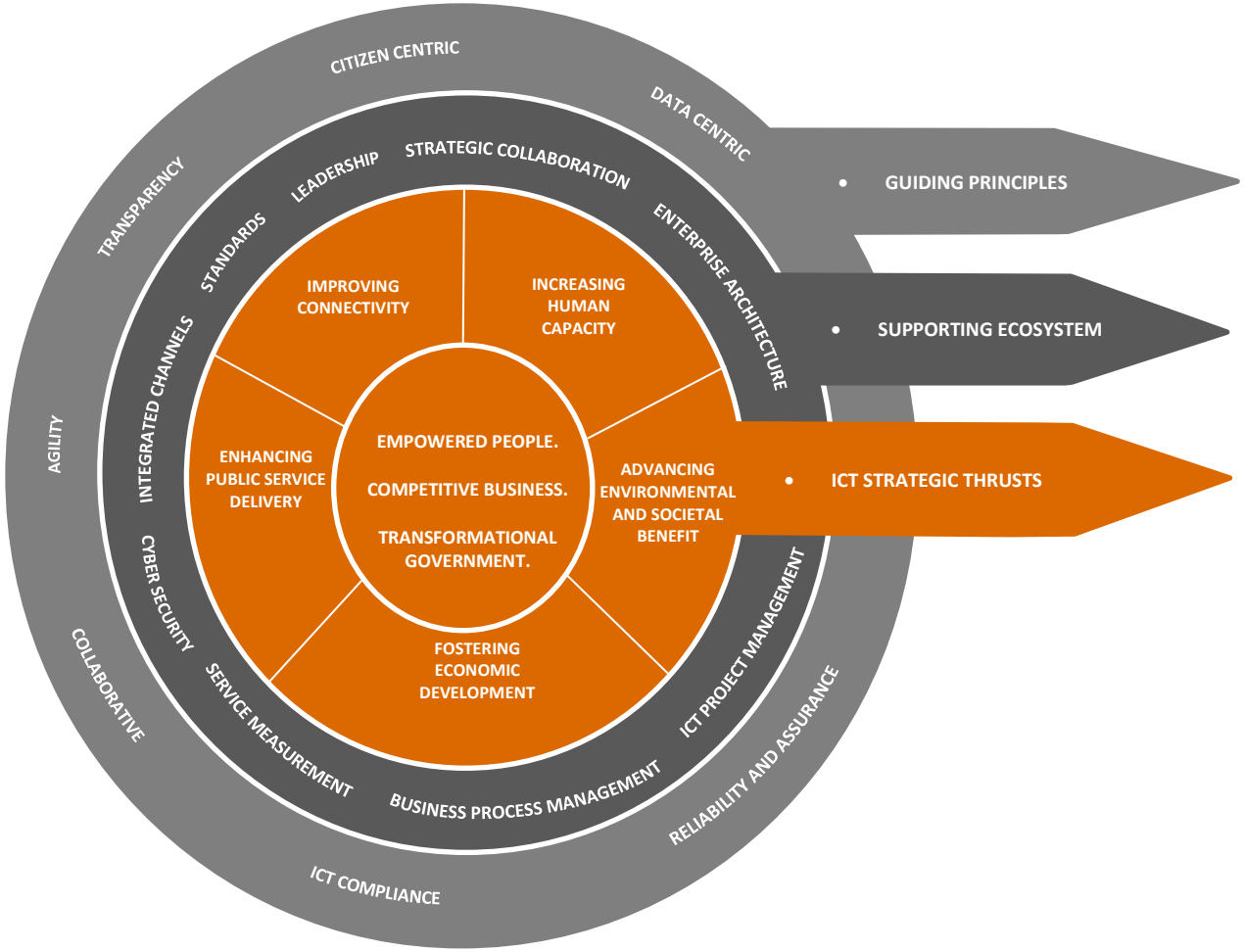
	Opportunities: People	Opportunities: Process	Opportunities: Technology
Citizens / Consumers	– Increase the ICT competencies of citizens – Increase awareness, confidence, and willingness towards ICT uptake (of both eServices and Technology) among citizens	– Improve efficiency in the process of engagement with Government, for example through eServices and eDemocracy	– Increase availability of and (productive) engagement with ICT
Businesses	– Increase ICT competencies and expertise of staff – Improve leadership of ICT personnel – Increase capacity to innovate and engage in ICT SMEs	– Establish an enabling environment for the set-up of eBusiness and eCommerce – Increase eBusiness and eCommerce activity – Increase automation of services	– Increase online presence – Offer new and improved services – Automate processes – Connect with and engage consumers – Drive revenue and increase contribution to the economy
Government	– Increase ICT competencies and expertise of staff – Improve leadership of ICT personnel – Increase capacity to innovate in the public service – Implement change management related to ICT utilization	– Increase automation of services – Conduct business process reengineering to boost internal efficiency – Improve efficiency and effectiveness in ICT project management – Establish performance measurement and evaluation indicators for ICT initiatives – Establish efficient and effective ICT governance structures – Create and utilize shared processes and standards operating models and systems	– Use ICT to enhance citizen engagement – Deliver government services electronically (eServices) enhancing service deliver to customers – Use ICT to automate functions and processes, thus increasing efficiency – Share ICT infrastructure – Use ICT to aid in the protection of the environment – Capture and analyze data

3. ICT Framework 2017-2021

The stocktaking exercise above examined Trinidad and Tobago's ICT progress, challenges, learning points, as well as global trends, opportunities, and critical insights which shaped the development of the new National ICT Plan, *fastforward II*.

fastforward II is built on an ICT Framework that consists of four components: the ICT Vision, Strategic Thrusts, Supporting Ecosystem, and Guiding Principles. These components are defined 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.



National ICT Planning Framework 2017-2021

Vision

National ICT Vision

The Vision of *fastforward II* is for a Trinidad and Tobago, by 2021, with ***"Empowered People, Competitive Businesses, Transformational Government through ICTs."***

- Our vision of Empowered People is one in which citizens of Trinidad and Tobago:
  - 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 one in which businesses in Trinidad and Tobago:
  - are supported by robust, pervasive, 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 one in which Ministries and Agencies in Trinidad and Tobago:
  - 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 that support delivering better with less.

Strategic Thrusts

To support the National Development Goals a comprehensive, strategic framework has been developed. It is organized 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 incentivize 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, all with the view of increasing productivity, creating new lifestyles and driving success in all forms of enterprise are at the center of this Thrust.

3. Enhancing Public Service Delivery
Ensuring the use of ICT to transform the delivery of public goods and services and strengthen institutional capacity.

Enhancing Public Service Delivery 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 would be a focus on strengthening public institutions with staff having increased capacity in the area of ICT.

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 Environmental and Societal Benefits
Managing the use of ICT to minimize 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
Valuing Our Environment focuses on protecting, and in some cases maintaining, the capacity of the environment to serve successive generations with the same capability that it has done today. For ICTs, this means managing their use and disposal and mitigating any negative environment 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 realize 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.

Government Sector Specific Enablers:

Enterprise Architecture: Upfront 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 of 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 interconnectivty will be a key consideration, enabling interface with specialized entities. Additionally, upfront planning with respect to demand aggregation for ICT goods and services would produce economies of scale and streamline procurement.

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

Business Process Management: Business Process Management (BPM) will be another vital function and it is required to usher in reengineered processes across Government. The Change Management component of BPM addresses the natural human fear of change, whether it be in well-known procedures or otherwise. Change sometimes evokes the strongest of opposition and the resulting resistance can become a major barrier to progress. The generational changes influenced by ICT upon Government's outdated procedures and processes requires robust and effective change management practices.

Strategic Collaboration: To achieve efficiencies in Government operations and logistical solutions, it will be necessary to forge new strategic collaborations among several entities. This will always be a foundational measure 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 various best practices. Internal committees and councils must be formed with mandates to cross-pollinate key functional areas of Government with the vital knowledge that may be deficient but necessary. 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 porgrammes and projects along the whole ICT developmental value chain.

Cyber Security: Government holds the largest repositories of citizen data and is therefore susceptible to cyber-attacks that may target financial and medical data, and other sensitive personal information. Further, businesses, as a result of the services that they provide to government, citizens and other businesses, can amass sensitive and confidential data

that should be heavily protected. Failure to protect personal and proprietary information and trade secrets exposes businesses to reputational, legal and financial risks. Citizens are the primary consumers of services provided by Government and businesses. Therefore, creating a safe cyber-space involves not only securing citizen data, but also necessitates educating people on ways to share information in a safe and secure manner.

Private Sector Specific Enablers:

Industry Standards: Interconnectivity and interoperability in the private sector is the foundation for B2B transacting. Industry standards, including ones for hardware are currently heavily subject to manufacturers' proprietary standard in favour of industry ones. Common industry standards are therefore needed to minimize 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, to support the development of repositories that can support business analytics, and other forms of big data sharing.

General Enablers:

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 realization 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.

Guiding Principles

The guiding principles[19] below provide a general framework for the development and implementation of the Plan. These principles are critical to success. They form the basis for decisions and actions by stakeholders and must be embraced and practised in order 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: Ensure that initiatives follow collaborative and cooperative practises 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.

ICT Roadmap 2017-2021

fastforward II is a five-year strategic plan that covers the period 2017-2021. It is envisioned that *fastforward II* 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 advancing the achievement of the national Vision for ICT.

Over the period 2017 to 2021 the Plan will focus on continued and 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 nudged towards ICT take-up—in many instances through the sheer momentum of government and business uptake and innovations

In the long run the Plan seeks to push 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.

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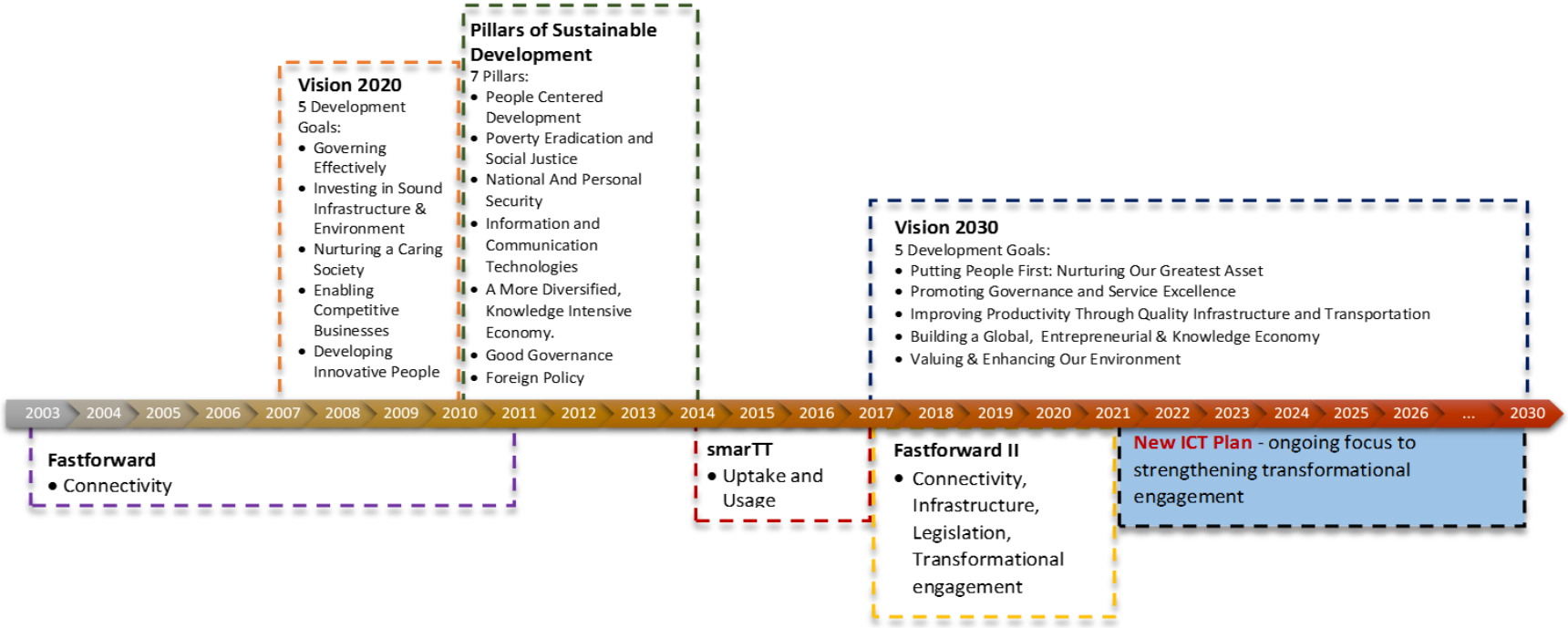
[19] Many of these principles have been globally endorsed through various conventions on the Information Society such as the WSIS Geneva Principles, Tunis Agenda, and NetMundial.

National ICT Roadmap 2017-2021



Targets

In aspiring to the national ICT Vision, Trinidad and Tobago will aim to achieve the following macro-economic ICT related targets by 2021.

- Increase to 5% in the ICT Sector's contribution to GDP
- 85% Broadband access of a minimum download speed of 100 Mbps for households and businesses
- 5 High demand/volume, strategically important Government services as end-to-end eServices[20]
- 5 Enterprise-wide applications operationalized to run routine functions of Government[21]
- 50% Adoption of Government shared services
- 50% Adoption of shared infrastructure
- 30,000 direct jobs created
- 500K Users participate in eForums moderated by Government
- # 1 in the Caribbean on the World Economic Forum (WEF) Network readiness Index (NRI). The following are 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 on the International Telecommunications Union (ITU) ICT Development Index (IDI). The following are sub goals:
    - 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

[20] Including: Drivers Permits, Filing of Income Tax, Filing of Value Added Tax, Business Registration

[21] Including: Payroll, ePayments, Human Resource, Appointment scheduling

4. Strategies and Programmes

Summary of Strategic Thrusts

The table below provides a summary of the five Strategic Thrusts identified to support the achievement of the National ICT Vision.

Summary of Strategic Thrusts, Strategies and Programmes

	ST 1	ST 2	ST 3	ST 4	ST 5
5 ***STRATEGIC THRUST***	**IMPROVING CONNECTIVITY**	**INCREASING HUMAN CAPACITY**	**ENHANCING PUBLIC SERVICE DELIVERY**	**FOSTERING ECONOMIC DEVELOPMENT**	**ADVANCING ENVIRONMENTAL AND SOCIETAL BENEFIT**
15 ***STRATEGIES***	**S1 - Enhancing ICT Infrastructure** **S2 - Modernizing the Legal and Regulatory Framework** **S3 - Strengthening Cyber Safety and Security**	**S4 - Building ICT Human Capital** **S5 - Improving Access to ICT Human Capital** **S6 - Promoting Digital Inclusion**	**S7 - Offering End-to-End eServices** **S8 - Driving User Adoption** **S9 - Increasing Government Efficiency** **S10 - Promoting Open Government**	**S11 - Advancing eCommerce** **S12 - Diversifying the Economy Through ICT Sector Development** **S13 - Increasing Digital Content Production**	**S14 - Promoting Green ICT** **S15 - Advancing Societal Benefit**
44 ***PROGRAMMES***	***10 Programmes***	***8 Programmes***	***10 Programmes***	***8 Programmes***	***8 Programmes***

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).[22]

[22] See table on the SDGs at Appendix 2

Strategic Thrust 1: Improving Connectivity

Advancing the deployment of ICT infrastructure and modernizing 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: SDG 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 recognized economic and social benefits. A robust and reliable system will facilitate the integration of ICT into health, education, businesses, and homes.

Strategies (with Programmes)	*Outcomes*	*KPI / Measures*
1. Enhancing ICT Infrastructure		
1. Next Generation Connectivity for Government 2. Next Generation Private Sector Connectivity: Ubiquitous Broadband Development 3. Modernization of Spectrum Management 4. Universal Service Implementation	- Increased number of employees and citizens connected - Increased number of households/business with broadband/wireless broadband access	- ICT Development Index (IDI): 20% increase in the IDI Access sub-index value
2. Modernizing the Legal and Regulatory Framework		
5. eCommerce Regulations 6. Information Society Laws and Consumer Protection 7. Other regulatory issues (Internet Governance, Telecommunications Act, International Agreements)	- Development of ICT digital markets and ICT products and services - ICT-based innovation, creativity and discovery for advancement - Competition, lifestyle improvements and growth	- World Economic Forum (WEF) Network Readiness Index (NRI): 30% increase in the NRI Political and regulatory environment pillar
3. Strengthening Cyber Safety and Security		
8. Cyber Infrastructure: Enhancing cyber security artifacts to keep pace with the online community 9. Legislation: Cyber violations, communications intercept, cyber safety guidelines and authorizations 10. Response team: CSIRT Government Assurance over Secure and Trusted Environment	- Citizens and businesses equipped with knowledge and skills to cope with the risks of the online world. - Regulatory certainty, fostered investment in cyber security - International collaboration and coordination as part of global security framework	- Citizen and Business Awareness on Internet Safety

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 *fastforward II*. The aim over the next five years is to build-out a world class ICT infrastructure—as a means to ensure increased availability and improved speed in connectivity, catalyze development of the ICT sector, support usage of ICT in other sectors toward achieving productivity gains, and increase affordability of telecommunications and broadcasting services to the end users. Connectivity would also be improved by having the requisite legal, regulatory and security frameworks in place.

The following strategies will be undertaken to support this Thrust:

Strategy: 1. *Enhancing ICT Infrastructure*

To achieve the gains that a digital agenda can propel, 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 (speeds up to 100Mbps on fixed and 30Mbps on mobile networks) will form the bridge between the citizenry and the economic and social activities that sustain the welfare and well-being of the country. 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 utilization 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:

- Infrastructure programs in the private sector actors, such as: TSTT's $5.7 billion broadband service provider network reaching 185,000 homes in five years 2017-2022 and Digicel broadband service provider 110,000 homes passed by 2017; in Tobago 9000 homes by 2018
- Infrastructure program in Public Sector: Enhancing GovNeTT backbone, build out of Government's eServices platform providing multichannel access to on line services; In Tobago 32 sites of the THA are interconnected to GovNeTT fibre backbone moving to full connectivity of the entire administration by 2018. Tobago eService will be specific to THA revenue collection and service responsibilities under the THA Act, as well as, for Central government e services emanating from Trinidad or, any Tobago divisions of the Central Government.
- Universal Service projects will support ubiquitous broadband development as it relates to closing the access gap, providing assistive technologies to persons with disabilities and the conduct of a digital divide survey every 3 – 5 years; key project areas in the short to medium term.
- Deployment of free Public WiFi coverage at locations throughout Trinidad and in Tobago.
- 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.

Strategy: 2. *Modernizing the Legal and Regulatory Framework*

Government is committed to e-Legislation - the delivery and existence of a body of harmonized legislation and regulations that authorise, enable, empower and underpin the electronic delivery of products and services by Government (e-Government) and the electronic facilitation of business processes (e-Business), including the electronic sale and procurement of goods and services (e-Commerce). Partially proclaimed legislation to this effect has already signalled Government's intent. Over the next five years, Government will remain focused on ensuring the full proclamation of eLeglisation and instituting the related regulations to support same. Initiatives to meet this objective involve the following:

- The Electronic Transactions Act
- The Data Protection Act
- The Exchequer and Audit Act (amendments)
- Electronic Transfer of Funds Crime Act

With respect to jurisdictional responsibility, attention will be paid to the specific roles of the Tobago House of Assembly (THA) and the specific areas it will control in absence of the Central Government. This will ensure no duplication or overlap of authority along the legal ambit nor will it leave room for discrepancy. These programmes will both enable and drive G2C, G2B, B2C, and B2B eServices and ePayments. 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 be undertaking initiatives focussed on digital financial services, in addition to e-transaction and e-payments. Tax Incentives to promote the use of ICTs will also be explored.

Additionally, focus will be placed on setting out guidelines to protect end users, ensuring that personal information shared and stored digitally are handled responsibly and protected from unauthorised access and use. Moreover, Government recognizes that the IInternet, its governance, and the policies for its use are what will, in many cases, determine 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 the governance structure, management of the country code top level domain (i.e. '.tt' domain), net neutrality and treatment of "Over the Top" (OTT) services. Another key regulatory issue is the Telecommunications (Amendment) Bill, which seeks to amend the Telecommunications Act Chapter 47:31 to provide more efficient regulation of the telecommunications and broadcasting sectors through international best practice and international treaty obligations.

Strategy: 3. Strengthening Cyber Safety and Security

Maintaining a safe and secure network and cyber environment is critical to instilling confidence in digital markets and ensuring user protection and participation. Providing the strongest attestation to the reliability, accuracy and integrity of cyber spaces can only be achieved by setting rigorous standards for their use and maintenance. All this is centred on ensuring that individuals, businesses, and government agencies are protected from online threats and disruption.

Executing this cyber safety and security strategy will require significant collaboration between the public and private sectors, and a significant effort to formalise it. An overarching national cyber security framework and governance structure will be a vital priority for this strategy's success.The Cybercrime Bill which seeks to provide for the definition of offences related to cybercrime is central to this strategy.

Strategic Thrust 2: Increasing Human Capacity

Enhancing digital literacy and developing the skills to enable a more productive and innovative nation.

Key Dimension: Capacity

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

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

Desired Outcome: Citizens of Trinidad and Tobago now demonstrate an increased capacity to engage productively with ICT as well as exhibit the ability to deploy it to drive real innovation (in the business arena).

Strategies (with Programmes)	*Outcomes*	*KPI / Measures*
4. Building ICT Human Capital		
11. eEducation and eLearning 12. Infocomm Training Framework and the development of Employment and Productivity related skills 13. Research and Development	- Increased ICT usage in education - Increased comfort level, trust and capability of citizens with regards to ICT usage	- 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		
14. Skills Bank / Repository for ICT Professional 15. Software and Content Incubators	- Better and more efficient access and use of ICT Human Resources	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		
16. Delivering affordable computers to low income households 17. Widening access to the Internet and Internet-enabled service 18. Increasing opportunities to use different ICTs	- Increased productive usage of Internet access for citizens in the less developed areas - Provision of computers with basic configurations income lower households	- IDI Index: 45% increase in the IDI Use sub-index value

Introduction

Vision 2030 places particular emphasis on developing "Empowered People". Key focal elements include: citizen empowerment, particularly to solve local problems; and the importance of promoting the right attitudes in citizens, to encourage lifelong learning and entrepreneurship. In the context of ICT, the achievements of the most successful countries prove that harnessing people is mandatory for deriving benefits through ICT. People's ICT sensibilities and ambitions are cultivated by:

- Promoting increased awareness of the technology as a tool;
- Increasing awareness of the opportunities and possibilities of ICT adoption; and
- Allowing them to engage and pursue the range of benefits they can then derive from ICT.

This Plan envisages a lifelong approach to ICT learning, to enhancing lifestyles and building of an eReady workforce. Developing a training framework that will cater for both public and private sector employment, propagating the information to retain and register ICT human resources, and ensuring the inclusion of all citizens.

This Thrust features the following strategies:

Strategy: 1. ***Building ICT Human Capital***

The Government is committed to advancing a digitally literate population. This begins with the use of ICT in education from the young to the old. The umbrella national training framework for ICT will comprise capability development, workforce training and eLifestyle adoption training, targeting ICT professionals along with the structures for them to plan and steer their professional development to meet the requirements of employers, both in the private and public sectors. Given the rate of technological advancement in the wider society, the ICT training framework will be dynamic and adaptable through periodic review to focus upon leveraging both traditional ICT as well as emerging ICT and applications. The Government will build upon existing human capital development programs including the On the Job Training (OJT) program and placement of national scholarship awardees as well as engage in multi-stakeholder programs to foster targeted science research and development through placement into established institutions that can fast track their development along specific streams of national interest. Programs to encourage innovative thinking and develop local and regional contextual solutions will also be advanced, both as the basis for leveraging human capital for addressing national problems as well as for exporting ICT knowledge and skills for national benefit. Embedded in this strategy would also be the promotion of ICT-enabled delivery 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. Toward this end, information on available ICT human capital, their knowledge and skills taxonomies around the wider societal needs for ICT professionals can be created. These repositories will be aligned to the likely focuses for which ICT is generally favoured or demanded 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 human capital management The latter would, through feedback, inform the first strategy, in terms of adapting human capacity building to meet evolving ICT needs.

Strategy: 3. ***Promoting Digital Inclusion***

ICT must be made accessible and affordable to all, and there have been tremendous strides in this regard, nationally. 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 provision. It is recognised that human capital development is interconnected with other strategic thrusts, for example increasing digital content creation in Strategic Thrust 4: fostering economic development. Therefore, other aspects of access not relating to

human capital development, while not directly included in this strategic thrust, are addressed in other sections of the Plan.
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Strategic Thrust 3: Enhancing Public Service Delivery

Ensuring the use of ICT to achieve institutional strengthening and to transform the delivery of public goods and services.

Key Dimension: Government

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

SDG Alignment: SDG 10,11,16 and 17

Desired Outcome: ICT is leveraged as a critical aid to service delivery in a Public Sector where service excellence is upheld and an economic environment for growth and development is facilitated. Further, ICT is employed to support the best efforts in transparency, accountability, value for money and integrity in all relevant government affairs and operations.

Strategies (with Programmes)	*Outcomes*	*KPI / Measures*
7. Offering End-to-End eServices		
19. eService Development Programme (G2C) 20. eService Development Programme (G2B) 21. Standardize Architecture and Processes (eServices Framework // eServices Guidelines // Government Payment Platform)	- 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	- Number of end-to-end G2C and G2B e- and m- Services on *ttconnect* (and other platforms) portal - WEF NRI: 40% increase in the NRI Government usage pillar -
8. Driving User Adoption		
22. Internal: Strengthen the capability of Public Sector Workers // Change Management 23. External: User education and promotion programme // Digital communication policy	- More digital oriented Public Service - Increased demand and citizen capacity for electronic government services and technology solutions	- 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		
24. Service Transformation with ICT 25. G2E e-Services Delivery 26. Increase the sharing of ICT resources through a	- Increased number of integrated e-Services - Reduced operating costs and cost savings accruing to Government.	- Number of integrated e-Services - Number of shared ICT systems and processes - Percentage of cost savings from sharing ICT

centralized and structured initiative 27. Strengthen leadership and governance of ICT initiatives	- 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.	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		
28. eDemocracy Platform	- 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	WEF NRI: 50% increase in the NRI Social Impact pillar

Introduction
eGovernment is a central Strategic Thrust of *fastforward II.*

ICT offers transformational opportunities for Government; they offer the power to:

- Bring Government closer to the people—increasing citizen satisfaction
- Improve service delivery— transforming the way public services are delivered to improve user experience, whilst achieving better for less
- Enable effective governance—advancing an integrated and participatory government

Over the next five years Government will become a leading driver of ICT usage and uptake. Towards this goal Government will build on the advancements already made—in terms of penetration levels of personal computers and mobile telephones, Internet connectivity, and organisational web presence—to widen the field of online services available to consumershhile at the same time promoting the uptake of eServices. Supported by the requisite infrastructure and processes, the focus will be placed on having multiple Service Delivery Channels. Customers will be provided with choice and the convenience of use, thus aiming at enhancing customer satisfaction. In parallel with the expansion of eServices would be initiatives that support user adoption and change management programs focused on gaining employee buy–in.

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 see 100 percent of government services online, with the highly used ones being end-to-end. 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 prioritization of services based on: the needs of the public; volume of transactions; utilization rate; and delivery benefits. Following this, an eServices implementation plan will be developed outlining a schedule 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. Certain assets will be ; appropriate existing policies and guidelines, including an eServices development framework, and technical processes for bringing a service online, e service redesigning guidelines and e service 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 percent 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 would be implemented. The Data Privacy Policy will foster trust in eGovernment 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***

Government will engage in dialogue and consultation with citizens regarding any policies or services encountering public resistance. Citizen service satisfaction will be a key issue of focus in meeting citizens needs through government services. 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, on forums, 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. Also channels that give constituents direct access to their constituency representatives will be a big boost for citizen confidence and trust in government transparency.

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: SDG 8,9 and 12

Desired Outcome: A pro e-Enterprise environment wherein e-Business and e-Commerce adoption, both within the Business-to-Business as well as Business-to-Consumer realms, are well established and contribute more significantly to the national economy.

Strategies (with Programmes)	*Outcomes*	*KPI / Measures*
11. Advancing eCommerce		
29. Raising awareness and increasing eCommerce, eBanking and eFinancing tools and services 30. Business ICT adoption and promotion 31. Single Electronic Window (SEW) (Second Generation) 32. Trade portal (G2B, B2B)	- Increase in e commerce - Increase in ICT usage and expenditure - Enhanced efficiency of the Government and businesses - Increased number of ICT business incubator projects from the National Integrated Business Incubator System (IBIS). Availability of post business incorporation services (TTBizLink) - Increased proportion of Government procurement (of contract value less than $1m) for ICT Micro-and Small Enterprises (MSEs)	- ICT Expenditure - Ranking in World Economic Forum's Global Competitiveness Report. - Ranking in World Bank's Ease of Doing Business Survey. - Rate of increase in number of ICT business incubator projects benefitting from IBIS - Proportion of Government procurement for ICT MSEs - WEF NRI: 15% increase in the NRI Business usage pillar
12. Diversifying the Economy Through ICT Sector Development		
33. Drive demand for ICT and ICT Related Services 34. Create opportunities for capacity building and strengthening of ICT Micro and Small Enterprises (MSEs) 35. Extend business alliances	- Increase in ICT usage and ICT related business development - Increased number of joint ventures with foreign partners through digital agenda. - Thriving SME environment consistently increasing its contribution to GDP. - T&T approaching excellence in business nurturing and development	- 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

13. Increasing Digital Content Production

36. Digitization of Heritage-related and Social-related Content	- Transformation of the country from a "Download" to an "Upload" culture that celebrates the ingenuity of its people.	- Awareness of the availability of local digital content through surveys - Volume of local digital heritage / social-related content created over a measured period

Introduction

The pervasiveness of ICTs has created a global digital economy. Traditional financial structures are evolving and new paradigms are emerging, such as Mobile Money and Financial Inclusion of the previously unbanked. Government will continue to foster the development of a positive environment to drive the development and growth of an innovative and vibrant ICT Sector. The GoRTT will be undertaking initiatives focused on digital financial services; e-transaction and e-payments. Also, tax incentives to promote the use of ICTs will be explored. 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*

The Government will develop a National eCommerce Policy and invest in an enabling suite of systems such as e-signatures, authentication systems, and advance a Government business portal and ePayment system which can be part of a national owned infrastructure available to the private sector under certain conditions.. The extended scope of this strategy is to facilitate an online B2B and B2C marketplace, which is expected to lead to a higher rate of ICTuse.

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 MSEs 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" [23]

Another key enabler is Government fulfilling its policy setting agenda with regards to its procurement practices.[24] 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.

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[23] http://www.molsmed.gov.tt/Services/EnterpriseDevelopmentDivision/NationalIntegratedBusinessIncubatorSystemIBIS/tabid/453/Default.aspx

IBIS –Ministry of Labour

[24] 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 " [25] This is key because the uplifting of the local capacity is not only about skills but also the readiness of the 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 digitalized 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 NICT 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.

[25] E Estonia.com the digital city https://e-estonia.com/meet-the-industry/ict-cluster/

Strategic Thrust 5: Advancing Environmental and Societal Benefit

Managing the use of ICT to minimize 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: SDG 3, 6 7 9,11,12,13,14 and 15

Desired Outcome: ICTs are being used and disposed of in ways that mitigate environmental impact and are being effectively used by citizens, businesses, and government as a means to realizing efficiency and environmental improvements. In the area of societal benefits, ICT is deployed in ways that allow the Government to leverage it as a critical tool to tackle the most pressing social challenges.

Strategies (with Programmes)	*Outcomes*	*KPI / Measures*
14. Promoting Green ICT		
37. Environment impact assessment of ICT and ICT usage 38. Green ICT Policy and Standards 39. Develop skills and capacities in the area of Green ICT 40. Increase public awareness on the role of ICTs in improving environmental performance 41. Green Government Policy and Management Strategy for ICT 42. Green ICT Portal	- Opportunities to develop and practice preventive measures against environmental abuse. - Citizens have clear and accessible rules 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 easily promoted to broader and specially targeted sections of the society.	
15. Advancing Societal Benefit		
43. ICT for Crime Fighting: Prevention; Detection; Prosecution (eJustice) 44. ICT for Enhancing Public Utilities	- WEF NRI: 50% increase in the NRI Social impact pillar - Performance benchmarking of these areas of focus against countries actually using technology driven tools.	- WEF NRI: 50% increase in the NRI Social impact pillar - Performance benchmarking of these areas of focus against countries actually using technology driven tools.

Introduction

ICT usages offer a compelling paradox. On the one hand, the rapid deployment of ICT contributes (in part) to our environmental problems, i.e. with the resources and energy it consumes, generating significant greenhouse gas emissions and creating waste. On the other, ICT is an enabler to change the way government and businesses operate and provide services, and thus offers an avenue for realising efficiencies and environmental improvements on a much wider and a larger scale.

The concept of 'e-Environment' [1] makes reference to the benefits of ICT applications in three main areas. By definition, these include:

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
3. The environmentally safe disposal and recycling of discarded hardware and components used in ICTs;

The Government is committed to advancing eEnvironment efforts in Trinidad and Tobago as part of its commitment to the environment. Toward this end, the country has signed on to numerous international agreements.

Around the world ICT is being leveraged as a powerful tool in tackling societal challenges— from poverty to health to crime and the provision of public utilities. For Trinidad and Tobago crime is the leading societal challenge facing the nation today. In view of this challenge, Government plans to employ ICT to address crime prevention, detection, and prosecution. Another area of strong concern is the delivery of public utilities. Government is seeking to have efficient, reliable and affordable public utilities provided to all households. The maturation of ICT infrastructure coming out from the early years of the Plan lays a strong foundation for ICT to better the performance of our public utility entities and positively Influence user conservation and efficiency.

This Thrust tackles advancing environmental and societal benefit through two strategies:

Strategy: 1. *Green ICT*

The impact of ICT on the environment occur 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 programs 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.

Strategy 2: *Advancing Societal Benefit*

ICT for Crime Fighting: Prevention; Detection; Prosecution (eJustice)

ICT will be used as a game changer in Government's fight against crime. This will entail a gradual ramping up of the infrastructure and capacity needed to execute modern crime fighting techniques and processes. There's need to create the legislative support and control structures to go along with it.[26] 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

[26] The Criminal Justice Assessment Toolkit (CJAT), United Nations, Office of Drugs and Crime (2006).

information and other face to face policing techniques intended to: destabilise crime spots are all preventive measures ICT can assist.

- **Detection:** Crime Scene Investigation(CSI) tools and techniques will be grafted into the Police Service first through foreign expertise and on the job training for local officers, then through development of a full local capacity and learning framework throughout the T&T Police Service. eForensic s that better supports, gathers and preserves 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 reduce transportation costs for prisoners and reduce time engagements of conducting court. Procedures that speed up the justice systems 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 so as to contain unique and unchangeable biometric information uniquely linked to and identifying an individual. Ballistics databases would contain information which can link projectiles and casings to firearms used incrimes. In most countries national legislation exists which defines legal and technical requirements for these databases.[27] In-house databases are primarily used by laboratories to assist with identifying materials in casework. They are also used to establish links with other cases so as to assist with recognising patterns.

-Forensice services and infrastructure, Criminal Justice Assessment Toolkit by United Nations Office on Drugs and Crime

ICT for Enhancing Public Utilities

The Public Utilities Sector—inclusive of water, electricity, and solid waste management—impacts the daily lives of all citizens and the operations of business and industry in Trinidad and Tobago. The sector is largely State owned and has an annual market size of approximately TT$15 billion. In the face of large financial transfers by State to utilities agencies and complaints by citizens about the quality of public utility services, Government continues to try many remedies to improve the performance of these organisations. While some gains have been made the levels of efficiency desired still eludes us. The more robust implementation of technology offers the chance not only to achieve efficiency gains on the operations and administrative side of the utilities, but it also offers the chance to positively influence user conservation and efficiency regarding the use of water, electricity and other public utilities. Government will therefore partner with utility agencies to see ICT increase efficiency in operations and administration, including in the automation of processes, asset management, and customer billing. On the user end, Government and utility providers will roll-out conservation and efficiency initiative to reduce water and electricity use and reduce waste—these efforts will bring positive knock-on effects to the country.

The implementation of an OSS/BSS Ericsson full stack system at the domestic customer service level will bring a next generation capability to customers both in Trinidad and in Tobago The business cycle of service orders, service commissioning, service usage, billing and collection and credit management are now being integrated into a single next generation converged service provider operation. Economy and efficiency will rise in performance and costs.

See Appendix 4 for the full suite of programmes.

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 Agenda[28].

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

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[29] with the intention of a wholesale market for same. 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. Tobago is also deployed with fixed wireless broadband across the majority of the island and mobile broadband is soon to be complete. The already completed areas are; Crown Point to Scarborough. The stage is therefore being set to accommodate higher levels of residential, business and institutional connectivity and the laying of a wide ranging foundation for the next milestones of ICT development, demand -side market growth.

Strategy: 2. ***Modernizing the Legal and Regulatory Framework***

This Strategy will run the same critical path in Tobago as it will in Trinidad, so there will be no difference in legislative readiness or commercial impact in either island once the requisite legislation has been assented. The network topology for Trinidad and Tobago is one 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 equally economically consistent.

Strategy: 3. Strengthening Cyber Safety and Security

The national cyber security configuration rollout will have sufficient capability to extend to Tobago. Risk assessments will be used to identify and prioritize 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 each other.

Strategic Thrust 2: Increasing Human Capacity

Strategy: 1. ***Building ICT Human Capital***

This Strategy will run the same critical 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 islands activities centres around tourism and hospitality. Therefore, the hotel, travel and hospitality sector

[28] 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. These programmes appear in Appendix 4, marked by an asterisk (*).

29Digicel and TSTT both have extensive network build out for fibre and wireless currently in progress. Additional dark fibre investment is expected from T&TEC

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 critical path in Tobago as it will in Trinidad.

Strategic Thrust 3: Enhancing Public Service Delivery

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 e 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 e 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 critical 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 GovNeTT 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 critical 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 e commerce. 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 acticity 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.

Strategy 2: *Advancing Societal Benefit*

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

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 eService and, importantly, promoting integration, collaborations, and standardisation across Government.

fastforward II Implementation Roadmap—Phase I 2017-2021

STRATEGIC THRUST	STRATEGIES	YEAR				
		2017	2018	2019	2020	2021
1 Improving Connectivity	S1 - Enhancing ICT Infrastructure					
	S2 - Modernizing 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 Enhancing Public Service Delivery	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					
	S15 – Advancing Societal Benefit					

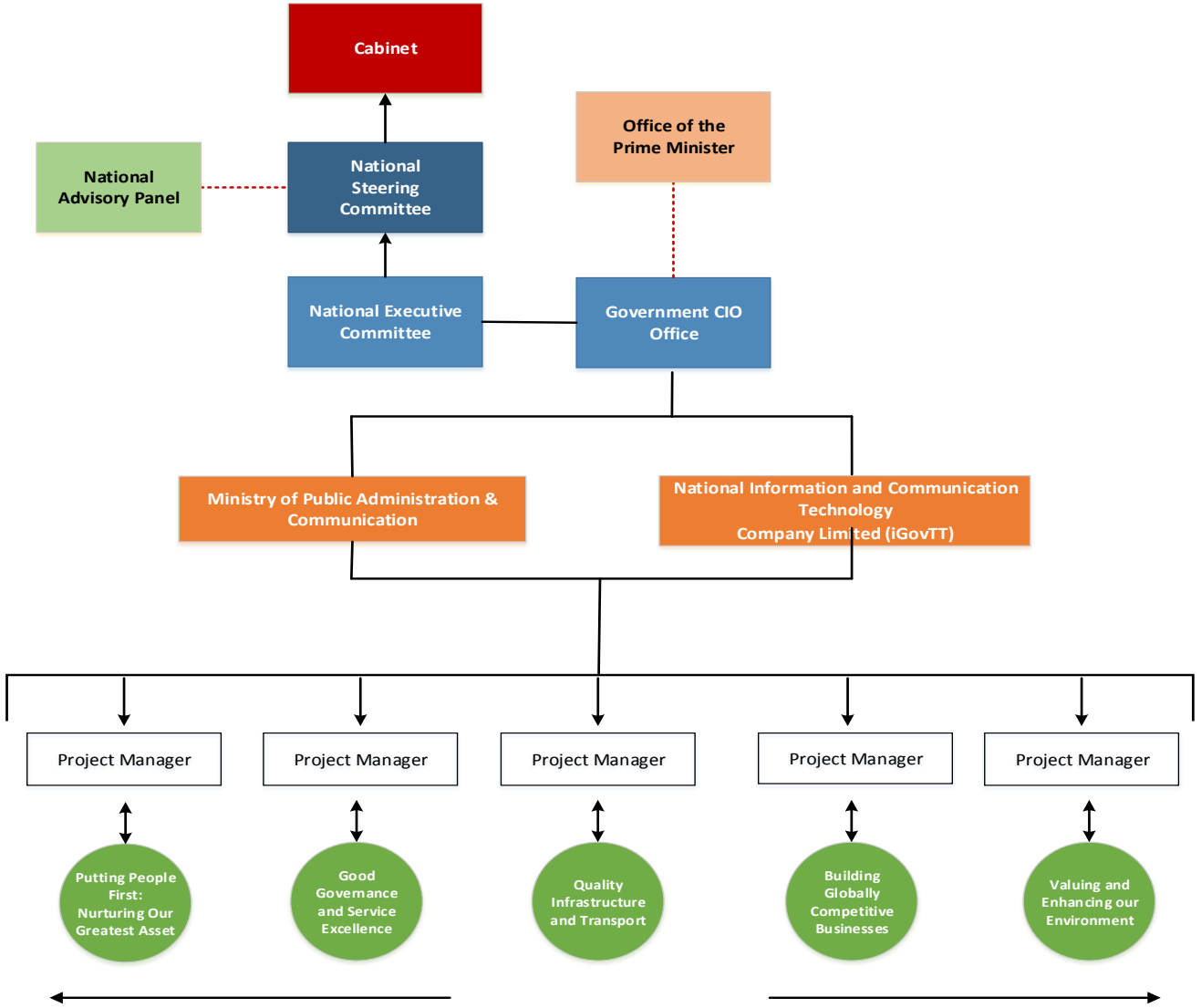
6. Governance and Ensuring Success

Implementation of *fastforward II* requires a clear governance structure which defines the roles and responsibilities of the various actors. The following are the key actors in the governance structure for the Plan:

- National ICT Steering Committee: This committee is the highest approving and decision-making committee that drives and oversees the suite of major government-wide ICT programmes as well as nation-wide ICT programmes under the Plan.
- National ICT Executive Committee: This Committee is the executing arm of the National ICT Steering Committee. It does this by ensuring the efforts of government agencies, related business entities, and citizen groups are aligned and coordinated. It also ensures that policies are instituted and adhered to in order to support the successful implementation of government-wide and nation-wide ICT programmes.
- National ICT Advisory Panel: This body comprises representation from academia, government (including independent institutions of State), private sector, and civil society. It provides feedback and advice to improve the implementation of Plan.
- Office of the National Chief Information Officer (NCIO): This Office will assume overall strategic oversight for the Plan and is required to align, manage, coordinate, and monitor the progress of all programmes. Strong programme management is required to retain focus on goals and maintain momentum and motivation to drive progress. This office will pioneer the change management required for successful implementation of programmes. It is recommended that the office be staffed with Programme Managers from both MPAC and iGovTT since they are currently tasked with guiding the ICT agenda.

The ICT Governance Structure for the implementation of *fastforward II* is displayed on the overleaf. Further details are also provided in Appendix 5.

National ICT Plan
(2017 - 2021)
Governance Structure



Financing

Achieving the vision of *fastforward II* will require the mobilization 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 annually.[30] This investment is sub-divided into 50 percent on hardware, 30 percent on software, and 20 percent 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.

[30] 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 *fasforward II* against key indicators. The ICT Program Management Office (PMO)[31] 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

Formalize 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 *fastforward II*.

Develop the Communications Plan
A Communications Plan must be developed to inform all stakeholders of key information regarding *fastforward II.* This includes, the Plans: vision, objectives, strategic thrusts, approach, benefits, and timelines.

Communication of *fastforward II* is required at different levels:

[31] The PMO comprises: the Government CIO Officer, the Execution and Monitoring Level, and the Operation Level of the Governance Structure.

- 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 *fastforward II* 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 eGovernment television radio would be considered important mediums for mass education on e-Government services. The aim is to highlight the many benefits of available eGovernment service offerings.

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*, *fastforward II* 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, capitalizes 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 - *Enhancing Public Service Delivery;*
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.

More importantly, there is a need for a cultural change to transition to first world nation status. People, businesses, and the Government of Trinidad and Tobago must be prepared to do things differently and to adapt to new ways of thinking, connecting, learning, living, doing business and engaging with public services.

Acknowledgements

Upon the request of the Minister of Public Administration and Communication, through formal country member protocol, assistance for the development of the National ICT Plan was sought from the International Telecommunications Union (ITU). The Area Representative, ITU Area Office for the Caribbean, was subsequently appointed as Chairman of the Working Group responsible for the preparation of this National ICT Plan 2017-2021, *fastforward II.*

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, organizations, 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 and Communications, the Project Working Group comprising officers of the Ministry of Public Administration and Communications, 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 Specialized Working Groups, all of whom provided direction and support for this exercise.

We are also grateful for the generous support of public sector leaders and ICT sector experts for providing their insight on the Plan.

Appendix

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	Number of Operators 2006	Number of Operators 2016
Mobile Telecommunications	2	2
Fixed Telephony	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 e-Government Survey 2016[32]	70th out of 193 countries
WEF Global Information Technology Report 2016[33]	67th out of 139 economies
EIU e-Readiness Rankings 2010[34]	48th out of 70 countries
World Bank's Doing Business 2016 Report[35]	88th out of 189 economies
ITU Measuring the Information Society 2016[36]	67th out of 167 economies
UNCTAD B2C E-commerce Index[37]	67th out of 137 countries

[32] 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

[33] Baller, Dutta, and Lanvin, *The Global Information Technology Report 2016*. Page 182

[34] Economist Intelligence Unit, *Digital economy rankings 2010 Beyond e-readiness*, The IBM Institute for Business Value, 2010. Page 4

[35] 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

[36] International Telecommunication Union, *Measuring the Information Society Report 2016*. Geneva, Switzerland, International Telecommunication Union, 2015. Page 13

- The same holds for the country's performance on Network Readiness which is an assessement 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[38]	2016[39]	Pillar	2012	2016
Environment Sub-index	76	96	1st pillar: Political and Regulatory Environment 2nd pillar: Business and Innovation Environment	90 72	104 77
Readiness Sub-index	43	35	3rd pillar: Infrastructure 4th pillar: Affordability 5th pillar: Skills	44 64 37	37 44 43
Usage Sub-index	52	69	6th pillar: Individual Usage 7th pillar: Business Usage 8th pillar: Government Usage	43 81 81	59 79 94
Impact Sub-index	91	88	9th pillar: Economic Impacts 10th pillar: Social Impacts	89 90	78 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 developmnet 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 inidcators for the same period.

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

[38] Dutta, Bilbao-Osorio, *The Global Information Technology Report 2012*. Page 302

[39] Baller, Dutta, and Lanvin, *The Global Information Technology Report 2016*. Page 182

Sub-index	2012[40]	2016[41]	Indicators	2012[42]	2016[43]
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
			Percentage of Households with computer*	56.3	67.9
			Percentage of households with Internet*	35	65.0
Usage Sub-index	61	68	Percentage 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 enrollment ratio, secondary*	89.9	85.5
			Gross enrollment ratio, tertiary*	11.5	12.0
			Adult Literacy Rate (2012) Mean years of schooling (2016)	98.7	 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 serviuces. The table below highlights the country's rank for the ITUs ICT price sub-baskets for the period 2012 to 2016.

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

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

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

43 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[44]	2016[45]
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 is 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[46]	2016[47]
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) UPU postal reliability score (2016)	93	 39

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

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

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

47 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

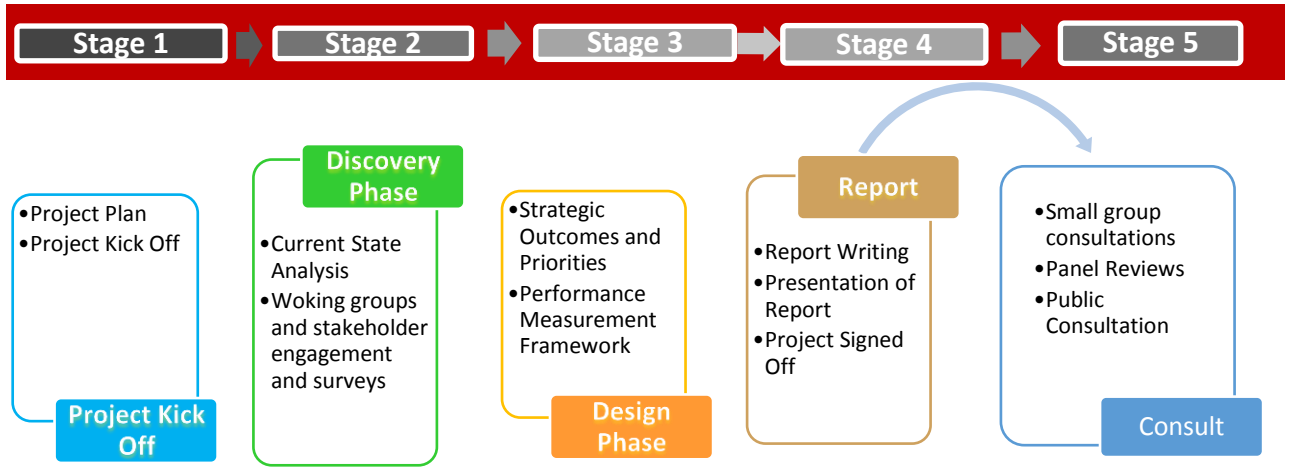
Both the National ICT and Vision 2030 are informed by the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development which are highlighted below.

APPENDIX 3: Five-Stage Planning Methodology

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

The process started with Stage 1: Plan when 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 is to be 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 Methodology[48]



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

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 to both Trinidad and Tobago at once)

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
1 Improving Connectivity	**S1 - Enhancing ICT Infrastructure**	- ***Government Backbone:** Government Network Infrastructure development and rollout	MPAC
		- ***Cloud Computing:** Software as a Service, Platform as a Service and Infrastructure as a Service.	MPAC
		- ***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.	MPAC
		- ***Provision of countrywide WiFi 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.	MPAC
		- ***Universal Service Project:** To Facilitate the rollout of infrastructure projects in under-served communities and assistive technologies for persons with disabilities	MPAC/TATT
		- ***Private Sector investment programmes:** o TSTT incubator project TT$5.7 billion over three years, o Digicel's fiber optic Digiplay broadband development and undersea cable facility and backhaul expansion, o C&W flow merger and prospective third mobile provider and mobile broadband.	ISPs/TATT
		- **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.	TATT

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		- **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.	TATT
		- ***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.	TATT
	S2 - Modernizing 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	Information Commissioner/MPAC
		- **Electronic Transactions Act** gives legal effect to electronic documents, electronic records, electronic signatures and electronic transactions	MPAC
		- **Electronic Transactions Act Regulations** provide for the creation of a Designated Authority to regulate Electronic Authentication Service Providers (EASPs) and procedures of registration of EASPs and authentication of electronic signatures	MPAC/Information Commissioner/TATT
		- **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/Central Bank
		- **Electronic Transfer of Funds Crime Act** regulates the transfer of money by electronic terminal through use of an electronic card.	
		- **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	

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		- **Consumer Protection Regulation (TATT) or Code**	TATT
		- **Modernizing of Spectrum Management Framework** o 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. The accommodation of innovative technologies such as white space devices and the planning of spectrum use to support mobile broadband, the Internet of Things, Smart Cities and the transformation of the transmission of Free-to-Air Television and Radio from an analogue to a digital form will also be included within this modernization effort.	TATT
		- ***Digital Financial Inclusion** o 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. The GoRTT will be undertaking initiatives focused on digital financial services; e-transaction and e-payments. Also, tax Incentives to promote the use of ICTs will be explored.	Central Bank/TATT
		- **Treatment of Net Neutrality** o Net Neutrality is based on the principle of an open and indiscriminate network. However, in light of the growing uptake of various content applications and their growing demand on network capacity, it has become imperative for the Authority to adopt balanced policy positions which protect competition and consumer rights while promoting continuous innovation. This deliverable aims to outline the main issues relating to the net neutrality and the Over the Top (OTT) debate and present the key principles underlying both sides of the discussion. It will also examine the applicability of legislation adopted globally in addressing the challenges faced by Trinidad and Tobago. The outcome of these activities will present a draft framework with a recommended position on Net Neutrality.	MPAC / TATT

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		- **Management of the ccTLD** o The Internet Corporation for Assigned Names and Numbers (ICANN) recognizes the University of the West Indies, Faculty of Engineering as the Sponsoring Organization of the country code Top Level Domain (ccTLD) for Trinidad and Tobago (dot tt.) The Government of the Republic of Trinidad and Tobago has determined that a more inclusive governance structure should be established for the management of this country code resource. The objective of this initiative is to ensure that the ccTLD is managed in a manner that serves the needs of all stakeholders involved.	TATT
	S3 - Strengthening Cyber Safety and Security	- **National Cyber-Security Strategy** sets out policy and implementation plan for protection of computer and information networks and facilitating secure communications	MNS
		- **Information Security Policy**	
		- ***Information Security Awareness Programme**	
		- ***Risk Management Programme**	
		- ***Disaster Recovery and Business Continuity Management**	
		- ***Cyber-security**	
		- **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	MNS
		- **Computer Misuse Act**: prohibits the unauthorized access, use or interference with a computer [intended to be superseded by proposed Cybercrime legislation]	MNS
2	**S4 - Building**	- FLOSS multi-channel learning management system for national training and	

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
Increasing Human Capacity	**ICT Human Capital**	in support of primary and secondary education systems	
		- Review and amendment of ICT Training Framework, aligned with current and emerging technological developments	
		- *ICT-based knowledge management framework for Government services	
		- Extending collaborative R&D work within and outside the region in line with identified technology areas	
		- Department R & D in ICT	
		- ICT Awards and Incentives scheme focused upon enhancing Government efficiency and effectiveness as well as other national challenges	
		- Girls in ICT programmes implemented on a yearly basis	
		- Awareness campaigns to educate the business community on ICT Developments in the country	
	S5 - Improving Access to ICT Human Capital	- National skills bank with ICT-based linkages between government, citizens, and businesses for access to services	
		- Policy for targeted, ICT-based use of human resource outputs from national training and education programmes (including OJT and National Scholarship Awardee Placement)	
		- Database of national/regional challenges with ICT-based system to encourage innovative thinking in developing local/regional, contextual solutions	
		- OJT and scholarship awardee placement system with allocations to scientific and academic institutions in support of research and development activities in line with identified technology areas	

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		- Attract and retain ICT and related technology professionals	
		Database of national/regional challenges with ICT-based system to encourage innovative thinking in developing local/regional, contextual solutions	
	S6 - Promoting Digital Inclusion	- **Provision of assistive technologies to persons with disabilities** o In accordance with the schedules contained within the Universal Service Regulations, this Mandatory Universal Service initiative aims to provide subsidized assistive devices to PwDs in Trinidad and Tobago, with the aim of bridging the gap between those who have access to basic telecommunications services and those who do not. 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.	TATT
		- **Design and Implementation of a National Digital Divide Survey every 3-5 years** o The purpose of this survey is to assess the gap between persons that have access to ICT services from those who do not, as well as the level of access (e.g. Internet speeds). This survey will inform the universal service projects that are developed towards closing this access gap and making broadband access ubiquitous.	TATT
		- **5% of USF funding to the Ministry of Public Administration and Communications**	
3 Enhancing Public Service Delivery	**S7 - Offering End-to-End eServices**	- ***Government e-Services Delivery Platform (G2B, G2C):** Provisioning a platform for seamless integration of ministry, department or agency applications and database at the back end; integrating all front end channels to deliver eServices.	MPAC
		- ***Coordination of Business Process Reengineering, Change Management and E-Service Deployment by Ministries:** The coordination of the development and rollout of Ministry and Agency	MPAC

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		applications and to deliver eServices to citizens	
		- ***Payment Gateway:** Provisioning of a national payment gateway to enable all modes of electronic payments to be transacted through all the electronic channels and on various devices.	MPAC
		- **Smart Card Development**: Improving security, reducing identity theft, fraud and creating an infrastructure of trust while delivering new avenues for on-line access to Government services.	MPAC/iGovTT
		- **eAuthentication:** Provisioning of a unique identity based login to individuals for accessing the various electronic channels of government (National Portal, Mobile Portal and other ministry applications	MPAC
		- **GIS Application**: Technologies to develop diverse fields for analyzing various types of geospatial data	MOALF
	S8 - Driving User Adoption	- **Encourage consumer adoption of e-lifestyle** Promotes culture change and encourages the development of an eReady society	MOALF
		- **Annual Broadcasting Forum:** The Annual Broadcasting Forum will seek to build capacity in the local broadcasting industry.	TATT
		- **Implementation of projects to commemorate 'World Telecommunications and Information Society Day' on a yearly basis:** Widespread promotion and awareness of the annual themes for WTISD on the yearly basis in conjunction with the International Telecommunications Union (ITU).	TATT
		- **Mobile Government:** The application of mobile technology to the delivery of government information and services.	MPAC
	S9 - Increasing Government Efficiency	- **Government ICT Standards and Guidelines:** Development and continuous review of technical policies and specifications for achieving interoperability and simplifying Information and Communication Technology (ICT) systems integration across the public sector	MPAC

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		- ***National Enterprise Architecture:** Unified architecture adoption across ministries enabling better integration of ministry applications	MPAC/iGovTT
		- **Frameworks for efficient operation, governance and standardization of the Infrastructure:** To enable effective and efficient systems integration and information flow in the provision of cross-departmental e-Government services that assures application and data interoperability.	MPAC/iGovTT
		- ***Enterprise Agreements:** Technology and contract/contract administration refresh of high bandwidth connectivity for sharing data, voice and video communication across GoRTT	MPAC
		- ***National Data Centre:** It is proposed that the National Data Centre would consolidate services, applications and infrastructure to provide efficient electronic delivery of G2G, G2C and G2B services.	MPAC
		- **Document and Information Management:** Assessment, consulting, software, implementation and support for storing and managing information centrally in an Enterprise Content Management (ECM) system.	iGovTT
	S10 - Promoting Open Government	- ***Open Government Initiative:** Promotes a high level of transparency and facilitates public scrutiny in government proceedings through the use of modern, open technologies.	MPAC
		- ***Open Data Initiative:** Development of a portal and accompanying processes to facilitate all government ministries and agencies to create and publish their datasets to promote a transparent government and foster the development of an open and innovative society.	MPAC
		- **Data Classification Policy:** Classification of data according to its sensitivity and criticality. This policy sets out how this classification is to be performed.	MPAC
		- **e-Democracy Platform:** Increasing transparency of the political process, enhancing the direct involvement and participation of citizens in government	MPAC
4	**S11 -**	- **More Government business online**	MPAC/ MOF

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
Fostering Economic Development	**Advancing eCommerce**	○ Development of e-Procurement System ○ Provision of end to government services	
		- **Develop and implement an e-Commerce Policy** ○ Creation of a framework for the use of eCommerce in government	MTI/MPAC
		- **Single Electronic Window (SEW) (Second Generation)**	MTI
		- **Develop online B2B and B2C marketplaces**	
	S12 - Diversifying the Economy Through ICT Sector	- **Facilitate SME e-commerce awareness, education and training programme** ○ Policy, Strategy and Institutional Framework for Micro Small Enterprise (MSE) Development 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.	Min of Labour/MPAC
		- **Promote and Facilitate Increases in the Availability of Funding for SME e-Business Adoption** ○ The Global Services Programme 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 promote exports, employment and foreign direct investment in the global services industry in Trinidad and Tobago	Min of Labour/MPAC/ Ministry of Planning
		- ***Facilitate a Pro Business Environment** ○ Strengthen of the Single Electronic Window for Trade and Business Facilitation (an IADB fund programme)-	MTI
		- **Promote ICT Cluster Development** ○ Development of a Framework for Cluster in alignment with eTeck's Mandate	MTI
		- **Develop and promote the National Integrated Business Incubator System** ○ The CARIRI CED Project The Centre for Enterprise Development (CED) was established	Ministry of Planning

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		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.	
		- ***Assess the mandate and expand the capacity of the e-business roundtable** o 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.	MPAC
		- **Develop ICT Linkages to Key Sectors** o Programme for development of ICT within other sectors e.g. Agriculture, Health and Tourism	MPAC
		- **3rd Mobile Operator concession open bid** o 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 services).	TATT
		- **International agreement**: 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	MPAC/TATT
	S13 - Advance Digital Content Production	- **Facilitation of digitize academic research**	MoE
		- **Digitization of Heritage, Indigenous and Social Content** o 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.	MPAC

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		○ 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 the implementation of an integrated Archival Management System (AMS), inclusive of: ▪ Digitizing the core collections at National Archives of Trinidad and Tobago (together with newspapers, books and magazine) ▪ Installing technology to facilitate the viewing of digital images ▪ Establishing a digitization lab	
		- **Facilitation of Digital Content for Learning for all levels of Education -**	MoE
5 Advancing Environmental and Societal Benefit	**S14 - Green ICT**	- **Green ICT Roadmap**	
		- **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 (CoE/P)**	
		- **Establishment of baseline statistics which provide the foundation for measurement going forward**	
		- **Establishment of Green ICT Standards**	
		- **Legislation to support the rational management of electronic waste**	
		- **E-Waste Sustainable Management Programme**	
		- **Guidelines for the inclusion of private sector and NGOs in e-waste**	

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		management	
		- **Develop Green ICT Youth Incubators**	
		- **Creating new job opportunities in Green ICT**	
		- **Green ICT Policy for Government**	
		- **Green ICT Portal**	
	S15 - Advancing Environmental and Societal Benefit	- ***eJustice**: embodies programmes and projects designed to increase the ***accessibility*** and ***timely delivery***, and reduce the ***cost*** of justice to individual and corporate persons. Programmes include: ***e-filing***: filing of documents electronically at Court office ***e-service***: service of documents electronically on parties ***e-storage***: electronic storage of documents at Court office ***e-litigation***: conduct of trials and hearings via electronic methodologies (video-conferencing, web-conferencing)	Judiciary/MPAC/iGovTT
		- **Cyber bullying policies – for schools**	
		- **Automated Palm and Fingerprint Identification System (APFIS)**	
		- **Automated system to check drivers' licenses, vehicle ownership etc.**	
		- **Infra-red equipment** to track fleeing criminals and missing people in the dark including those of the drug trade crossing into the TT boarders.	
		- **Predictive analytics and GPS maps which show crime hotspots**	
		- **GPS-based law enforcement technologies** can be used in the following ways: emergence response, patrol management, individual and vehicle tracking and gunshot detection	
		- **Information security awareness programmes**	
		- **Upgrade of Customer Information Systems / Customer Relationship**	WASA

STRATEGIC THRUSTS	STRATEGIES	PROGRAMMES	DRIVING AGENCY
		Management Systems	
		- **Upgrade of Governance Risk Compliance Software Applications**	WASA
		- **Automation and Digitalisation Programme**	WASA & EID
		- **Bulk and Universal Metering Programme**	WASA
		- **Public Awareness Education on Conservation and Efficiency**	WASA / T&TEC / SWMCOL
		- **Upgrade of SCADA Equipment and Enhancement to Distribution Management Systems**	T&TEC
		- **Social media to distribute information, and news of crime**	

The proposed roles and responsibilities for the National ICT Steering Committee, National ICT Executive Committee, National ICT Advisory Panel and the National ICT Programme Office are presented in the table below. *Proposed Roles and Responsibilities of the ICT Governance Structure for Phase 1*

<table>
<tr><th colspan="2">Proposed Roles and Responsibilities for ICT Governance Structure</th></tr>
<tr><th>National ICT Steering Committee</th><th>National ICT Executive Committee</th></tr>
<tr><td>1. Oversees and drives the overall implementation of National ICT Plan, and provides strategic direction towards realising the national Vision 2030
2. Provides executive sponsorship and guidance for all major and government-wide, and nation-wide ICT programs
3. Highest approving and decision making committee for all major and government-wide, and nation-wide ICT programs
4. Secures active participation from Ministries and Agencies, business and academic entities, and resolves any conflicts
5. Endorses combined ICT program budget for Cabinet approval
Frequency: Quarterly
Secretariat: MPAC</td><td>1. Drives organisational transformation for the Public Service as a whole through harnessing the full potential of ICT, beyond just increasing effectiveness & efficiency in the Public Service
2. Endorses and lends support to all major and government-wide, and nation-wide ICT programs
3. Endorses all government policies relating to National ICT Plan with special emphasis on driving e-service and e-government delivery to the next level of service excellence
4. Directs and pushes for synergy of cross-Ministry ICT efforts and resolves cross-Ministry issues that arise from the implementation of major and government-wide ICT initiatives
Frequency: Quarterly
Secretariat: MPAC</td></tr>
<tr><th>National ICT Advisory Panel</th><th>Office of the National Chief Information Officer</th></tr>
<tr><td>1. Provides feedback and advice to improve the implementation of National ICT Plan;
2. Assists to generate the awareness and highlight the benefits of e-Services, e-government, cybersecurity etc. to the citizens and business groups represented;
Frequency: As required by the National ICT Steering Committee and the National ICT Executive Committee
Secretariat: e-Business Round Table</td><td>Programme Managers (MPAC and iGovTT) – Phase 1
<u>MPAC Project Mangers Functions (Vertical Services)</u>
1. Oversees, tracks and monitors progress of cross-functional programmes of National ICT Plan
2. Coordinates and integrates efforts across the various programmes cross-functional of National ICT Plan, and ensures alignment with other national development efforts
3. Identifies and addresses gaps and areas of overlap between the various programmes of National ICT Plan</td></tr>
</table>

4. Identifies opportunities for major ministry ICT projects

<u>iGovTT Project Mangers Functions (Horizontal Services)</u>

1. Oversees, tracks and monitors progress of enterprise wide programmes of National ICT Plan
2. Coordinates and integrates efforts across the various programmes enterprise wide of *National ICT Plan*, and ensures alignment with other national development efforts
3. Identifies opportunities for GoRTT enterprise wide ICT projects

<u>Collaboration between Project Management Offices (MPAC and iGovTT)</u>

1. The programme offices of MPAC and iGovTT will work collaboratively on the implementation and delivery of the *National ICT Plan* through the Government virtual programme management office
2. The project managers' deliverables will be based on programmes under *National ICT Plan in* alignment with the Vision 2030 SDGs

Frequency: Monthly

Secretariat: MPAC, iGovTT

*<u>*Vertical services*</u> refers to cross-functional collaboration among GoRTT Ministries or Agencies

*<u>*Horizontal services*</u> refers to collaboration on enterprise wide ICT initiatives among GoRTT Ministries or Agencies

Composition of Governance Committees

The composition of the ICT Governance committees determine the ability of committees to successfully execute their roles and responsibilities. **Table 2** details the recommended composition for the mentioned governance committees:

Table 1: Proposed Composition of the ICT Governance Committees

Proposed Composition	
National ICT Steering Committee	**National ICT Executive Committee**
Chairman: Minister, Ministry of Public Administration and Communications **Vice Chairman: Minister, Ministry of Planning and Development** **Members:** • **Ministers of large ministries that provide critical or high-volume services to public or ministries that lead government-wide or major ICT projects:** – **Ministry of Finance** – **Ministry of Trade and Industry** – **Ministry of Attorney General and Legal Affairs** – **Ministry of National Security** – **Ministry of Education** – **Ministry of Health** – **Secretary with responsibility of ICT, Tobago House of Assembly** **Attendees:** • **Government CIO** • **CEO, iGovTT**	**Chairman:** PS, Ministry of Public Administration and Communications **Vice Chairman:** PS, Ministry of Planning and Development **Members:** 1. PS, Ministry of Finance 2. PS, Ministry of Trade and Industry 3. PS, Ministry of Attorney General and Legal Affairs 4. PS, Ministry of National Security 5. PS, Ministry of Education 6. PS, Ministry of Health 7. Chief Administrator, Tobago House of Assembly 8. President, Chamber of Industry and Commerce 9. Government CIO 10. CEO, iGovTT **Attendees:** • Information Commissioner (*Data Protection Act 2011*)
National ICT Advisory Panel	**Office of the National Chief Information Officer**
Expert advisors to be invited as required e.g. Attorney-General's Office and Auditor-General's Office, e-Business Roundtable, Civil Society, academia (UTT, UWI), Regulators, Information Commissioner etc.	**Chairman:** National Chief Information Officer (NCIO) **Vice Chairman:** CEO, iGovTT **Attendees:** • Programme Managers (MPAC) for all SDG programmes in the

	National ICT Plan; • Project Manager (iGovTT) for all SDG programmes in the *National ICT Plan*; • Representative from the Monitoring and Evaluation Unit, Ministry of Planning and the Develop.

Government of the Republic of Trinidad and Tobago
Ministry of Public Administration and Communications