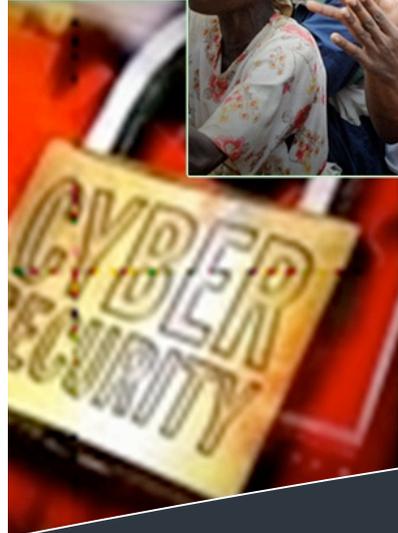




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# NATIONAL ICT STRATEGY AND PLAN NISI - 2015



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## **List of Acronyms**

AGAGE	Advanced Global Atmospheric Gases Experiment
AISI	African Information Society Initiative
AMIS	Agriculture management Information System
ARTEL	Africa Rural Telecommunication
BNR	Banque National du Rwanda
BPO	Business Processing Outsourcing
CD	Community Development
CERT	Computer Emergency Response Team
COMESA	Common Market for Eastern and Southern Africa
CNS-ATM	Communication Navigation Surveillance /Air Management
CS	Cyber Security
CSIRT	Computer Security Incident Response Team
CTC	Coordination Technical Committee
FWG	Focus area Working Group
DCRS	Develop a Digital Court Recording System
EAPP	East African Power Pool
EASSy	Eastern Africa Submarine Cable System
EDPRS	Economic Development & Poverty Reduction Strategy (2008-2012)
e-GOV	e-Government
EMIS	Education Management Information System
EMR	Electronic Medical Records
EQMS	Electronic Queue Management System
ERMS	Electronic Records Management System
FMS	Financial Management Systems
FY	Fiscal Year
GDP	Gross Domestic Product
GIS	Geographical Information System
GNI	Gross National Income
GNP	Gross National Product
GoR	Government of Rwanda
G2B	Government-to-Business
G2C	Government-to-Citizen
G2G	Government-to-Government
HIV	Human Immunodeficiency Virus
HLSC	High Level Steering Committee
HRMS	Human Resource Management System
ICT	Information Communication Technology
ICT4D	ICT for Development
IDS	Intrusion Detection Systems
IPAR	Institute of Policy Analysis and Research
IPS	Intrusion Prevention Systems
ISP	Internet Service Provider
ISPA	Internet Service Provider in Africa
ITU	International Telecommunication Union
IXP	Internet Exchange Point
JICA	Japan International Cooperation Agency
JRLOS	Justice, Reconciliation, Law & Order Sector
JWG	Joint-sector Working Group
KIST	Kigali Institute of Science and Technology
LMIS	Labour Management Information System

LUMIS	Land Use Management Information System
MAJ	Maison d' accès a la Justice
MDG	Millennium Development Goal
MINALOC	Ministry of Local Government
MINEDUC	Ministry of Education
MINICT	Ministry in charge of Information Communications Technology
MIT	Massachusetts Institute of Technology
MITIR	Monitoring Information Technology Impact in Rwanda
MTN	Mobile and Telecommunications Network
NCAB	National Cyber Security Advisory Board
NCSRC	National Cyber Security Research Centre
NICI	National Information Communication Infrastructure
NICI I	NICI Plan Phase I (2000-2005)
NICI II	NICI Plan Phase II (2006-2010)
NICI III	NICI Plan Phase III (2011-2015)
NICI IV	NICI Plan Phase IV (2016-2020)
NID	National ID
NPD	New Project Development Division
NUR	National University of Rwanda
OECD	Organisation for Economic Cooperation and Development
OpenMRS	Open Medical Records System
PKI	Public Key Infrastructure
PSD	Private Sector Development
PSF	Private Sector Federation
RAMA	la Rwandaise d 'Assurance Maladie
R&D	Research and Development
RBS	Rwanda Bureau of Standard
RwEdNet	Rwanda Education Network
RDB	Rwanda Development Board
RDB/HCID	Rwanda Development Board – Human and Institution Capacity Development Division
RDB/ICT	Rwanda Development Board – ICT Department
RICTA	Rwanda ICT Association
RIPPS	Rwanda Integrated Payment Processing System
RITA	Rwanda Information Technology Agency (predecessor of RDB-ICT)
RNP	Rwanda National Police
RTN	Rwanda Telecentres Network
RTTA	Rwanda Tour and Travel Association
RURA	Rwanda Utility and Regulatory Agency
SD	Skills Development
S&T	Science and Technology
SME	Small and Medium Sized Enterprises
SMTE	Small and Medium Tourism Enterprises
SOC	Secure Operation Centre
TRACnet	Treatment & Research AIDS Centre network
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
VLP	Virtual Landing Point
VoIP	Voice over Internet Protocol
WDI	World Development Indicator
WIBRO	Wireless Broadband (version of WiMAX service)
YBE	12-Year Basic Education

# “Accelerating Service Development”

## Rwanda ICT Strategic and Action Plan (NICI III – 2015)

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## “Accelerating Service Development”

### Rwanda ICT Strategic and Action Plan (NICI III – 2015)

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## Executive Summary

Global ICT policies have become more mainstream in the last decade underpinning growth, jobs, increasing productivity, enhancing the delivery of public and private services, and achieving broad socio-economic objectives in the areas of healthcare, education, climate change, energy, employment and social development. As such, the global ICT industry is fast changing as a result of emerging technologies, economic, social and business trends. As ICT applications and services are becoming ubiquitous, they are increasingly essential for ensuring sustainable economic development, and Rwanda is no exception.

Adopted in 2000, Vision 2020 aims to transform Rwanda into a middle-income country and transition her agrarian economy to an information-rich, knowledge-based one by 2020. The Government of Rwanda (GoR) strongly believes that Information and Communication Technology (ICT) can enable Rwanda leap-frog the key stages of industrialization. As such, GoR has integrated ICTs, through the NICI process, as a key driver for socio-economic development to fast track Rwanda's economic transformation, and consistently strives to align the country's development agenda to global trends in order to be competitive.

Since 2000 GoR has established institutions and mechanisms to create an enabling environment for ICT development, deployed critical world-class infrastructure and is continuously developing a skilled human resource base in its quest to become a knowledge-based society and regional ICT hub. Today, the existence of a conducive legal and regulatory framework, availability of good infrastructure and a growing and innovative human resource base are further positioning Rwanda as a regional ICT hub. NICI III aims to accelerate "*services development*" by running efficient government services and increasing private sector productivity and in turn Rwanda's competitiveness.

Rwanda strives to leverage ICTs in all sectors of the economy and is registering tremendous progress. In 2010, Rwanda was the top global reformer in the World Bank Doing Business report and second global reformer out of 183 countries in 2011. Rwanda is also the 9<sup>th</sup> easiest place to start a business in the world and the 6<sup>th</sup> most competitive economy in Sub-Saharan Africa according to the 2010 World Economic Forum global competitiveness report. This has largely been a result of several reforms including online business registration, aimed at making the business environment more conducive. Rwanda's real GDP growth increased from 2.2% in 2003 to 7.2% in 2010 with a peak growth of 11.5% in 2008, and an overall average GDP of 7%. These achievements are a result of the long-term economic development plan, Vision 2020, its medium-term strategy, the Economic Development Poverty Reduction Strategy (EDPRS), and the NICI Plan, which all give a clear direction on how Rwanda will transition from poverty to a middle-income, knowledge-based economy.

The NICI process, which coincides with Vision 2020, begun with the first of four five-year rolling plans, NICI I (NICI-2005 Plan), that focused on creating the necessary enabling environment that would enable the establishment and growth of Rwanda's ICT sector. Emphasis was placed on establishing the appropriate institutional, legal and regulatory framework, liberalization of the telecoms market, and reduction of entry barriers to the telecom market as well as an effective implementation and coordination mechanism.

The just concluded second plan, NICI II (NICI-2010 Plan), focused on providing world-class communications infrastructure that will serve as the backbone for current and future communications requirements. Today, Rwanda enjoys increased nationwide coverage of telecommunication networks, has deployed a versatile and high capacity national optic fiber backbone network, and a national data center. Rwanda is now well positioned to become a regional ICT hub that can offer a wide range of competitive ICT products and services.

The third plan, NICI III (NICI-2015 Plan), will focus on the development of services by leveraging ICTs to improve service delivery to citizens, as Rwanda approaches the fourth and final phase of the NICI process that will propel Rwanda to achieve Vision 2020 goals. Lessons learned (Appendix 1) during NICI II implementation have been widely considered in the development of NICI III. In this phase, emphasis will be placed on the development of services in the following five focus areas:

- **Skills development** aims to develop a high quality skill and knowledge base leveraging ICT
- **Private Sector Development** aims to develop a vibrant, competitive, and innovative ICT sector/ ICT enabled private sector
- **Community Development** aims to empower and transform communities through improved access to information and services
- **E-Government (e-GOV)** aims to improve government operational efficiency and service delivery
- **Cyber Security (CS)** aims to secure Rwanda's cyberspace and information assets

These focus areas will accelerate services development and fuel continued growth.

This document is divided into the following four parts:

**Part 1** sets out the overview of the NICI process since its inception in 2000. It also provides a background of Rwanda's current ICT status in relation to the global context: national development strategies, ICT vision, achievements, challenges and opportunities.

**Part 2** highlights the methodology employed in NICI III formulation and provides the rationale, description, mission and objectives for each of the five focus areas.

**Part 3** elaborates each NICI III project by outlining its purpose, description, activities, expected outcomes and outcome indicators. The projects defined will be implemented in the first two years of the NICI III plan (FY 2011 and FY 2012).

**Part 4** describes the institutional and implementation framework for NICI III, including specific roles and responsibilities, and the framework that will guide the development of projects in the second phase of NICI III i.e. FY2013 - 2015.

**Part 5** is the conclusion.

Implementation of NICI III projects will commence in July 2011 and have annual/biennial project cycles. NICI II evaluation revealed that lack of ownership, inadequate project planning and coordination, and monitoring and evaluation were major shortcomings. As such, NICI III

has been designed to solve these issues and is more flexible, with clear outcomes that ensure alignment with overall NICI III goals. Annual/biennial project cycles will allow for easy adaptation to socio-economic changes and emerging technologies. A strong institutional and implementation framework has been created for NICI III and will require full participation of all stakeholders as they each have complementary roles. Stakeholders include:

- National ICT Steering Committee, chaired by MINICT, will provide strategic direction for Rwanda's ICT sector and be the guardian of NICI III implementation, providing leadership and oversight.
- RDB, the designated coordination and implementing agency of all GoR ICT initiatives, in partnership with project implementers and the private sector, will continue to implement and oversee the implementation of the NICI III initiatives. Further, the focus area working groups (FWGs) that we were very instrumental in the NICI III formulation process will continue to support RDB ensuring effective project implementation.
- Project Implementer will be executing specific NICI III projects in partnership with RDB.
- On-going monitoring and periodic external evaluation will objectively verify project implementation and overall NICI III progress.

The next five years will be most critical to Rwanda's transformation into a knowledge-based economy as NICI III aims to accelerate services development and advance the country's development agenda.

**PART 1: PREAMBLE**

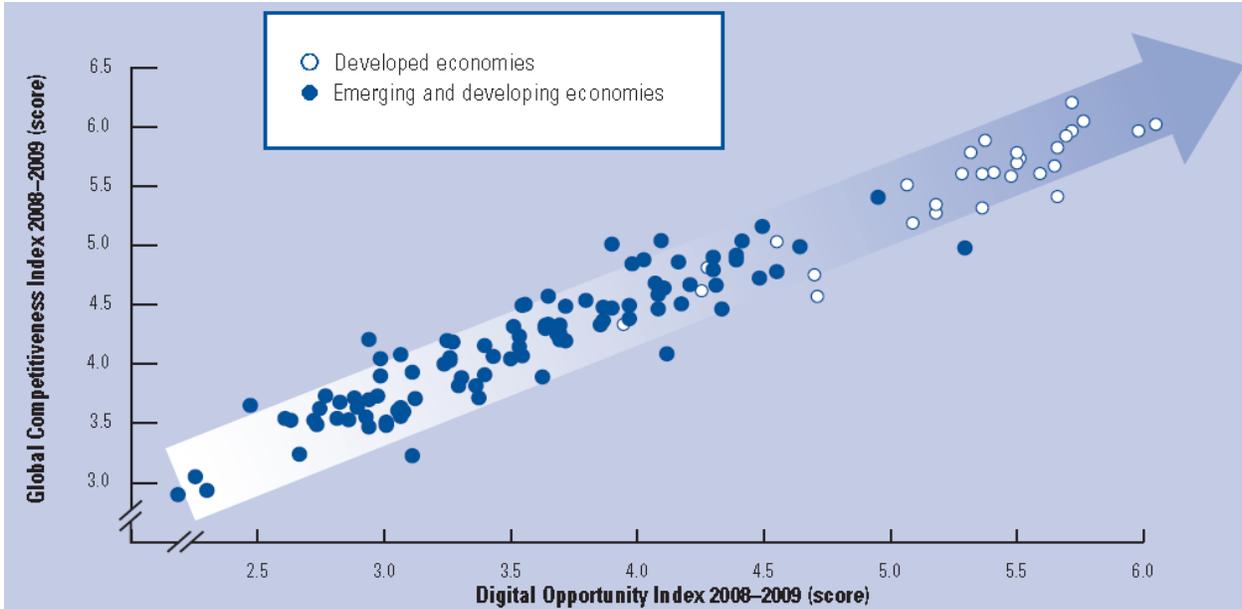
*This section sets out the overview of the NICI process since its inception in 2000. It also provides a background of Rwanda’s current ICT status in relation to the global context and national development strategies. It also highlights Rwanda’s ICT vision, achievements, challenges and opportunities.*

**1.1. The Current Context**

Global ICT policies have become more mainstream in the last decade underpinning growth, jobs, increasing productivity, enhancing the delivery of public and private services, and achieving broad socio-economic objectives in the areas of healthcare, education, climate change, energy, employment and social development. As such, the global ICT industry is fast changing as a result of emerging technologies, economic, social and business trends. As ICT applications and services are becoming ubiquitous, they are increasingly essential for ensuring sustainable economic development, and Rwanda is no exception.

Investing in ICT is a key driver of economic development for emerging and developed markets alike. Figure 1 illustrates the correlation between ICT readiness – the availability of broadband, computers, and software in a country – and competitiveness. Countries with the most advanced ICT sectors present the highest levels of competitiveness, suggesting that having a country enabled by ICT improves its overall economic performance in the long run.<sup>1</sup>

**Figure 1: ICT Readiness vs Competitiveness<sup>2</sup>**



<sup>1</sup> The Global Information Technology Report 2009-2010 @ 2010 World Economic Forum

<sup>2</sup> World Economic Forum, Competitiveness Index 2008-2009; McKinsey, Digital Opportunity Index 2008-2009.

Since 2000 GoR has established institutions and mechanisms to create an enabling environment for ICT development, deployed critical world-class infrastructure and is continuously developing a skilled human resource base in its quest to become a knowledge-based society and regional ICT hub. Today, the existence of a conducive legal and regulatory framework, availability of good infrastructure and a growing and innovative human resource base are further positioning Rwanda as a regional ICT hub. NICI III aims to accelerate “*services development*” by running efficient government services and increasing private sector productivity and in turn Rwanda’s competitiveness.

Rwanda strives to leverage ICTs in all sectors of the economy and is registering tremendous progress. In 2010, Rwanda was the top global reformer in the World Bank Doing Business report and second global reformer out of 183 countries in 2011. Rwanda is also the 9<sup>th</sup> easiest place to start a business in the world and the 6<sup>th</sup> most competitive economy in Sub-Saharan Africa according to the 2010 World Economic Forum global competitiveness report. This has largely been a result of several reforms including online business registration, aimed at making the business environment more conducive. Rwanda’s real GDP growth increased from 2.2% in 2003 to 7.2% in 2010 with a peak growth of 11.5% in 2008, and an overall average GDP of 7%. These achievements are a result of the long-term economic development plan, Vision 2020, its medium-term strategy, the Economic Development Poverty Reduction Strategy (EDPRS), and the NICI Plan, which all give a clear direction on how Rwanda will transition from poverty to a middle-income, knowledge-based economy.

In 2007, Rwanda took a key step toward its long-term goal when it became the 1<sup>st</sup> East African country and the 3<sup>rd</sup> in Africa to adopt the “One Laptop Per Child” program. This initiative aims to provide pupils with laptops in order to bridge the global digital divide. With the above-mentioned achievements among many more, Rwanda is now on track to achieving MDG and Vision 2020 goals.

### 1.1.1. ICT Trends

**Internet:** In just a few decades, Internet is transforming the way we live, work, socialize and the way countries develop and grow. Its impact on economic wealth includes the creation of jobs, improved standards of living, and contribution to real growth. The United Nations in its Millennium Development Goals (MDGs) lists Internet penetration as a key metric in efforts to reduce poverty and encourage rational development. According to a 2011 McKinsey report, more than 2 billion people now use Internet in every country, in every sector, in most companies, and almost \$8 trillion exchange hands each year through e-commerce and these numbers are still growing.<sup>3</sup> E-commerce websites such as Amazon, iTunes, and Google Checkout are transforming global business transactions.

Voice communication over the Internet (VoIP), blogging, Internet radio, Internet television, social networking sites, cloud computing, and Internet-based user applications are all contributing immensely to the rise in popularity and acceptance of the Internet as the primary communication method for many.<sup>4</sup> In 2008, an estimated 300 Cybercafés were operational of which 65% were within Kigali. However, due to computer affordability, mobile phone penetration and easy connectivity to Internet (Hotspots, 3G modems), that number decreased to

<sup>3</sup> McKinsey Global Institute, May 2011 Report: Internet matters: The Net’s sweeping impact on growth, jobs and prosperity

<sup>4</sup> UNESCAP, January 2010 Briefing Note: ICT Trends for Government Leaders

131 in 2010. In 2010, 40 Broadband VSAT companies were operational in Rwanda. It is envisaged that the use of VSAT will be drastically reduced due to increasingly affordable Internet resulting from the deployment of broadband through the national fiber optic backbone that been rolled out in the country (over 2,300 km). In 2010, Internet penetration in Rwanda was 5.3% compared to the African average of 10.9%. From 2008 to 2010, Rwanda registered one of the highest Internet user growth rates with 8900% compared to the continent growth rate of 2450% and the world average rate of 444%. In 2010, more than 38.9% of Rwanda's public sector (ministries, agencies, provinces and districts) and 34.5% of the private sector had web presence.<sup>5</sup>

**Mobile Applications:** There is increased demand linking mobile payment systems with online-based e-commerce and trading platforms globally. Today, there are more than 3.4 million mobile subscribers in Rwanda who are now able to purchase electricity and airtime anywhere at any time as a result of mobile payment systems. Rwandan software developers and telecom providers can work together to capitalize on this trend.

**Outsourcing:** Outsourcing of help-desk services, desktop management, data-center services, and on-the-spot support services are on the rise. It is creating new job opportunities in the IT industry, stimulating the need for progressive and innovative strategies to connect employees from continent to continent. Nelson Hall, a global outsourcing research firm, estimates global demand for business processing outsourcing (BPO) services at \$250 billion annually and it is projected to increase to \$750 billion by 2020. Demand for BPO services in Rwanda is estimated at \$50 million, which will increase to almost \$200 million by 2020 with regional market potential predicted to be \$1900 million in 2020.<sup>6</sup>

**Information Security:** Information security is increasingly becoming of critical importance given the need to secure critical information currently available online. This is a result of advanced and repeated cyber-attacks to government and private companies that are now spending more on security technology, assessments, training, and certification.<sup>7</sup> Rwanda is investing, and must continue to do so, in IT and information security to ensure that Rwanda's information is not compromised.

**Cloud Computing:** There is a shift in the global service model in which service providers are leveraging cloud computing technologies to offer "everything-as-a-service". This is a new and swiftly growing approach to service provision. Gartner, a leading cloud computing research firm estimates that the global market for cloud computing will reach \$148 Billion by 2014. Today, Rwanda has constructed a national data center that is fully capable of maximizing the potential in cloud computing, paving the way for increased services development.

**Green ICT:** A host of trends, including rising stakeholder awareness, increasing environmental regulations and rising energy costs are causing many executives to "green" their companies. Through reduction in CO2 emissions, the IT industry can save billions of dollars and garner more money in electric utilities rebates. Benefits and incentives are being offered to businesses in countries like the United States as reducing carbon emissions has become a pressing issue. Governments in countries like Canada and South Africa are refurbishing ICT equipment. Refurbished computers are then distributed across these countries to schools, libraries and

<sup>5</sup> RWANDA 2010 ICT Status Baseline Survey

<sup>6</sup> Rwanda BPO strategy

<sup>7</sup> <http://hostwisely.com/blog/six-major-trends-of-information-technology-in-2010/>

registered non-profit learning organizations. Rwanda can greatly increase ICT penetration and utilization through such initiatives.

**Convergence:** Technological innovation and market demand are driving the ICT sector toward convergence. This trend is lowering barriers-to-entry; allowing service providers to try new business models; promoting competition; reducing costs for service providers and users, and broadening the range of services and technologies available to users. The growing use of Internet protocol (IP)-based packet-switched data transmissions has made it possible for various devices and applications to use any one of several networks, and interconnect previously separated networks. Service providers around the world are embracing convergence through investment in all-IP networks – estimated to reach a cumulative total of \$200 billion in 2015 – and in converged business models.<sup>8</sup> Rwandan telecom companies are also following this trend by converging voice and data network infrastructure.

In order to compete in an increasingly globalized market place, developing economies need to not only use ICT, but also ensure the availability of ICT to all sectors of the economy. This requires a significant investment in infrastructure, capacity building, and a policy environment that fosters innovation and growth. Rwanda, through the NICI process, has created an enabling environment and deployed critical infrastructure for ICT growth and development. NICI III aims to capitalize on this to accelerate services development through ICT by running efficient government services and improving business efficiency and productivity, thereby facilitating sustainable economic competitiveness for Rwanda.

## 1.2. Vision

Adopted in 2000, Vision 2020 provides a set of overarching goals that aim to transform Rwanda from an agrarian to knowledge-based economy and achieve middle-income status by 2020. It is the blueprint for the country’s economic development strategies that has the following six pillars and three crosscutting areas:

1. Good governance and a capable state
2. Human resource development and a knowledge based economy
3. A private sector-led development
4. Productive and market oriented agriculture
5. Infrastructure development
6. Regional and international economic integration and cooperation

Crosscutting areas:

1. Gender equality
2. Protection of environment and sustainable natural resource management
3. Science and technology, including ICT

GoR has adopted the following strategies to fast track the achievement of Vision 2020 in three priority clusters including economic, social and governance.

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<sup>8</sup> World Bank, 2009, Information and communication for development : Extending reach and increasing impact

**Economic Development & Poverty Reduction Strategy 2008-2012 (EDPRS)** is the medium-term framework for achieving Vision2020. It follows Millennium Development Goals (MDG) benchmarks and targets, organised in 3 flagship programmes:

- 1) Sustainable growth for jobs and exports
- 2) Vision 2020 *Umurenge* – a pro-poor, rural development programme for poverty reduction
- 3) Governance

**Vision 2020 *Umurenge*** is a highly decentralised integrated rural development programme designed to accelerate extreme poverty reduction in Rwanda. It is currently being piloted in 30 of the poorest sectors, “*imirenge*” around the country.

**The Governance Programme** underpins two flagship programmes that provide an anchor for pro-poor growth by building on Rwanda’s reputation as a country with a low incidence of corruption and a regional comparative advantage in “soft infrastructure”. The capacity of local government and accountability are strengthened, and a business-friendly, risk-free environment promoted.<sup>9</sup>

The most recent **Government 7-year plan (2010-2017)** focuses on private sector development and job creation; good governance and zero-tolerance of corruption; economic growth combined with poverty reduction; capacity building in all sectors, and transformation of the agriculture sector – especially increasing the use of technology and thus productivity.

In line with Vision 2020, GoR integrated ICT as a key driver for socio-economic development by adopting the Rwanda ICT for Development (ICT4D) policy, commonly known as the National Information and Communication Infrastructure Plan (NICI). The NICI plan, which started in 2001, aims at fast tracking Rwanda’s transformation to a knowledge-based society. Its objectives are to:

- Transform Rwanda into an IT-literate nation
- Promote and encourage the deployment and utilization of ICTs within the society
- Improve the civil and public service efficiency
- Develop the information and communications infrastructure of Rwanda
- Make Rwanda a regional ICT hub
- Transform the educational system using ICTs with the aim of improving accessibility, quality and relevance to the developmental needs of Rwanda
- Empower Rwandans by developing a human resource base that adapts to changing demands of the economy
- Develop the legal, institutional and regulatory framework and structures required to support the deployment and utilization of ICT

These objectives have been the guiding principles of the NICI process to-date.

### 1.3. Rwanda ICT4D (NICI) Process

In order to transform Rwanda into a knowledge-based economy, GoR integrated ICT in the Vision 2020 and Poverty Reduction Strategy (EDPRS) to enable Rwanda leap-frog the key

<sup>9</sup> OECD 2008: 524; GoR 2007: 86-87

stages of industrialization and transform her agro-based economy into a service, information-rich and knowledge-based one that is globally competitive. In 1998, the Rwandan ICT for Development (ICT4D) policy was adopted to implement policies and plans that would address Rwanda's developmental challenges in the information and technology age, in order to accelerate the country's socio-economic development. In 2000 GoR began implementing the ICT4D policy, commonly known as NICI, and subsequently developed and implemented NICI I (NICI-2005 Plan), the first of the four five-year rolling plans. Emphasis in NICI I was placed on creating a conducive environment by establishing the institutional, legal and regulatory framework for ICT development, putting in place the necessary mechanisms, liberalization of the telecoms market, reduction of entry barriers to the telecom market as well as an effective implementation and coordination mechanism.

The just concluded second plan NICI II (NICI-2010 Plan) focused on providing world-class communications infrastructure as a backbone for current and future communications requirements. Several projects ranging from increased nationwide coverage of telecommunications networks, versatile and high capacity national optic fiber backbone network, national data center as well as a centralized monitoring and operations center were among the accomplishments of NICI II.

The third plan NICI III (NICI-2015 Plan) will build on the two previous phases and propel Rwanda to the fourth and final phase of the NICI process. In this phase, emphasis will be placed on services development across five focus areas identified to fuel continued growth. This plan is more flexible than previous ones in that it allows for easy adaptation to emerging technologies and sectoral changes. This approach ensures coherence and continuity throughout implementation of NICI III. As such, projects will be implemented annually or biennially compared to the previous plans in which projects had 5-year life cycles to ensure easy adaptation to emerging technologies and changing national priorities.

Figure 2 below illustrates the NICI process to date. NICI I and II provided the foundation for Rwanda's ICT development. The third level illustrates the NICI III framework, which focuses on five key areas defined as focus areas. The fourth level denotes the fourth plan NICI IV (NICI-2020 Plan), which will complete the NICI process by consolidating the country's ICT transformation.

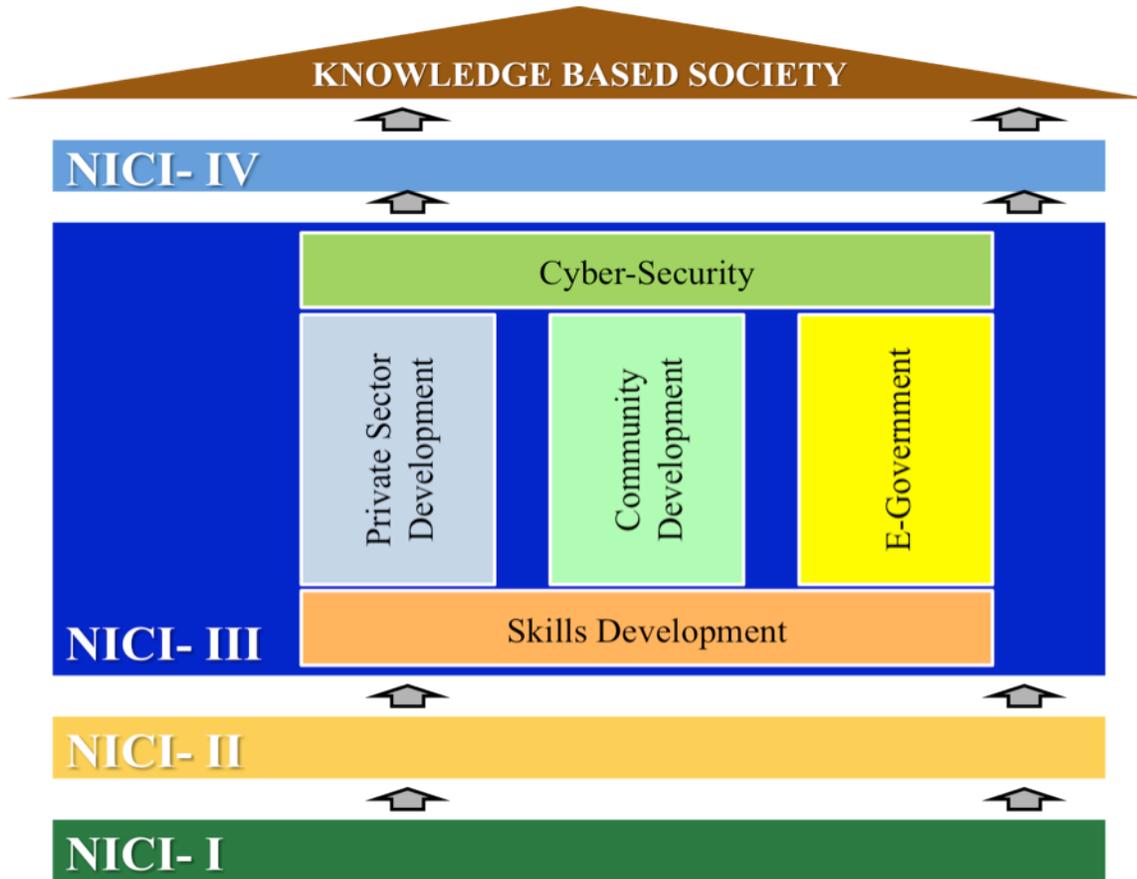


Figure 2: NICI Framework

### 1.3.1. NICI I (NICI-2005 Plan)

*Goal:* To build the foundation and create an enabling environment for ICT development by putting in place the required institutional framework and policies in order to transform Rwanda into a knowledge-based society.

*Outcome:* NICI I evaluation revealed that Rwanda had made progress in achieving the planned goals by building the requisite foundation for ICT development. NICI I, implemented between 2001 and 2005, focused on the following:

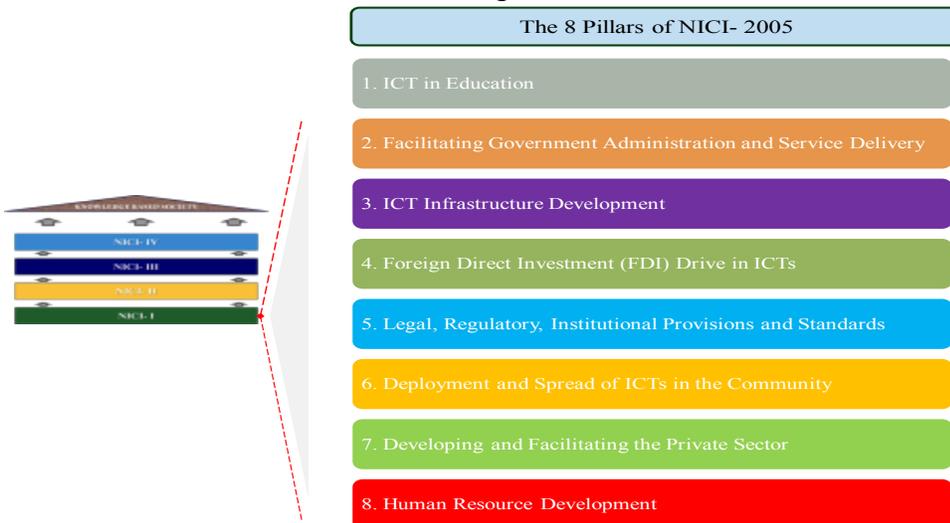
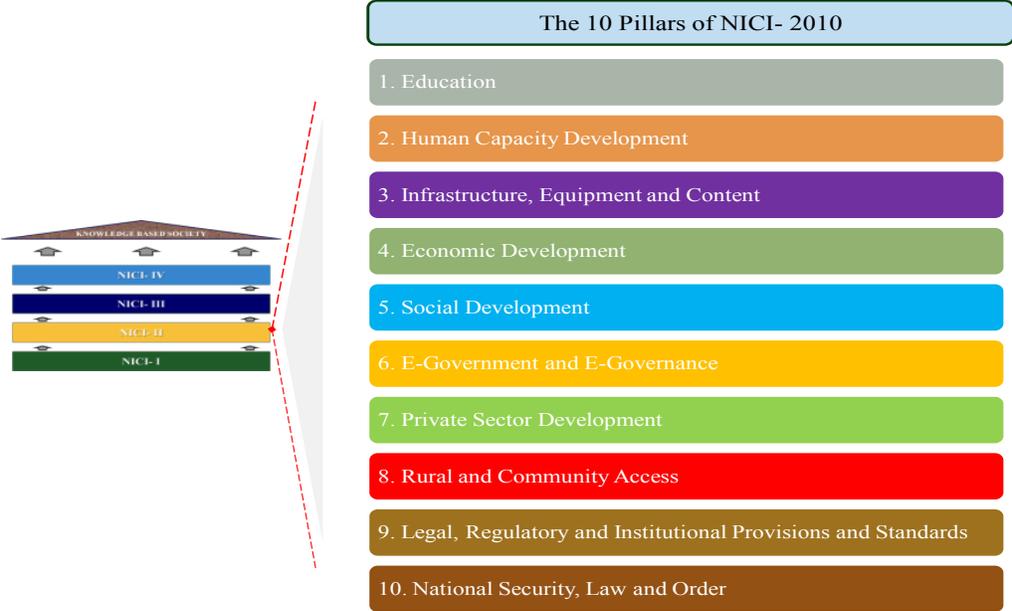


Figure 3: NICI I Framework

**1.3.2. NICI II (NICI-2010 Plan)**

*Goal:* To develop and deploy world class ICT infrastructure that will support and accelerate ICT development and growth.

*Outcome:* NICI II evaluation showed that Rwanda had solidified the foundation for ICT development and achieved the plan’s main goal to deploy world-class ICT infrastructure. NICI II, implemented between 2006 and 2010, focused on the following:



**Figure 4: NICI II Framework**

**1.3.3. NICI III (NICI-2015 Plan)**

*Goal:* To accelerate service development through ICT thereby facilitating sustainable economic competitiveness and ICT contribution to GDP. Figure 5 illustrates the five focus areas of NICI III.

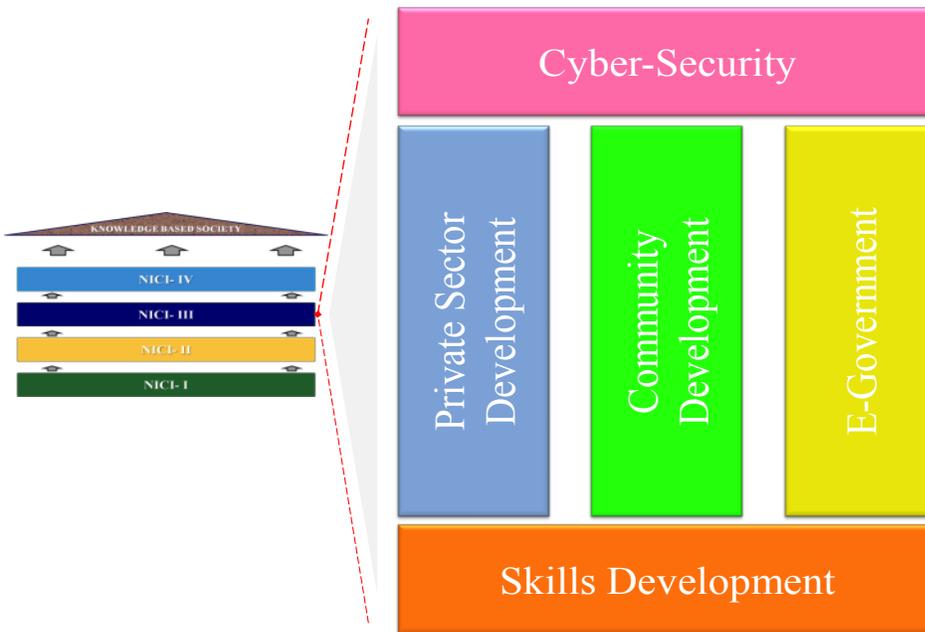


Figure 5: NICI III Framework

#### 1.3.4. NICI IV (NICI - 2020 Plan)

*Goal:* To consolidate the NICI process towards achieving a middle-income country status and an information-rich knowledge-based society and economy.

The fourth plan will complete the NICI process by consolidating the country’s ICT transformation.

#### 1.4. ICT Achievements

Since the beginning of NICI process, Rwanda has made significant progress towards becoming a knowledge-based economy and is now well positioned to become a regional ICT hub that can offer a wide range of competitive ICT products and services. The following achievements have been registered in the country’s priority clusters i.e. economic, social and governance:

##### **Economy**

**Private sector:** ICT initiatives fostering Rwanda’s private sector development include several business and career development support services; online trade information portals; business incubators; online tax calculators; credit reference bureau; a land administration and management information system; electronic case management system; and improvements in online banking and e-transaction regulatory system. These initiatives have greatly improved Rwanda’s business environment. In 2010, Rwanda was the top global reformer in the World Bank’s “Ease of doing business” ranking, moving up from 143<sup>rd</sup> in 2009 to 67<sup>th</sup>, the biggest jump ever recorded by any country. Online business registration was key to Rwanda’s improved ranking in 2011, where it currently ranks 58<sup>th</sup>.

**Agriculture:** ICT initiatives benefiting the agriculture sector include the Agricultural Management Information System (AMIS); an online exchange platform, “e-Soko”, a mobile market information solution that allows farmers and consumers to access market information for



agricultural products. The e-Soko project won the 2011 public service delivery Technology in Government Award (TIGA). A Land Use Management and Information System has been implemented to ensure proper usage, planning and management of land.

**ICT:** Rwanda has registered significant progress in the deployment of world-class ICT infrastructure that is now connecting Rwandans to global networks. The national fiber optic backbone network that is connecting Rwanda to international sea cables will facilitate increased affordability and access to Internet across the country. A national data centre has been developed, which allows Rwanda to centralize her information storage, management and protection, as well as take advantage of cloud computing opportunities. Communication, Navigation Surveillance and Air traffic management system (CNS-ATM) has been deployed, which will greatly transform air travel, not just for Rwanda, but the region at large. Broadcasting masts that are transforming broadcasting nationally have been deployed at Rwanda's highest peak thereby fast tracking Rwanda's migration from analogue to digital. Key achievements in this sector include:

- Enactment of telecom law No. 44/2001 of 30/11/2001 as well as the Law No. 39/2001 of 13/09/2001 establishing the Rwanda Utilities and Regulatory Agency (RURA)
- Liberalization of the telecommunication industry
- Two telecom operators – MTN and TIGO
- Seven Internet service providers (ISPs) – MTN, TIGO, Altech Stream, Rwandatel, ARTEL, ISPA and Value Data Rwanda
- ICT subscriber base increased.<sup>10</sup>
  - Fixed line (19,000 in 2000 to 39,664 in 2010)
  - Mobile (42,000 in 2000 to 3,548,761 in 2010)
  - Internet (1,200 in 2000 to 493,900 in 2010)
- Enactment of intellectual property rights law, Law N° 31/2009 of 26/10/2009
- Enactment of a law governing electronic messages, electronic signatures, electronic transactions; data protection; cyber security and ICT usage in government administrative procedures, Law N° 18/2010 of 12/05/2010
- RURA adopted International Telecommunications Union (ITU) ICT industry standards since its establishment in 2001
- Key ICT Infrastructure deployed including: the National fiber optic backbone; wireless broadband (WIBRO); National Data Centre; Broadcasting infrastructure, communication, navigation and surveillance-air traffic management system
- SMART National ID
- One Laptop per child (56,607 laptops deployed in 113 schools)
- Connection to the international sea cables through Mombasa and Dar-es-Salaam

<sup>10</sup> <http://www.rura.gov.rw/>



## Social

**Education:** GoR has implemented numerous ICT in education initiatives including ICT training for teachers and One Laptop Per Child that are transforming the delivery and quality of education; Science and Technology scholarships that are growing the number of ICT capacity; Schoolnet that aims to improve connectivity and deploy ICT tools in 12-year basic education schools; RwEdNet that is interconnecting Rwanda's institutions of higher learning and linking them to global education and research networks, and the Rwanda Education Commons a one-stop portal for education information. These initiatives are transforming and improving the delivery and quality of education in Rwanda.

**Health:** Numerous ICT initiatives have been implemented in health such as: *OpenMRS* – an open-source medical records system that facilitates nationwide tracking of patient data; *TRACnet* – a system that allows central collection and storage of clinical health information; Mobile e-Health – a system used by community health workers to collect data for OpenMRS and TRACnet systems; Telemedicine – that is connecting King Faisal Hospital to Hospitals in Kabgayi and Musanze facilitating the sharing of clinical information between urban and rural hospitals, and most importantly allowing citizens to receive specialized treatment services remotely without travelling to Kigali. These initiatives are transforming healthcare delivery and helping Rwanda achieve Millennium Development Goals (MDGs) in health, which is earning Rwanda critical acclaim world-wide.

## Governance

**E-Government:** Numerous e-Government initiatives such as the modern and secure National ID and driving license; e-Cabinet; e-Parliament, document tracking and workflow management system; financial management system (FMS) and human resource management system (HRMS) have been or are in the process of being deployed to improve government operations and service delivery to citizens. One of the key tools introduced by the GoR in 2006 to reinforce participation and accountability of local government is performance-based contracts, locally referred to as "*Imihigo*". *Imihigo* is an old cultural practice of Rwanda where an individual would set him/herself targets to be achieved within a specific period of time. Through this approach, local governments and communities set their own priorities and strategies to achieve their goals. Furthermore, hundreds of local government officials and citizens have been trained in ICTs to promote ICT literacy and citizen participation in the country's development. These initiatives will most certainly improve government-to-citizen (G2C) services and facilitate more development in the governance cluster.

### 1.5. Challenges and Opportunities

The principle that guides this strategy is that Rwanda should not only be a consumer of ICT goods and services, but also an active producer and developer of cutting-edge technology and high value services. However, numerous challenges still hinder Rwanda's ICT development. NICI III aims to address these challenges and presents opportunities that Rwanda can take advantage of over the next five years to fast track the achievement of Vision 2020 goals.

**Energy:** Energy access and high costs are a major impediment to Rwanda's industry and services sectors. The country has low per capita electricity consumption relative to the East African Community with only 13% of the population having access to electricity, moreover with power outages. Electricity generation costs are high as well as the feed-in tariff of power that



currently stands at 112 RWF/Kwh for households and RWF 102/kWh for industries, despite GoR subsidizing the utility. Rwanda's electricity costs of \$0.24/Kwh, almost double that of its neighbours. 64% of businesses surveyed in the 2008 business investment climate survey cited access and cost of electricity as a major constraint. As Rwanda strives to increase electricity generation, ICTs can be leveraged to consolidate Rwanda's energy sources in order to enable sustainable energy generation, transmission and distribution through a SMART Electricity Grid and Energy Market Design.

**Limited access to finance:** Lending for ICT companies is constrained by costs and risks arising from several factors, including: lack of adequate collateral, crowding out by government bonds, asymmetrical information (caused in part by limited private credit registries), and inadequate skills to assess and manage risk. Limited lending can also be attributed to Rwanda's low savings rate that currently stands at 8% of GDP. GoR should partner with financial institutions to establish special funding mechanisms to foster ICT industry growth.

**Inadequate international bandwidth:** Rwanda still does not have sufficient international bandwidth. Being landlocked, the country is very dependent on neighboring countries for connectivity, which greatly increases connectivity costs. More importantly, given that ICT is a competitive industry, this dependence could compromise Rwanda's information security and business continuity. This can be remedied through other links to other sea cables such as those from southern Africa as well as satellite back up. Further, a virtual landing point can be established locally where telecommunication providers converge and acquire submarine capacity that can be distributed through their networks.

**Inadequate ICT skills:** Rwanda has insufficient skilled personnel in the ICT field to drive ICT development. As such, more ICT professionals will be trained and developed to increase Rwanda's ICT skills base.

**Low ICT awareness and usage:** Most Rwandans are still not aware of the available ICTs and their benefits. This is largely attributed to the lack of awareness, insufficient content relevant to the general population and limited rural ICT penetration. ICT in education, community development and public awareness initiatives will be implemented to increase ICT awareness among Rwandans.

**Nascent private sector:** Rwanda's private sector, particularly the ICT sector, is relatively small. It is mostly constrained by the high cost of accessing ICTs especially in rural areas, insufficient payment systems and a lack of innovation. Several initiatives will be implemented to foster ICT and ICT-enabled sector development including establishing a Technopole (an advanced ICT park), e-Payment systems, a national access network to increase broadband penetration and Internet affordability among others in order to foster both ICT and ICT-enabled sector growth.

**Inadequate information security:** Rwanda's cyber security needs to be reinforced to mitigate ever-increasing cyber threats. Cyber security awareness will need to be disseminated and public private institutional collaboration strengthened. Furthermore, a strong policy, legal and regulatory framework to ensure cyber security and compliance will be required.

**Limited interoperability of government systems:** Many government systems work in isolation of each other, which creates duplication and inefficient resource management. Most processes are to a large extent paper-based, which creates unnecessary delays. As such ICTs can be leveraged through e-Government initiatives to further improve government operational effectiveness and efficiency, thereby improving service delivery to citizens.

NICI III aims to address the above-mentioned challenges while improving Rwanda's ICT environment and accelerating services development.

## **PART 2: NICI III Focus areas**

*This section highlights the methodology employed in NICI III formulation and provides the rationale, description, mission and objectives for each of the five focus areas.*

### **2.1. Methodology**

NICI III focus areas, objectives and projects were generated through a wide-range of consultations to ensure ownership of the NICI III formulation process and implementation.

The formulation process began by setting up the necessary structure and identification of the following NICI III objectives.

1. ICT to contribute significantly to GDP Growth
2. ICT to run efficient government services
3. ICT to improve business efficiency and productivity
4. ICT to be the foundation for long term and sustainable economic competitiveness (service economy)

This was followed by the identification of challenges hindering the achievement of the above-mentioned objectives and five focus areas that would address the identified challenges.

Stakeholders validated the above objectives and articulated the mission, objectives, goals, and projects for all focus areas. A detailed description of the stakeholders is elaborated in Appendix 3.

### **2.2. Focus Area Rationale and Description**

NICI III focuses on five key areas that capture crosscutting national challenges and provides mechanisms through which Rwanda's ICT vision will be attained. NICI III focus areas are the following:

- Skills Development [**SD**]
- Private Sector Development [**PSD**]
- Community Development [**CD**]
- E-Government [**e-GOV**]
- Cyber Security [**CS**]

#### **2.2.1. Skills Development [SD]**

Rwanda has a shortage both in terms of the quality and quantity of skilled personnel to drive ICT development as well as achieve EDPRS targets to develop required skills for a knowledge-based society. Skills development is a national priority and also a foundation for the achievement of NICI III. This focus area aims to build ICT professional skills and leverage ICTs in education in order to accelerate skills development. The scope of the skills development is two fold; first, build ICT professional skills that will increase innovation in the ICT industry and enable all sectors of the economy and second to leverage ICTs in education.

**Mission:** *“To develop a high quality skills and knowledge base leveraging ICT”*

**Objectives**

**1: (SD-01) Capacity building in ICT**

In order to fully maximize and realize ICT benefits, Rwanda must greatly boost ICT competencies and skills. The capacities of the public and private sector as well as civil society to utilize ICTs must continuously be developed in order to fast track the country’s transformation into a knowledge-based society.

**2: (SD-02) Foster Research & Development (R&D) to spur innovation**

Technological innovation is critical to ICT and economic development. Currently, Rwanda has limited R&D and insufficient institutional capacity to innovate. Investment in science and technology (S&T) and R&D is important in fostering innovation for economic transformation and must be part of a larger framework to build S&T institutional capabilities.

**3: (SD-03) Improve access to education and training through ICT**

Primary, secondary, vocational and tertiary education can be enhanced through ICT education and training tools, e-learning, content development and access to educational resources, in order to foster innovation. Since education delivery involves both government and non-government actors, ICTs can also be leveraged to ensure efficient delivery of informal education.

**2.2.2. Private Sector Development [PSD]**

Entrepreneurship fosters innovation, generates wealth and creates jobs thereby expanding the tax-base and increasing economic development. Achieving Vision 2020 and improving Rwanda’s competitiveness hinges on private sector led development, hence the need to continuously improve the enabling environment to spur growth and realize EDPRS goals of widening and strengthening the financial sector; raising the contribution of services to economic development and building an economic infrastructure. Therefore, a specific focus on growing and strengthening the ICT sector and other ICT enabled sectors is of paramount importance in this plan. This focus area will also help address the national priority of developing viable SMEs. The scope of the private sector development is two fold. First is to develop the ICT sector and second, a competitive and vibrant private sector leveraging ICT.

**Mission:** *“To develop a vibrant, competitive, and innovative ICT / ICT enabled private sector”*

**Objectives**

**1: (PSD-01) Support the development of a competitive ICT sector**

Today, the ICT private sector lacks sufficient capital to start, expand and develop businesses. This is a key obstacle cited by ICT companies, which requires significant attention. In addition, the lack of knowledge and technology transfer and innovation weakens the sector.

## **2: (PSD-02) Foster private sector growth through ICT**

ICT is an enabler of increased productivity and cost reduction. Therefore, leveraging ICTs will greatly empower all key economic sectors i.e. infrastructure, mining, trade and manufacturing, agriculture, energy, tourism, financial services thereby increasing their competitiveness.

## **3: (PSD-03) Increase ICT sector contribution to GDP**

ICT has been identified as a key contributor to Vision 2020 yet its economic contribution to GDP is not currently quantified. Therefore, it is important for ICT GDP contributions to be measured and enumerated to determine impact on economic growth and returns on ICT investments.

### **2.2.3. Community Development [CD]**

Community development is critical to achieving socio-economic development goals. Though broad in scope, in this plan CD is a community-centric approach to the deployment of ICT thereby strengthening and developing communities. Specific focus on CD is imperative to fostering and increasing citizen participation in the country's development. This focus area contributes to the realization of MDGs including poverty alleviation, health, and education. Furthermore it contributes to the achievement of EDPRS goals of building economic infrastructure and improving health status. The scope of community development is three fold. First is to increase ICT access, awareness and usage within communities. Second is to improve citizens' access to information thereby increasing their participation through ICT. Third is to facilitate the provision of basic services (education and health) to communities using ICT.

**Mission: “To empower and transform communities through improved access to information and services”**

### **Objectives**

#### **1: (CD-01) Promote ICT awareness in communities**

A systematic approach to promoting ICT awareness and its benefits is of paramount importance. This will undoubtedly increase utilization, adoption, and ownership of deployed ICTs. Therefore, increased ICT awareness campaigns countrywide, such as the November 2010 National ICT week, newspaper articles, ICT competitions/awards and media campaigns will be necessary.

#### **2: (CD-02) Establish and institutionalize ICT-enhanced systems to increase citizen participation and improve access to services and information**

Citizen participation is at the core of economic development and good governance. ICTs can greatly enhance extensive participation by providing affordable and efficient ways to extend services and information to communities. This will also greatly improve local government transparency and accountability.

### **3: (CD-03) Improve healthcare delivery through ICT**

Healthcare initiatives and services can be more efficiently delivered to Rwandans by leveraging ICTs to improve healthcare access and service delivery for all communities.

#### **2.2.4. e-Government [e-GOV]**

E-Government aims to integrate all government processes such that government operates under a “ONE government” system in order to improve service delivery to citizens/businesses. This focus area ensures sustained improvements in government service provision and delivery by simplifying Government-to-Citizen (G2C) services to continuously improve the social and governance clusters; Government-to-Business (G2B) services to continuously improve the economic cluster, and Government-to-Government (G2G) processes to continuously improve government efficiency. The scope of the e-Government (e-Gov) is three fold. First is to improve both government business processes and communication. Second is to increase citizen participation in the country’s socio-economic development and third is to improve the legal and regulatory environment that enables Rwanda to adapt to emerging technologies.

**Mission:** *“To improve government operational efficiency and service delivery”*

#### **Objectives**

#### **1: (e-Gov-01) Improve communication and reduce barriers to government transactions through ICT**

Barriers to transactions in government slow down public service delivery. Therefore, it is imperative that all government institutions establish the appropriate and effective communication mechanisms and an institutional framework that facilitates this seamless transition.

#### **2: (e-Gov-02) Streamline government business processes using ICT**

Government can be efficient and effective when all business processes are streamlined. The deployment and application of ICTs is the most efficient way to transform processes that foster efficiency and reduce the cost of delivering services in a sustainable manner.

#### **3: (e-Gov-03) Increase transparency and accountability in government processes through ICT**

Transparency and accountability are key indicators of good governance. Therefore, it is critical that government is more responsive to citizen needs by leveraging ICTs in order to improve and increase transparency and accountability.

#### **4: (e-Gov-04) Foster a conducive legal and regulatory environment to allow easy adaptation to emerging technologies**

ICTs are constantly evolving. Therefore, it is imperative that the ICT legal and regulatory environment is flexible to ensure easy adaptation to technological changes and that Rwanda seizes new technology opportunities.

## 2.2.5. Cyber Security [CS]

Cyber security is at the core of a knowledge-based society and as such must be a national priority. It ensures secure management of all deployed ICT assets that support all facets of Rwanda's ICT goals. To fully realize ICT benefits, there must be full confidence that information and communication systems are secure and dependable. The Internet exposes Rwandans to global networks, which are prone to advanced and repeated cyber-attacks. Therefore, Rwanda must continue investing in IT and information security to ensure the protection and integrity of national information and ICT assets. The scope of cyber security is three fold. First is to increase the level of cyber security awareness and protect key ICT assets against attacks. Second is to build local capabilities to respond to attacks as well as foster international cooperation on cyber security. Third is to create a legal and regulatory environment to mitigate cyber vulnerabilities.

**Mission:** *“To secure Rwanda’s cyberspace and information assets”*

### Objectives

#### **1: (CS-01) Develop cyber security awareness**

Rwanda's ICT infrastructure demands that every Rwandan participate in safeguarding it. Cyber attacks can come in the form of virus-infested hardware or casual access to malicious sites that cause serious harm to the country's critical infrastructure. Therefore, to fully safeguard ICT infrastructure assets, all Rwandans must learn about ICT security, which requires due diligence.

#### **2: (CS-02) Build Cyber-security capabilities**

Building appropriate cyber security capabilities is critical to ensuring that Rwanda possesses adequate and relevant capacity to counter any attacks. While ICT infrastructure is protected by built in state-of-the-art security technology and solutions, it is extremely important that Rwanda builds national capacity to safeguard ICT assets, as built in protection is not sufficient and sustainable.

#### **3: (CS-03) Ensure Rwanda’s critical infrastructure and systems protection from cyber attacks**

Rwanda built state-of-the-art ICT infrastructure during NICI II. However, impending attacks on the country are of grave concern and pose real and credible threats to deployed assets. Therefore, it is imperative that there is adequate planning to ensure mechanisms are in place to counter or mitigate future threats.

#### **4: (CS-04) Foster national and international cooperation to handle cyber crimes and threats**

Cyber attacks are increasingly global in nature and as such, it is no longer feasible or appropriate to simply handle them at a national level. Therefore, global cooperation and collaboration to safeguard interdependent infrastructure and mitigate the effects of cyber attacks is increasingly necessary.

**5: (CS-05) Improve legal and regulatory environment to ensure and support cyber security**

A conducive legal and regulatory environment compliments this initiative to ensure efficient protection of cyber infrastructure. It is important that Rwanda puts in place an adequate legal and regulatory framework to support deployed and changing cyber security measures.

## **PART 3: NICI III Projects 2011-2013**

*This section elaborates projects by outlining the purpose and description, activities, expected outcome and outcome indicators for each project. The projects in this section will be implemented in the first two years of the NICI III plan (FY 2011 and FY 2012).*

### **3.1. Introduction**

This part consists of proposed projects to be implemented in the first two years of NICI III. Some projects are rolled over from NICI II because they were either not implemented or require continuous improvement. As previously mentioned, NICI III projects will have annual/biennial cycles to facilitate adaptation to socio-economic changes and emerging technologies. It will also ensure that specific outcomes are realized and continuous alignment to overall NICI III goals.

Projects are organized in their respective focus areas and the following details provided for each:

- Project Name
- Project Purpose
- Project Description
- Project Activities
- Expected Outcome
- Outcome Indicators

Each project is fully detailed in the project profile documents with specific information on implementation and supporting agencies, indicators, socio-economic impact, timelines and potential financing sources. A sample of a project profile document is attached in Appendix 2.

### **3.2. Focus Area Projects**

#### **3.2.1. Skills Development [SD] Projects**

**Mission: *“To develop a high quality skills and knowledge base leveraging ICT”***

To realize this mission and keep Rwanda’s ICT development relevant to changing national and global trends, the following projects were chosen to build ICT professional skills and integrate ICT in both formal and non-formal education:

- SD project 1: ICT Professional Training and Certification Programs
- SD Project 2: SchoolNet
- SD Project 3: ICT Training for Teachers
- SD project 4: Rwanda Education and Research Network (RwEdNet)
- SD project 5: Open, Distance and e-Learning (ODEL)
- SD Project 6: Digital Library

Figure 6, illustrates skills development projects and how they work together to achieve the SD mission. EDUNet is aimed at providing ICT infrastructure and connectivity for all educational levels and is the foundation for successful implementation of projects within this focus area.



**Mission:** To develop a high quality skills and knowledge base leveraging ICT

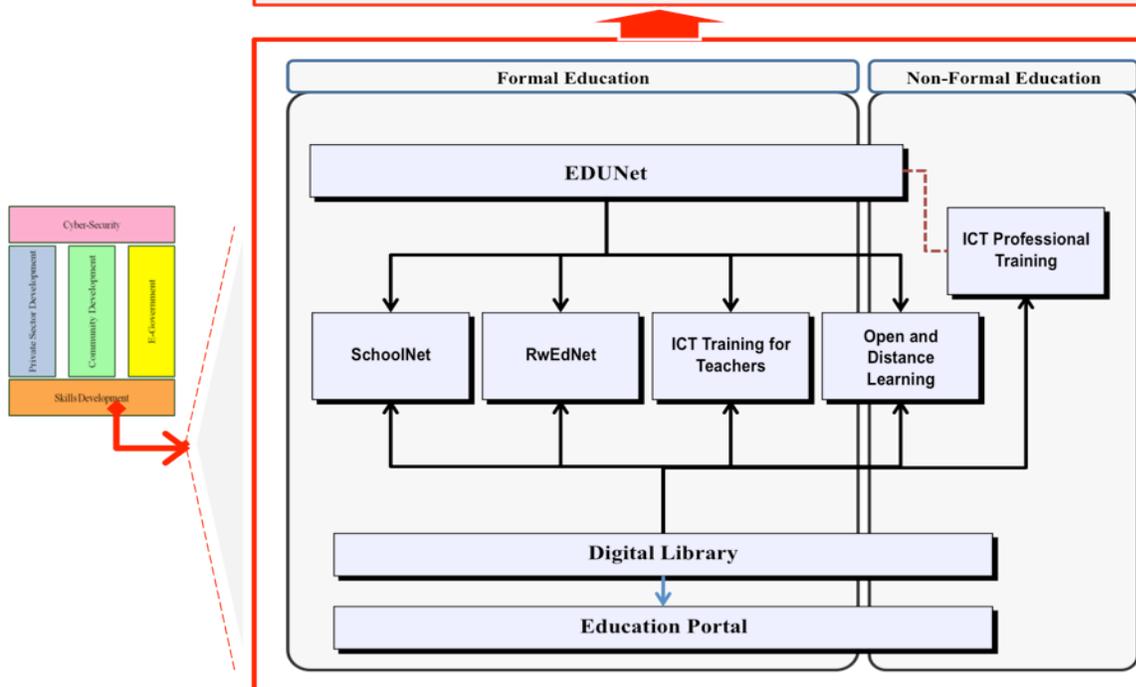


Figure 6: Skills Development Projects

### SD Project 1: ICT Professional Training and Certification Programs

**Purpose:** To continuously develop a competent and relevant ICT professional base that meets international and industry needs in order to accelerate Rwanda's ICT development

#### Description:

Rwanda has a dearth of skills needed to drive ICT development. The private sector identified the lack of adequate ICT skills and the cost of professional ICT training/certification as key challenges. Graduating students for the most part do not have hands-on training that meets industry needs thus requiring significant financial resources to train them. Given that the private sector is young and has limited capital, it is imperative that government provides the necessary support to enable the ICT sector acquire relevant skills. Therefore, in order to fast track Rwanda's ICT development and transformation into a knowledge-based economy, there must be programs designed to train ICT personnel and campaigns to attract more Rwandans in the field of ICT, particularly Technical, Vocational Education and Training (TVET) Institutions. Institutions of higher learning such as TVET and Universities as well as the private sector can collaborate to ensure the development of industry specific skills. This project aims to increase home grown ICT expertise that meets national, regional, and global ICT needs.

#### Activities:

1. Conduct ICT skills assessment
2. Incorporate ICT Professional certification courses in the teaching curriculum for institutions of higher learning
3. Develop an ICT training programme to subsidize specialized training for Rwandan ICT professionals
4. Enforce public servant ICT certification



5. Coordination of ICT capacity building in public and private sector to ensure industry alignment

**Expected Outcome:**

1. Increased number of ICT certified Rwandans
2. Increased skilled and competitive ICT human resource base
3. Increased innovation and job creation
4. Increased number of globally competitive Rwandan ICT professionals
5. Rwanda positioned as a regional provider of professional certification programs

**Outcome Indicators:**

1. All ICT Professionals in Rwanda registered with RDB (LMIS) by 2012
2. 50% of registered ICT professionals, internationally certified and accredited by 2013
3. 50% of ICT companies internationally certified by leading ICT industry companies by 2013

**SD Program: EDUNet**

**Purpose:** To increase ICT usage at all educational levels

**Description:**

The EDUNet program aims to provide ICT infrastructure and connectivity for all educational levels. It integrates several ICT in education projects for primary, secondary, tertiary institutions and non-formal education.

**SD Project 2: SchoolNet**

**Purpose:** To increase ICT usage in 12-year basic education (YBE) schools thereby enhancing teaching and learning through ICT

**Description:**

Most schools do not have reliable connectivity due to electricity problems and high Internet costs. This is project, rolled-over from NICI II, aims to provide connectivity in all schools further bridging the urban-rural digital divide, and enhancing teaching and learning through the use of technology tools and promoting universal computer literacy in Rwanda's schools. It builds on the numerous ICT in education initiatives such as One Laptop per Child (OLPC) project and aims to ensure that all primary school students have access to ICT. To date 110,000 laptops have been imported of which 56,000 laptops were distributed to primary 4-6 kids in 113 primary schools countrywide. However, numerous challenges still impede ICT advancement in primary schools. In 2010, only 13% of primary schools had electricity and 88% of primary schools accessed telephone services through headmasters' mobile phones. Other challenges include inadequate technical support and insufficient resources to meet the demand. Therefore, it is necessary for Rwanda to adopt strategies that ensure resources are maximized in order to realize ICT goals.

**Activities:**

1. Enhance and promote ICT utilization in the teaching and learning process with a particular focus on technical education
2. Provide ICT infrastructure and connectivity to all schools
3. Increase availability of quality ICT technical support for schools



4. Establish mechanism to recycle and refurbish old computers and other ICT hardware
5. Teacher training in basic ICT skills

#### **Expected Outcome:**

1. Appropriate ICT teaching tools available in 12-year basic education (12-YBE) schools
2. ICT infrastructure and connectivity deployed in 12-YBE schools
3. Adequate technical support provided for all 12-YBE schools
4. Cost savings as a result of using refurbished equipment
5. Increased access and usage of ICTs in schools
6. Improved skills and learning capabilities

#### **Outcome Indicators:**

1. 50% of 12-YBE schools equipped with ICTs by 2013
2. 50% teachers using ICTs in teaching by 2013

### **SD Project 3: ICT Training for Teachers**

**Purpose:** To develop teacher capabilities in and through ICT

#### **Description:**

ICTs can be leveraged as effective educational tools. Training teachers in ICTs will increase their resource base and improve education delivery, hence the need to institutionalize ICT usage and training for all teachers. Teacher ICT literacy in primary and secondary schools increased from 17% to 52% in primary schools and from 25% to 51% in secondary schools between 2006 and 2010, respectively. In technical and vocational schools, that rate increased from 31% to 50% in the same period. This project is aimed at developing ICT literacy and ICT pedagogy in teaching and learning, by training teachers in basic ICT and leveraging ICT as a tool to enable teaching and learning.

#### **Activities:**

1. Develop national teacher training strategy
2. Facilitate acquisition of ICT tools for teacher through schemes such as loans/subsidies
3. Train teachers in utilization of ICTs
4. ICT awareness campaign and sensitization in schools

#### **Expected Outcome:**

1. Increased on-line content for teacher training and ICT skills acquisition
2. Increased understanding and utilization of ICT education tools by teachers
3. Improved education delivery
4. Increased capacities of teachers and students

#### **Outcome Indicators:**

1. Teacher training strategy developed and implemented by December 2011
2. Number of teachers with ICT skills
3. Number of on-line content for teacher training and skills acquisition
4. 50% of teachers trained in ICTs by 2013
5. A minimum of 5 hours per week ICT classroom usage by 2013



## SD Project 4: Rwanda Education and Research Network (RwEdNet)

**Purpose:** To enhance teaching, learning and research in Institutions of Higher Learning

### Description:

RwEdNet, a NICI II rolled-over project, is aimed at creating a dedicated cost-effective network that connects institutions of higher learning to global research and education networks. The pilot connecting King Faisal hospital, CHUK and KIST to the network was successfully implemented. This project aims to scale up RwEdNet to all institutions of higher learning.

### Activities:

1. Deploy the appropriate infrastructure in all institutions
2. Increase broadband connectivity to all institutions
3. Strengthen industry, government and academia collaboration, particularly R&D
4. Support acquisition of ICT skills within institutions

### Expected Outcome:

1. Increased access to global research and education networks
2. Increased research and development capabilities of local institutions
3. Increased student capacities i.e. skills and knowledge thereby becoming globally competitive
4. Increased innovation and entrepreneurship

### Outcome Indicators:

1. All institutions equipped with ICTs by 2013
2. All lecturers using ICTs to teach by 2013
3. Number of publications and innovations produced by institutions

## SD Project 5: Open, Distance and e-Learning (ODEL)

**Purpose:** To increase access to education through Open, Distance and e-Learning (ODEL) programmes

### Description:

This project aims to leverage ICTs in order to provide second chance educational opportunities to all citizens through Open, Distance and e-Learning (ODEL) programmes that further improve the quality of education in Rwanda.

### Activities:

1. Develop and implement ODEL institutional framework for formal and informal education
2. Conduct ODEL training for teachers, subject tutors, centre coordinators, provincial learner support officers, and other relevant personnel
3. Establish ODEL infrastructure including provincial learner support centres
4. Administer ODEL programme in all districts
5. Increase awareness and sensitization around this initiative

### Expected Outcome:

1. Increased access to quality education
2. Increased education opportunities for citizens



3. Increased number of skilled labour force

**Outcome Indicators:**

1. 5 (All provinces) ODEL regional centres of excellence established by 2013
2. 100 trained and qualified ODEL instructors by 2013
3. Annual output of 10,000 ODEL graduates by 2013

**SD Project 6: Digital Library**

**Purpose:** To increase access to information for educational institutions and the general public

**Description:**

This project aims to build repositories of books, papers, theses, images, sound files and videos organised in electronic form made available for educational institutions and the general public.

**Activities:**

1. MINEDUC, academia and private sector to identify and gather all locally available information that should be digitized
2. Acquisition of appropriate digitizing tools
3. Digitization and publishing of all curricula and education materials
4. Purchase digital books
5. Link to leading higher learning institutions, research think tanks and other institutions
6. Create micro-publishing and content distribution mechanisms around the country
7. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. All national education materials available online by 2013
2. Increased student and civil society capabilities
3. Increased availability of online local content
4. Increased teachers capacities

**Outcome Indicators:**

1. Digital Library fully operational by 2013
2. 100% of education content available online by 2013
3. All learning institutions connected to the Digital Library by 2013

### 3.2.2. Private Sector Development [PSD] Projects

**Mission: “To develop a vibrant, competitive, and innovative ICT / ICT enabled private sector”**

To realize this mission and keep Rwanda’s private sector relevant to changing national and global trends, the following projects were chosen:

- PSD Project 1: Establish a Technopole
- PSD Project 2: e-Payment Systems
- PSD Project 3: Tourism Portal
- PSD Project 4: ICT Business Financing Mechanisms
- PSD Project 5: Virtual Landing Point
- PSD Project 6: Access Network
- PSD Project 7: e-Soko 2.0
- PSD Project 8: SMART Electricity Grid and Energy Market Design
- PSD Project 9: Establish a Commodity and Securities Platform
- PSD Project 10: Adoption of ICT Industry Standards

Figure 7 illustrates private sector development projects and how they work together to achieve the PSD mission. A vibrant ICT sector is a pre-requisite for other sectors to develop. The ICT enabled private sector illustrates specific ICT initiatives that will improve Rwanda’s private sector competitiveness.

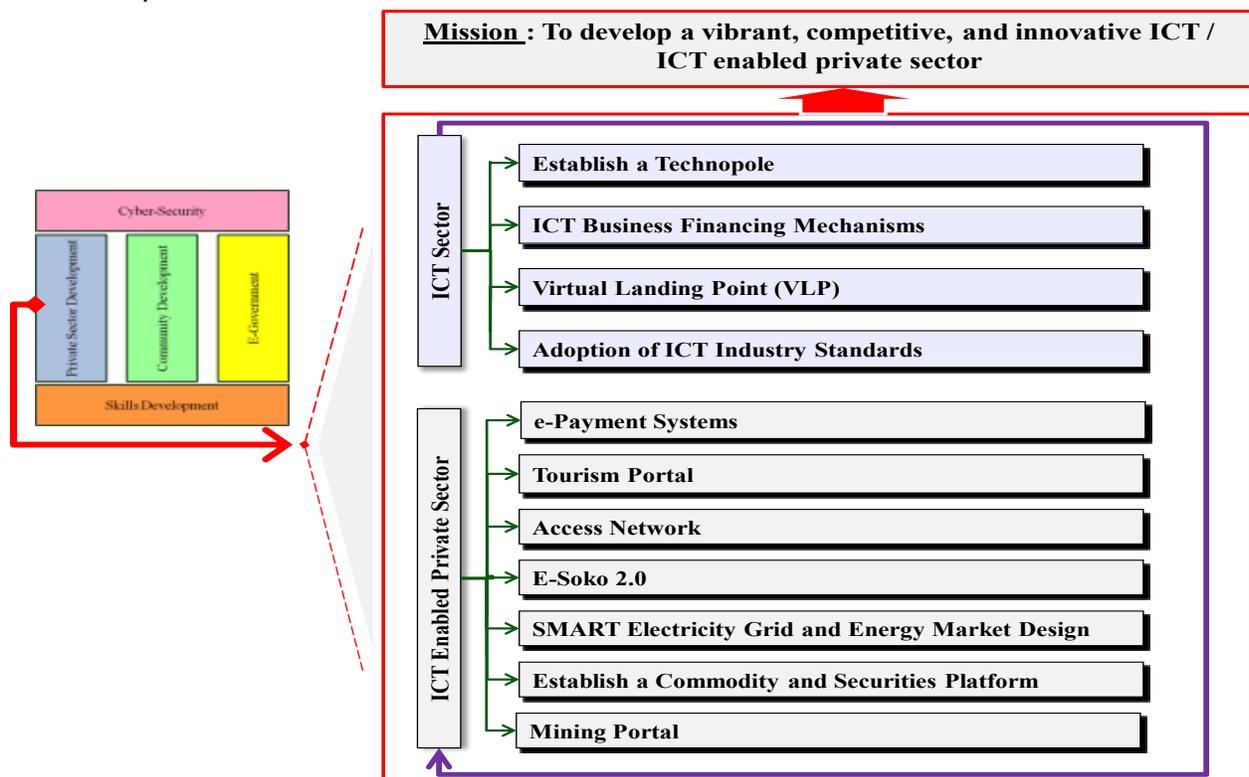


Figure 7: Private Sector Development Projects



## PSD Project 1: Establish a Technopole

**Purpose:** To consolidate and accelerate the development of Rwanda's ICT industry

### **Description:**

ICT can diversify jobs beyond agriculture, provide new middle-income jobs, drive the development of SMEs and increase product and service innovation. Key enablers for the ICT industry are 1) ICT infrastructure 2) a steady energy supply and 3) skilled human capital. Whilst Rwanda's ICT infrastructure is well developed, significant challenges continue to be the dearth of ICT skills, language (English and French) and business/entrepreneurship skills, and continued infrastructural deficiencies in energy. The technopole will be a large scale ICT Park designed around the above-mentioned challenges by providing much needed infrastructural improvements including guaranteed electricity and infrastructure for companies within the park. It will be the basis of an ICT eco-system that provides ICT firms with ready-access to world-class infrastructure hence facilitating Rwanda's entry into developing new and emerging ICT products and services.

### **Activities:**

1. Conduct feasibility studies
2. Develop the technopole master plan
3. Establish S&T incubation facilities and R&D incentives to foster innovation
4. Improve R&D capabilities in higher learning institutions and link S&T Research in institutions of higher learning to the technopole
5. Target top global ICT firms to be anchor investors as well as other investors
6. Mobilize existing ICT sector
7. Develop and implement annual regional ICT awards

### **Expected Outcome:**

1. SME development
2. R&D capabilities of institutions of higher learning improved
3. Increased investments in the ICT and job creation
4. One stop centre for ICT start ups and increased innovation in ICT
5. Position Rwanda as a regional ICT hub
6. Development of highly-skilled ICT professionals
7. Increased innovation in Rwanda and the region
8. Increased regional collaboration
9. Increased ICT exports

### **Outcome Indicators**

1. Feasibility studies and Master plan complete by end of FY 2011
2. Incubation and R&D facilities and incentives established by 2012
3. 1<sup>st</sup> Regional ICT Awards held by 2013
4. 50 ICT companies operating in the Technopole by 2015
5. 50 ICT intellectual property registered annually by 2015
6. ICT sector contributing to 15% of the economy by 2015



## PSD Project 2: e-Payment Systems

**Purpose:** To simplify business transactions in Rwanda

**Description:**

This project aims to put in place e-payment mechanism to support online transactions thereby fostering e-Commerce. E-Commerce, the online buying and selling of goods and services, is a missing component of the Rwandan business environment, which is mostly cash-based. Key prerequisites for e-Commerce including the electronic transaction and signature law, copyright and intellectual property rights law, an e-Payment policy and mobile payments currently exist in Rwanda and have laid a foundation for e-Commerce. However, the lack of adequate infrastructure; wariness of business and consumers to conduct business electronically; security concerns and lack of awareness hinder the adoption and usage of electronic payments. This project also aims to address these challenges.

**Activities:**

1. Develop and implement cash electronification mechanism
2. Harmonize regulations with regional and international operators to facilitate mobile money banking
3. Develop implementation matrix to accelerate the deployment of mobile money access points across the country
4. Build capacity of mobile banking resellers
5. Establish incentives to stimulate e-Payments usage
6. Conduct financial literacy campaigns

**Expected Outcome:**

1. Improved efficiency in business transactions
2. Increased ICT usage and penetration
3. Reduced transaction costs
4. Increased financial access and inclusion
5. Foster entrepreneurship and innovation

**Outcome Indicators:**

1. 50% of all GoR transactions conducted online by 2013
2. Reduction of cash in circulation
3. Reach of financial literacy

## PSD Project 3: Tourism Portal

**Purpose:** To simplify access to tourism information and facilitate online transactions thereby improving Rwanda's tourism experience

**Description:**

RDB and Rwanda Tour and Travel Association (RTTA) currently have online presence and host tourism players such as hotels, restaurants, tour companies etc. However, online transactions are still non-existent. Transactional websites are key and central to the tourism sector and overall



services development. This project aims to build on the existing platforms by establishing a destination management system that allows online transactions and provides detailed contacts of all tourism players to enable new and cost-effective ways of doing business such as the online purchase of gorilla and park permits, thereby facilitating customer base expansion.

**Activities:**

1. Develop and implement an e-Tourism strategy
2. Establish a destination management system that adopts a PPP approach for the management of the system

**Expected Outcome:**

1. Increased revenue generation in the tourism sector
2. Increased quality and efficiency of tourism service delivery
3. Increased adoption of ICTs within the tourism sector
4. Increased tourism sector competitiveness

**Outcome Indicators:**

1. A destination management system established by 2013
2. Number of tourism online transactions by 2013
3. Number of portal users by 2013

## PSD Project 4: ICT Business Financing Mechanisms

**Purpose:** To establish affordable funding mechanisms for ICT companies

**Description:**

This project will establish viable financing mechanisms for ICT companies to address the financing gap they face at different growth stages. Three funding mechanisms will be established including: *Project Finance*, *Trade Finance* and *Venture Finance*. Project financing will mainly focus on providing funds for ICT start-ups through incubations and Grant awards; while trade financing will mainly target established ICT companies in need of capital to implement specific contracts by setting up a guarantee fund; and finally venture finance will mainly fund heavy investment projects.

**Activities:**

1. Develop the regulatory framework for the three funding mechanisms (Project Finance, Trade Finance and Venture Finance)
2. Seek seed/guarantee funding for ICT SMEs
3. Training of ICT entrepreneurs in business planning and management
4. Increase awareness and sensitization for intellectual property rights

**Expected Outcome:**

1. Increased investments in ICT sector
2. Appropriate and sufficient funding mechanisms available for ICT companies
3. Development of competitive ICT companies
4. Increased ICT export potential



### **Outcome Indicators:**

1. Number of ICT funding mechanisms
2. Number of companies receiving funding from established mechanisms
3. Number of ICT companies in the country by 2013

## **PSD Project 5: Virtual Landing Point**

**Purpose:** To increase Rwanda's international capacity and eliminate additional costs of acquiring international capacity for operators

### **Description:**

A Virtual Landing Point (VLP) is a central location where telecommunication providers can meet and acquire submarine bandwidth capacity to distribute through their networks. Countries bordering the sea generally construct fiber cable landing stations. Being a landlocked country, Rwanda cannot construct such a facility. However, a virtual instance of the same is possible and would be the point of choice for all international link providers to terminate their networks and deliver their services to local network providers. Coupling the VLP with the existing local Internet Exchange Point (IXP) is efficient since operators' networks are already reaching the IXP thereby eliminating additional costs of acquiring international capacity.

### **Activities:**

1. Prepare VLP site
2. Acquire and install VLP hardware (Racks, Routers, Switches, Servers, Transmission equipment) and software

### **Expected Outcome:**

1. VLP fully operational by 2013
2. Low throughput from VLP to end users
3. Simplified international capacity acquisition for telecommunication providers
4. Reduction in cost of Internet and a boost in ISP industry

### **Outcome Indicators:**

1. 50% reduction in wholesale bandwidth costs
2. 99.5% reliability and availability of bandwidth by 2013

## **PSD Project 6: Access Network**

**Purpose:** To extend Internet access across the country in order to bridge Rwanda's digital divide

### **Description:**

The national fiber optic backbone network has been completed and is available in all 30 districts. However, not all end-users i.e. schools, hospitals, government offices, commercial buildings etc. are centrally located in districts. This project aims to bridge the gap between the backbone nodes and end-user premises by means of wireless or fiber. In doing so, it is expected that all telecommunication providers will expand their customer base using the same access points thereby increasing their revenue streams while transforming businesses and lives across Rwanda.



**Activities:**

1. Map all target end-user locations and analyze infrastructure readiness
2. Provide and roll out broadband infrastructure
3. Develop and implement network strategy with the appropriate business model
4. Develop and implement a broadband policy
5. Adopt and enforce infrastructure sharing policy

**Expected Outcome:**

1. Increased broadband penetration and Internet service access
2. Fostering an information culture
3. Increased private sector productivity
4. Realisation of a smart government structure with high transparency and productivity
5. Increased usage of new technologies
6. Increased innovation
7. ICT sector growth

**Outcome Indicators:**

1. 25% of target institutions connected by 2012
2. 50% of target institutions connected by 2013

## PSD Project 7: e-Soko 2.0

**Purpose:** To provide sufficient agriculture information to both producers (farmers, cooperatives) and consumers (Individual consumer, hotels and restaurants, agri-business)

**Description:**

E-Soko 2.0 aims to build on the existing e-Soko platform by upgrading the system to link both demand and supply aspects of the agriculture sector and provide the price, quantities and location of agriculture commodities. It aims to increase web-based platforms that help farmers and citizens alike share local innovations for growing crops. This project aims to exploit the existing infrastructure such as mobile phones, radios, telecenters, Internet cafes to enable consumers be aware of current market prices, quantities and location of commodities and allow suppliers (farmers, agricultural cooperatives, importers) to inform their market prices, quantities and location of produce.

**Activities:**

1. Develop and implement the e-Soko 2.0 platform
2. Train and coordinate local content and application developers to foster innovation in the agriculture sector
3. E-Soko 2.0 awareness campaign

**Expected Outcome:**

1. Increase innovation and competition in the agriculture sector
2. Increased access to agricultural product information
3. Increased productivity, availability and cost reduction of agriculture products
4. Increased availability of locally relevant content

**Outcome Indicators:**

1. E-Soko 2.0 established and operational by 2013



2. E-Soko 2.0 number of users
3. Number of local innovations in the agriculture sector

### PSD Project 8: SMART Electricity Grid and Energy Market Design

**Purpose:** To consolidate Rwanda's energy sources in order to enable sustainable energy generation, transmission and distribution

**Description:**

A smart grid is an electricity network that utilizes digital technology to ensure consistent power supply. This is a reliable, cost-effective and integrated energy supply system that facilitates fault identification, demand management and diversified energy generation sources. Developing a local smart grid will provide an interconnection standard for the East African Power Pool (EAPP) that can accommodate future technologies and transit from current legacy systems.

**Activities:**

1. Conduct feasibility study
2. Develop blueprint for Smart Grid
3. Conduct awareness campaign
4. Piloting the project for buildings
5. Piloting the project for decentralized systems (off grid)
6. Piloting the project for Micro grid with one centre
7. Piloting the project for energy billing system

**Expected Outcome:**

1. Reduced power shortages and improved fault identification over the grid
2. Increased quality of service both in demand management and energy supply
3. Innovative solutions for future energy mix
4. Increased investments in green energy
5. Establish data and broadband transmission over the grid
6. Electrical market and asset optimization
7. Efficient network operation

**Outcome Indicators:**

1. 30% of Rwandan households aware of smart-grid induced energy efficiency by 2013
2. 10 Megawatt produced in the SMART Grid
3. Only 0.5 Megawatt loss in the Grid

### PSD Project 9: Establish a Commodity and Securities Platform

**Purpose:** To enable efficient and effective online trading of both commodities and securities

**Description:**

A commodity-trading platform is an online tool where products are commoditized and traded in an organized and transparent trading environment. This involves the trading of such instruments as warehousing receipts. The warehousing receipts are traded as securities representing ownership of goods or commodities that are stored in a known warehouse.



A securities-trading platform is an electronic based facility where shares, bonds and derivatives will be traded. The platform links buyers and sellers of either commodities or securities and facilitates fast, efficient, and transparent transactions in order to ease access to the markets by investors.

**Activities:**

1. Develop a policy and regulatory framework for an online commodity exchange
2. Develop and implement the commodity exchange platform
3. Develop and implement the securities exchange platform
4. Develop and implement a market information system for key commodities
5. Increase awareness and sensitization on utilizing this platform

**Expected Outcome:**

1. Secure and fast online trading of both commodities and securities
2. Increase the number of commodity and securities transactions
3. Expand and increase access to finance and capital formation
4. Increased liquidity and access to capital
5. Effective credit and cash flows monitoring
6. Improved transport and logistics
7. Guaranteed product quality
8. Efficient disputes arbitration
9. Efficient compensation for defaults
10. Standardized grading of contracts

**Outcome Indicators:**

1. Number of companies listed on platform
2. Number of daily stocks and commodities transactions
3. Monthly value of transaction of stocks and commodities
4. Number of companies procuring capital from the platform

## PSD Project 10: Adoption of ICT Industry Standards

**Purpose:** To align Rwanda's ICT sector to international best practices and standards

**Description:**

Rwanda needs to adopt ICT industry standards that are based on international best practices and standards. These foster interoperability of ICT products/services, promote innovation and efficiency, fuel market growth and protect investments in new technologies. They encompass the entire ICT industry ranging from acquisition/maintenance/disposal of ICT products & services, software development, hardware interface, intellectual property rights and industry specifications.

**Activities:**

1. Develop and establish ICT standards aligned with international standards
2. Improve existing regulatory framework to ensure adoption of ICT industry standards
3. Align training and academic curricula to established ICT standards
4. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. Rwanda ICT standards complying with international standards by 2013

2. Adoption of ICT standards by all Rwanda ICT institutions by 2013
3. Increased success rate of ICT projects

**Outcome Indicators:**

1. All ICT job qualifications aligned to international standards by 2013
2. All ICT firms meeting international and national qualifications by 2013
3. All ICT firms certified by at least one internationally recognized IT player by 2013

### 3.2.3. Community Development [CD] Projects

**Mission:** *“To empower and transform communities through improved access to information and services”*

To realize this mission and ensure that Rwanda’s ICT development is continuously relevant to community needs, the following projects were chosen:

- CD Project 1: Land Use Management and Information System
- CD Project 2: Business Delivery Service Centres
- CD Project 3: ICT Infrastructure and Applications for Local Government
- CD Project 4: Integrated Public Safety Communication System
- CD Project 5: Community Health Worker Reporting and Information System
- CD Project 6: Health Insurance Information System
- CD Project 7: Telemedicine
- CD Project 8: Vision 2020 e-Citizen

Figure 8, illustrates community development projects and how they work together to achieve the focus area’s mission. The Access Network and ICT infrastructure for local government are the backbone for the successful implementation of these projects.

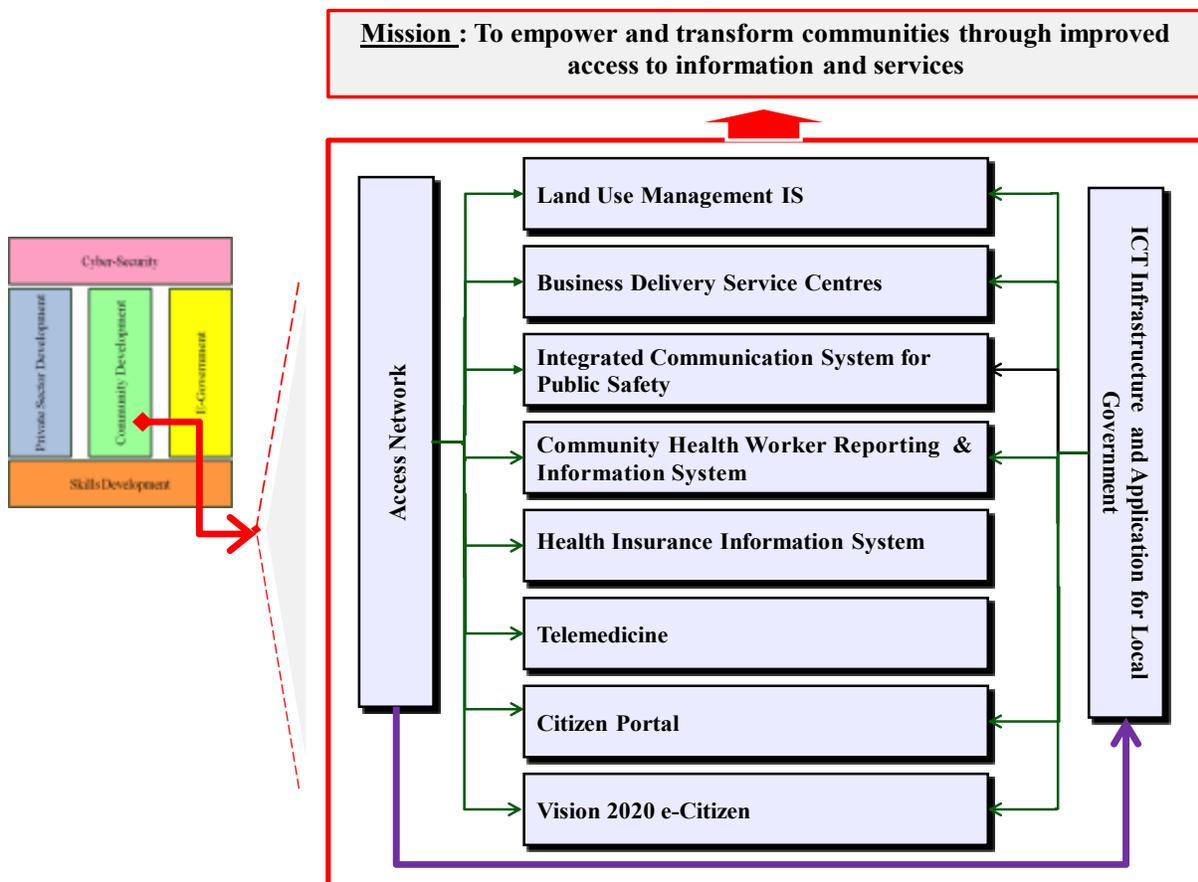


Figure 8: Community Development Projects



## CD Project 1: Land Administration Information System (LAIS)

**Purpose:** To improve land management and ease the cost of doing business

### Description:

A national land use study has been conducted and several reforms adopted including the Land Act; the Land Commission; geographic information system (GIS); a national land use master plan; a National Land Centre established to oversee land administration services and digitization of land titling is near completion. In addition, a pilot land use management and information system and land tenure administration system has been implemented in Kigali and needs to be scaled up nationally. This is a NICI II rolled over project aimed at easing land use planning and administration and streamlining land management processes thereby reducing the cost of doing business.

### Activities:

1. Expand LUMIS countrywide
2. Develop and implement interface between districts and National Land Center
3. Increase awareness and sensitization around this initiative

### Expected Outcome:

1. Improved land management
2. Reduced cost of doing business

### Outcome Indicators:

1. LAIS fully operational country-wide by 2013
2. Reduction of land registration costs
3. Reduction in time taken to process title deeds by 100% in 2015
4. Reduced cases of multiple property claims/ownership to less than 5% by 2015
5. Number of property disputes reduced to less than 5% by 2015

## CD Project 2: Business Delivery Service Centres

**Purpose:** To increase access to ICT and business development services within communities

### Description

Local entrepreneurs can take the lead in establishing business development service centers (BDSC) to foster entrepreneurship around the country. Government, rather than spend millions to do this, can support local entrepreneurs to establish BDSC such as multipurpose cyber cafés/ business centres. This support can include business, financial, legal, and technical services to communities. The centres can provide a wide range of services, such as business incubation, IT services, postal services, training, etc

### Activities:

1. Develop and implement a public private partnership model to accelerate the establishment of BDSC
2. Conduct public awareness campaigns on BDSC

**Expected Outcome:**

1. Increased access to services across the country
2. Job creation
3. Fostering entrepreneurship

**Outcome Indicators:**

1. 200 business service delivery centers established by 2013
2. 600 new jobs created by 2013
3. 50% of public services offered through the business service delivery centers by 2013

### CD Project 3: ICT Infrastructure and Applications for Local Government

**Purpose:** To improve local government operational efficiency

**Description:**

The Ministry of Local Government (MINALOC) identified the lack of sufficient ICT infrastructure and applications, particularly in districts, sectors and cells in rural areas, as a major impediment to efficient service delivery, resulting into high costs of doing business for government, citizens and businesses. This project is designed to deploy sufficient and reliable ICT infrastructure and the appropriate applications that will improve and increase access to services and information across the country thereby eliminating barriers to transactions in government.

**Activities:**

1. Deploy the appropriate ICT infrastructure and applications in all local government offices including local and wide area networks, bandwidth, computers, VoIP, video conferencing facilities and other hardware
2. Train local government staff in utilizing deployed technologies

**Expected Outcome:**

1. Increased efficiency of local government
2. Improved service delivery

**Outcome Indicator:**

1. All local government offices equipped with the appropriate ICT infrastructure and applications by 2013

### CD Project 4: Integrated Public Safety Communication System

**Purpose:** To enhance public safety capabilities in order to better respond security/safety incidents

**Description:**

This project aims to improve the communication within public safety agencies to ensure swift response to citizen needs and public safety incidents. It requires building a communication and information sharing facility where all incidents can be monitored, filtered and rapidly sent to appropriate incident response agents.

**Activities:**

1. Establish a police command and control centre
2. Develop an integrated system that will enable information sharing
3. Develop an integrated communications facility
4. Develop law enforcement information systems that includes a crime management system, traffic records management system and public safety automatic vehicle location solution
5. Develop and improve law enforcement ICT capabilities
6. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. Improve public safety, efficiency and effectiveness of law enforcement
2. Facilitate communication and information sharing between law enforcement agencies
3. Accurate and reliable operations
4. Increase confidence in law-enforcement

**Outcome Indicators:**

1. Public Safety Communication System operational by 2013
2. Response to citizen public safety needs
3. Number of users of the system
4. e-Readiness of stakeholders to exchange data using the public safety integrated communication system.

## CD Project 5: Community Health Worker Reporting and Information System

**Purpose:** To improve community health workers' reporting and information sharing

**Description:**

There are numerous healthcare interventions offered at the community level, mainly by community health workers. Currently there are approximately 60,000 health workers, four per village (umudugudu), who collect and report maternal and child health data among other MDG indicators. Although every health worker is equipped with a mobile phone and RapidSMS and mUbuguzima is operational in few parts of the country, most reporting remains paper-based. This delays reporting and data collection, hence the need for automation.

**Activities:**

1. RapidSMS and mUbuguzima training for all community health workers
2. Improve connectivity for all hospitals and health centers RapidSMS and mUbuguzima systems
3. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. Improved case management (patient or client forms, records and registers)
2. Improved community health workers' services
3. Reliable supply of drugs at the community level
4. Improved planning, monitoring and evaluation of community healthcare services
5. Improved quality of medical data collection and analysis

**Outcome Indicators:**

1. Number of mothers delivering at health care facilities increased by 30%
2. Maternal & child mortality rates reduced (mUbuguzima) by 50%



## CD Project 6: Health Insurance Information System

**Purpose:** To improve healthcare delivery

**Description:**

Health insurance plays a critical role in healthcare provision by increasing accessibility to healthcare services. In Rwanda there are two main health insurance schemes: RAMA and Mutuelle de Santé, with over 90% Rwandans covered by Mutuelle de Santé. However, all its services including authentication and claim processing are paper-based, which translates into long reconciliation processes between healthcare providers and insurance thereby hindering effective operations and in-turn quality of service delivery. This project aims to automate all health insurance services hence allowing for swift and seamless insurance claims processing, which will greatly improve health care service delivery.

**Activities:**

1. Develop a health insurance database
2. Automate insurance claims and re-imburement
3. Integrate National ID (NID) with health insurance for authentication purposes
4. Increase awareness and sensitization on the system

**Expected Outcome:**

1. Enabled “patient roaming” i.e. patient can receive treatment anywhere in the country
2. Seamless health insurance claims processing
3. A unique patient identifier integrated with NID

**Outcome Indicators:**

1. Health Insurance Information System fully operational by 2013
2. Processing time for insurance claims

## CD Project 7: Telemedicine

**Purpose:** To improve accessibility and affordability of specialized healthcare services in remote areas

**Description:**

Telemedicine is an application of clinical medicine where medical information is transferred through audio-visual media and other technologies for purposes of diagnosing or treating patients. This is a rolled over project, currently being implemented in three teaching hospitals and two rural hospitals in Musanze and Kabgayi that are connected to King Faisal Hospital. This needs to be scaled-out to all health institutions across the country. However, challenges including inadequate infrastructure, lack of connectivity and inadequate trained staff still impede the development of telemedicine in Rwanda.

**Activities:**

1. Develop and deploy telemedicine solutions in selected health facilities
2. Provide reliable connectivity and electricity



3. Continuous training of staff
4. Increase awareness and sensitization on telemedicine

**Expected Outcome:**

1. Reduced mortality
2. Improved access to and provision of quality health care services
3. Reduced cost of health care services
4. Knowledge transfer through increased collaboration between local, regional and international health institutions.

**Outcome Indicators:**

1. Mortality rates
2. Length of in-patient stay
3. Number of physical referrals
4. Reduction in waiting times for patients needing specialist treatment

## CD Project 8: Vision 2020 e-Citizen

**Purpose:** To ensure efficient delivery of GoR's community development programs

**Description:**

Rwanda's community development programs including *ubudehe*, *Abunzi*, *girinka*, *imihigo*, vision *umurenge* programs, SACCOS and other socio-economic development initiatives have been instrumental in the country's socio-economic development. However, the largely paper-based processes greatly hinder monitoring and evaluation of programs/impact. This project is aimed at automating citizen programs in order to ensure efficient delivery thereby further empowering citizens.

**Activities:**

1. Assess operational challenges of community development programs to determine where ICTs can be leveraged
2. Automate *ubudehe*, *Abunzi*, *girinka*, *imihigo*, vision *umurenge* processes
3. Train users in deployed applications to ensure effective utilization
4. Increase awareness and sensitization around this initiative
5. Assess other community challenges to determine what problems ICT can help unlock

**Expected Outcome:**

1. Transparent, efficient and effective delivery of community development programs
2. Reduced corruption in delivery of programs
3. Accurate and efficient reporting mechanisms established
4. Citizens empowered to increasingly participate in socio-economic development

**Outcome Indicators:**

1. All community development programs automated by 2013
2. Number of complaints
3. Availability and access to accurate periodic reports

### 3.2.4. e-Government [e-GOV] Projects

**Mission:** *“To improve government operational efficiency and service delivery”*

To realize this mission, the following projects were chosen:

- e-Gov Project 1: Government Enterprise Architecture
- e-Gov Project 2: Government Intranet
- e-Gov Project 3: Document Tracking and Workflow Management System
- e-Gov Project 4: e-Procurement System
- e-Gov Project 5: National ID and Smartcard System (NID)
- e-Gov Project 6: Justice, Reconciliation, Law & Order Sector (JRLOS) Information Systems
- e-Gov Project 7: Disaster Recovery Centre
- e-Gov Project 8: Rwanda National Portal

Figure 9, illustrates e-Government projects and how they work together to achieve the focus area’s mission. The Government Enterprise Architecture and Disaster Recovery Center are the foundation required for the successful implementation of the focus area projects.

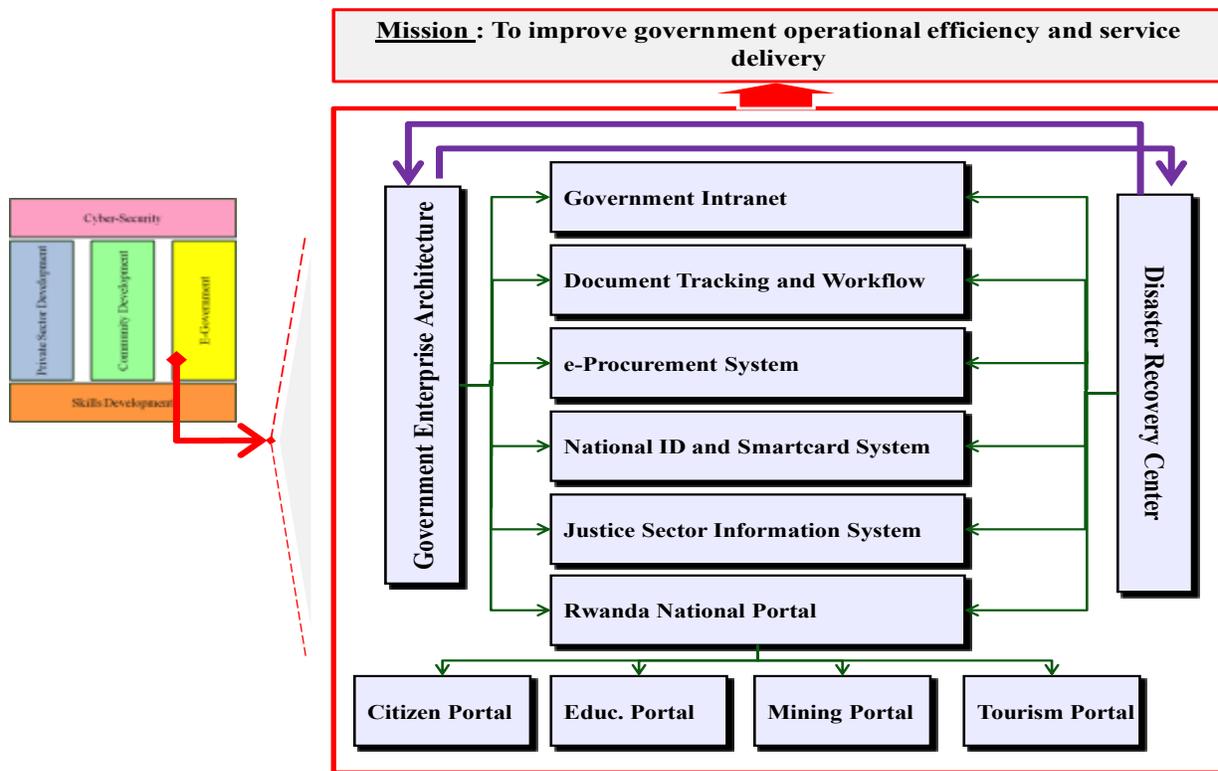


Figure 9: e-Government Projects



## e-Gov Project 1: Government Enterprise Architecture

**Purpose:** To establish a master plan for developing and deploying IT systems in government so as to improve service delivery

### Description:

This project aims to systematically capture business, operational and IT issues from government institutions; design the corresponding business, operational and IT solutions and communicate these solutions to stakeholders for implementation. This project will consolidate all e-government initiatives to-date in order to continuously improve performance between G2G, G2B and G2C, and achieve national socio-economic goals.

### Activities:

1. Capture business/operational processes in all government institutions
2. Design and document the business/ operational IT solutions for identified processes i.e. Data/information architecture; business architecture; application architecture; technology architecture
3. Develop and document integration and migration plans
4. Identify and document common information to be shared among institutions and how it can be accessed

### Expected Outcome:

1. A blue-print of GoR Enterprise “to-be” Architecture to guide future application deployments
2. Enabled and improved service delivery by streamlining government processes
3. Optimized GoR ICT investments
4. Reduced cost of service delivery in government
5. Interoperability between government applications
6. Elimination of duplication of data/application within government institutions, agencies and organizations
7. Enabling the application integration and information sharing
8. Optimization of ICT investment

### Outcome Indicator:

1. “ONE Government” applications running by 2013
2. A blue-print of GoR Enterprise “to-be” Architecture to guide future application deployments fully developed
3. All government employees using deployed applications by 2013

## e-Gov Project 2: Government Intranet

**Purpose:** To improve GoR information security and inter and intra government communication

### Description:

This is a rolled-over project from NICI II (GOVNet) that involves the provision of a common Internet gateway for all Government Ministries and other institutions via a Government network, independent of the Internet (intranet) in order to mitigate GoR cyber attacks. The intranet will



also facilitate the sharing of resources including: Financial Management Systems (FMS) and Human Resource Management System (HRMS); e-Cabinet; document tracking; VoIP; etc. Currently over 90 government institutions are connected to the Kigali Metropolitan Network (KMN Network) and SMARTGov applications have been deployed. However, there is still limited government information sharing. This project aims to create a single network that allows for shared resources in government while securing GoR information.

**Activities:**

1. Develop and implement an intranet for each government institution
2. Develop and implement a government intranet
3. Develop, implement and enforce an information sharing policy

**Expected Outcome:**

1. Operationalization of all deployed government applications
2. Increased and improved information sharing across government
3. Increased security of GoR network and information
4. Strengthened government decentralization policy
5. Improved government processes
6. Efficient management of government resources

**Outcome Indicators:**

1. Intranet developed and operational for each government institution by 2013
2. All institutions on government network by 2013
3. Percentage of institutions utilizing intranet

**e-Gov Project 3: Document Tracking and Workflow Management System**

**Purpose:** To improve information sharing and management thereby reducing bureaucracy in government processes

**Description:**

Government processes are still largely paper-based and numerous systems are not integrated causing duplication and hindering efficient service delivery. This project, rolled over from NICI II, aims to drastically reduce the use of paper-based processing in public and private organizations; automate, accelerate and simplify administrative processes. A centralized electronic system will be developed to streamline tracking of document within public sector institutions.

**Activities:**

1. Analysis and design of institutional processes for all government
2. Implement the document tracking and workflow management system in all Government institutions
3. Migration of legacy systems
4. Develop policies, guidelines and a service charter for the system

**Expected Outcome:**

1. Petty corruption eliminated i.e. extracting favours in order to speed up the processing of transactions or documents
2. Increased accountability and transparency



3. Increased efficiency by reducing the turn-around time of documents
4. Seamless tracking of documents
5. Increased confidence in the public sector given that information e.g. documents and transactions are made available to citizens at any given time
6. Increased employee productivity
7. Measured employee productivity
8. Reduction in paper-based processes
9. Reduction in cost and time of tracking documents

#### **Outcome Indicators:**

1. 50 % of government institutions installed with mail management system by 2013
2. Improved employee productivity by 60%
3. Maximum process time of 48 hours in all government institutions/agencies by 2013
4. Cost and time of tracking documents reduced by 80%
5. Reduce 70% of paper work – transmission of hard copies
6. Reduce cycle times by 30% and workload on employees

### **e-Gov Project 4: e-Procurement System**

**Purpose:** To enable efficient and transparent procurement transactions between government and private sector

#### **Description:**

E-Procurement is a comprehensive system that will help Rwanda streamline procurement transactions for efficient government service delivery. This system will facilitate e-Tendering, e-Selling and e-Auctions services, and provide ready-access for buyer-sellers to create and approve purchasing requisitions, placing purchase orders and receiving goods and services.

#### **Activities:**

1. Analysis of existing manual system and develop implementation strategy
2. Design processes for automating procurement activities
3. Develop, implement and enforce an e-Procurement system
4. Awareness and sensitization of the system

#### **Expected Outcome:**

1. Increased efficiency and transparency in procurement processes
2. Increased confidence and trust in government procurement processes
3. Smoother and transparent procurement transactions between government and private sector.
4. Increased competition
5. Increased market access
6. Integration of information between entities
7. Facilitate procurement reporting
8. Environmental conservation

#### **Outcome Indicators:**

1. e-Procurement system deployed and operational by 2012
2. 97% of tender publications online by 2012
3. 40% of bids submitted and evaluated by 2013



4. 100% of bids processed after evaluation – contract management system
5. 100% of procurement data collected and analysed online by 2013
6. 50% of tenders completed online by 2013
7. Number of bids submitted online

### **e-Gov Project 5: National ID and Smartcard System (NID)**

**Purpose:** To support the online authentication of transactions

**Description:**

This is a rolled-over project from NICI II aimed at the deployment of a modern and secure National ID Card and Driving License to all citizens above 16 years of age. Phase I of the NID saw the complete digitization of the NID and driver licensing. Phase II involves the production and issuance of a multi-application smartcard-based NID embedded with a central processing unit to enable authentication services.

**Activities:**

1. Pilot the smart card
2. Develop and implement a system to secure and support the smart card
3. Develop and implement a roll-out plan

**Expected Outcome:**

1. Provide an enabling environment for the development of e-Commerce
2. Centralised and secured citizen information

**Outcome Indicators:**

1. 20 % of Rwanda population with smart cards by 2013
2. Smart card used in e-commerce transactions by 2013

### **e-Gov Project 6: Justice, Reconciliation, Law & Order Sector (JRLOS) Information Systems**

**Purpose:** To improve information sharing, management and collaboration while ensuring high quality, dependable and valued information base that supports operational and strategic decision-making in the Justice sector

**Description:**

Rwanda's justice sector aims to fully automate all its activities in order to meet wider sector objectives and is currently in the process of developing various technologies to achieve this. This project aims at providing the necessary support to enable the implementation of JRLOS initiatives.

**Activities:**

1. Conduct an ICT needs assessment for the sector
2. Operationalize the Justice Sector Legal Information Portal
3. Operationalize the cross-institutional Legal Drafting Support System in all government institutions
4. Develop and implement an online Criminal Records Management System



5. Deploy LAN infrastructure and upgraded server rooms in JRLOS institutions
6. Develop and implement a Digital Court Recording System (DCRS)
7. Develop and implement an Electronic Queue Management System (EQMS)
8. Develop and implement Maison d'accès à la justice (MAJ) and mediation (ABUNZI) reporting and information system
9. ICT capacity building of staff
10. Enforce utilization of deployed ICTs

#### **Expected Outcome:**

1. Improved efficiency of justice sector business processes
2. Uniformity and completeness of court cases
3. Easy archiving and reference of case files
4. Improved process workflow and information sharing
5. Increased case settlement and arbitrations thereby reducing backlogs
6. Time and cost savings for the justice sector and citizens

#### **Outcome Indicators:**

1. JRLOS Needs assessment completed by 2012
2. Justice sector portal operational by 2012
3. Legal Drafting Support System operational in all government institutions by 2013
4. Criminal Records Management System deployed by 2013
5. LAN infrastructure and upgraded server rooms for JRLOS institutions by 2013
6. DCRS, EQMS, ABUNZI and MAJ deployed and operational by 2013
7. 50% of records digitized by 2013
8. Number of trained staff working with trained ICTs

### **e-Gov Project 7: Disaster Recovery Centre**

**Purpose:** To ensure continuity of work in the event of any disaster

#### **Description:**

This project aims to create a backup site where Rwandans will easily retrieve information following disasters such as fire, floods, earthquakes, cyber attacks or other disruptive events to ensure government and business continuity.

#### **Activities:**

1. Conduct site studies to identify key locations for the disaster recovery centres
2. Construction of site
3. Replication of applications of the disaster recovery center
4. Connectivity to ISPs

#### **Expected Outcome:**

1. Business continuity
2. Increased confidence in Rwanda's information security
3. Increased protection and availability of data resources

#### **Outcome Indicators:**

1. Disaster Recovery Centre established by 2012



2. 50% of government institutions applications replicated in the disaster recovery center by 2013
3. 99.99% availability of data resources and hosted services

## e-Gov Project 8: Rwanda National Portal

**Purpose:** To provide country information from diverse sources in a unified manner

### Description:

The Rwanda national portal is nearing completion but needs to be integrated with both public and private sector information sites. This is a rolled-over project from NICI II that enables government to provide a consistent look with access controls and procedures for multiple databases that would have been different entities altogether. It will include the following:

## Citizen Portal

**Purpose:** To provide a platform that fosters citizen-to-citizen and government-to-citizen interaction

### Description:

Limited interaction between citizens within Rwanda; the Diaspora and policy makers can be an obstacle to governance and service delivery. Establishing this portal will increase citizen participation and improve social cohesion. This portal will be a user-friendly website and integrated with an SMS-service on existing platforms in English and Kinyarwanda.

### Activities:

1. Develop and implement the Rwanda citizen portal
2. Develop and implement sms mechanism for citizens to interact with portal
3. Build capacity to manage the portal
4. Pilot the portal
5. Conduct public awareness campaign to foster and encourage citizen participation

### Expected Outcome:

1. Increased citizen participation thereby nurturing innovative solutions to local problems
2. Increased interaction between citizens and government
3. Foster good governance and increased service delivery

### Outcome Indicators:

1. Citizen Portal established and operational by 2013
2. Number of users
3. Percentage of complaints/queries resolved/responded to by 2013
4. Percentage of citizens aware of the portal

## Training and Education Portal

**Purpose:** To improve access and equity to skills development opportunities through ICT

**Description:**

This is a rolled over NICI II project that builds on the Rwanda Education Commons initiative to create a low-cost and versatile platform for standardised educational content at all levels of education.

**Activities:**

1. Develop and implement education portal
2. Digitization of curriculum and education materials in English and Kinyarwanda
3. Create an e-Library that is linked to all higher learning institutions, research think tanks and other institutions
4. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. Increased access to education materials
2. Low-cost ICT enhanced training solutions for students and citizens
3. Increased student and citizen learning capabilities
4. Increased teachers capacities and effectiveness to teach

**Outcome Indicators:**

1. Training and Education Portal operational by 2013
2. Number of users

**Mining Portal**

**Purpose:** To increase and improve access to information on mining in Rwanda

**Description:**

The online mining portal is a tool that will be used to host all information on the mining sector. This information includes: a list of mining concessions in Rwanda; types of minerals extracted in each concession; quantities of minerals extracted per concession; published mining research; environment standards; statistics and mining maps for public use.

**Activities:**

1. Develop a mining portal
2. Develop and integrate mining content from both public and private institutions
3. Increase awareness and sensitization around this initiative

**Expected Outcome:**

1. Information on mining industry easily accessible
2. Increased investment within the mining industry

**Outcome Indicators:**

1. Number of users
2. Number of mining companies utilizing system
3. Contribution to GDP

### 3.2.5. Cyber Security [CS] Projects

**Mission:** *“To secure Rwanda’s cyberspace and information assets”*

To realize this mission, the following projects were chosen:

- CS Project 1: Computer Emergency and Security Incident Response Team (Rw-CERT/CSIRT)
- CS Project 2: Establish Public Key Infrastructure (PKI)
- CS Project 3: Security Operation Centre (SOC)
- CS Project 4: Establish an Information Infrastructure Security System
- CS Project 5: Cyber Security Capacity Building
- CS Project 6: Establish National Cyber Security Research Centre (NSRC)

Figure 10, illustrates Cyber-Security projects and how they work together to achieve the focus area’s mission. The establishment of information infrastructure security system and cyber security capacity building are of paramount importance for the successful implementation of the projects.

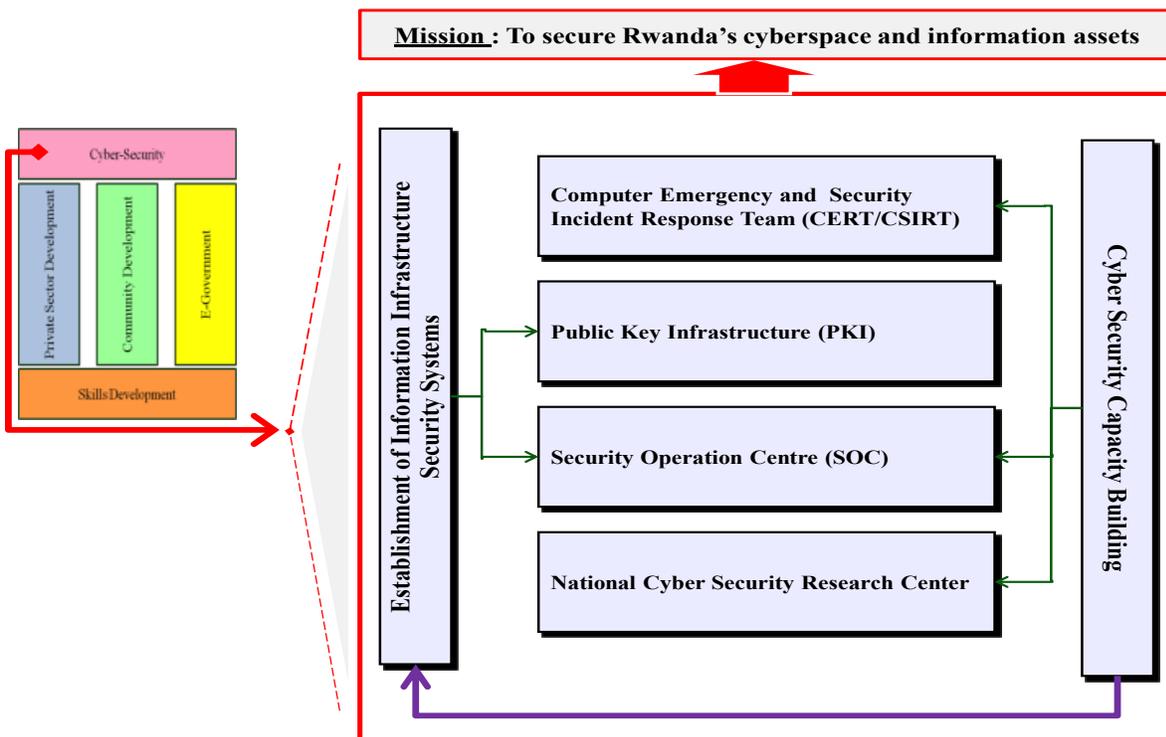


Figure 10: Cyber Security Projects

## CS Project 1: Computer Emergency and Security Incident Response Team (Rw-CERT/CSIRT)

**Purpose:** To provide prompt response to cyber threats

### Description:

There is an increasing number of cyber threats to the Rwanda ICT infrastructure, hence an urgent need to manage and respond to these cyber threats when they occur. The Rwanda Computer Security and Incident Response Team (Rwanda CSIRT) is required to manage and respond to any cyber threats targeting Rwanda's ICT infrastructure.

### Activities:

1. Define and approve the Rwanda CSIRT policy
2. Determine Rwanda CSIRT vision and strategic plan
3. Communicate Rwanda CSIRT vision and operational plan
4. Educate and train Rwanda CSIRT team.
5. Foster collaboration and partnership with international CSIRT to ensure knowledge and skills transfer

### Expected Outcome:

1. Dedicated team for providing computer security support and responding to cyber threats
2. Increased number of Internet security experts
3. Swift handling of computer security incidents.
4. Cooperation and coordination between other CERTs

### Outcome Indicators:

1. Number of incidents managed and responded to
2. Public awareness of cyber security threats
3. Number of Internet security experts
4. Number of partnerships formed with international CERTS/CSIRTS

## CS Project 2: Establish Public Key Infrastructure (PKI)

**Purpose:** To improve information security

### Description:

As the GoR deploys more resources online, there is a need to build trust among users. A Public Key Infrastructure (PKI) system that validates users' digital identity over a public or private network should be set up.

### Activities:

1. Develop operational framework for national PKI
2. Conduct national PKI design study
3. Develop and Implement the root certification authority
4. Develop and Implement the government certification authority

### Expected Outcome:

1. Increased confidence between parties carrying out electronic transactions/E-commerce in Rwanda's cyberspace

**Outcome Indicators:**

1. Number of external digital certificates in use
2. Number of institutions registered at the Certification Authority

**CS Project 3: Security Operation Centre (SOC)**

**Purpose:** To centralise all national cyber security activities

**Description:**

A Security Operations Center will help deliver IT security services and detect unauthorized access in any form to prevent and manage security related incidents using defined processes and procedures. It performs centralized analysis using the combined resources consisting of personnel, dedicated hardware and specialized software. Main functions of a SOC consists of monitoring and analyzing all types of systems, devices, or applications events

**Activities:**

1. Conduct a SOC design study and design architecture
2. Develop SOC infrastructure
3. Install and configure monitoring systems
4. Centralize the management of security information and events coming from different sources

**Expected Outcome:**

1. Real time security management of Rwanda's cyber space.

**Output Indicators:**

1. Number of core infrastructure with security operations managed by the SOC
2. Number of distributed security systems/equipment monitored and managed by the SOC
3. Number of e-Government applications managed by the SOC
4. Number of security threats detected and/or prevented by the SOC

**CS Project 4: Establish an Information Infrastructure Security System**

**Purpose:** To protect and secure Rwanda's critical ICT infrastructure

**Description:**

The Government of Rwanda is implementing network communication infrastructure facilities across the country such as the National Backbone (NBB), Kigali Metropolitan Network (KMN), Wireless Broad Band (WiBro), National Data Center (NDC), Karisimbi Project, Energy Infrastructure, Banking and Finance systems, etc. This infrastructure needs to be highly protected both logically and physically.

**Activities:**

1. Enforce Information security policy



2. Acquire and implement Network Security solutions (Firewalls, Intrusion Prevention Systems, and Intrusion Detection Systems), Access Control and authentication Systems, Data leakage prevention systems and other information security systems.
3. Implement Disaster Recovery plan

**Expected Outcome:**

1. Mitigation of cyber security threats

**Outcome Indicators:**

1. Number of successfully resolved attacks
2. Number of successfully detected and prevented attacks
3. Time to recover from successful attacks
4. Accessibility of classified data

### CS Project 5: Cyber Security Capacity Building

**Purpose:** Improve and increase Rwandan cyber security capabilities

**Description:**

There is an inadequate supply of cyber security experts. This project aims to build Rwandan capacity in cyber security.

**Activities:**

1. Develop and implement education and training curricula programs in cyber and information security
2. Foster collaboration and partnership with international cyber security agencies to ensure knowledge and skills transfer
3. Training of trainers

**Expected Outcome:**

1. Adequate supply of cyber security professionals
2. Cyber security awareness and education
3. Cyber security preparedness

**Outcome Indicators:**

1. At least one ICT professional within each government institution receives at least 1cyber security training of trainer course
2. At least one personnel in private sector and other critical sectors trained in cyber security
3. At least 100 students from Rwandan Universities trained in cyber security per year.
4. Number of cyber security professionals

### CS Project 6: Establish National Cyber Security Research Centre (NSRC)

**Purpose:** Increase and improve cyber security preparedness

**Description:**

In order to minimize and counter cyber security threats, GoR, academia, and industry must collaborate to establish a NSRC that can research and develop cyber security technologies to protect Rwanda's cyber space and ICT assets.

**Activities:**

1. Develop a national cyber security strategy
2. Establish National Cyber Security Research Centre Advisory Board
3. Design study
4. Develop infrastructure (office, labs, equipment)

**Expected Outcome:**

1. Capacity building in cyber security
2. Increased public awareness on cyber security
3. Preparedness for cyber attacks
4. Increased collaboration between Government, industry and academia on cyber security

**Outcome Indicators:**

1. Number of publications by NCSRC
2. Number of innovations by NCSRC

### 3.2.6. Cross-Cutting Projects

The following projects are cross-cutting and all contribute to making Rwanda an ICT hub:

- CC Project 1: NICI III Implementation Support
- CC Project 2: ICT Awareness Campaign
- CC Project 3: Policy, Legal and Regulatory Framework
- CC Project 4: Content and Application Development
- CC Project 5: Green ICT
- CC Project 6: Climate Change Observatory
- CC Project 7: Digital Migration
- CC Project 8: CNS-ATM

The figure below illustrates cross-cutting projects

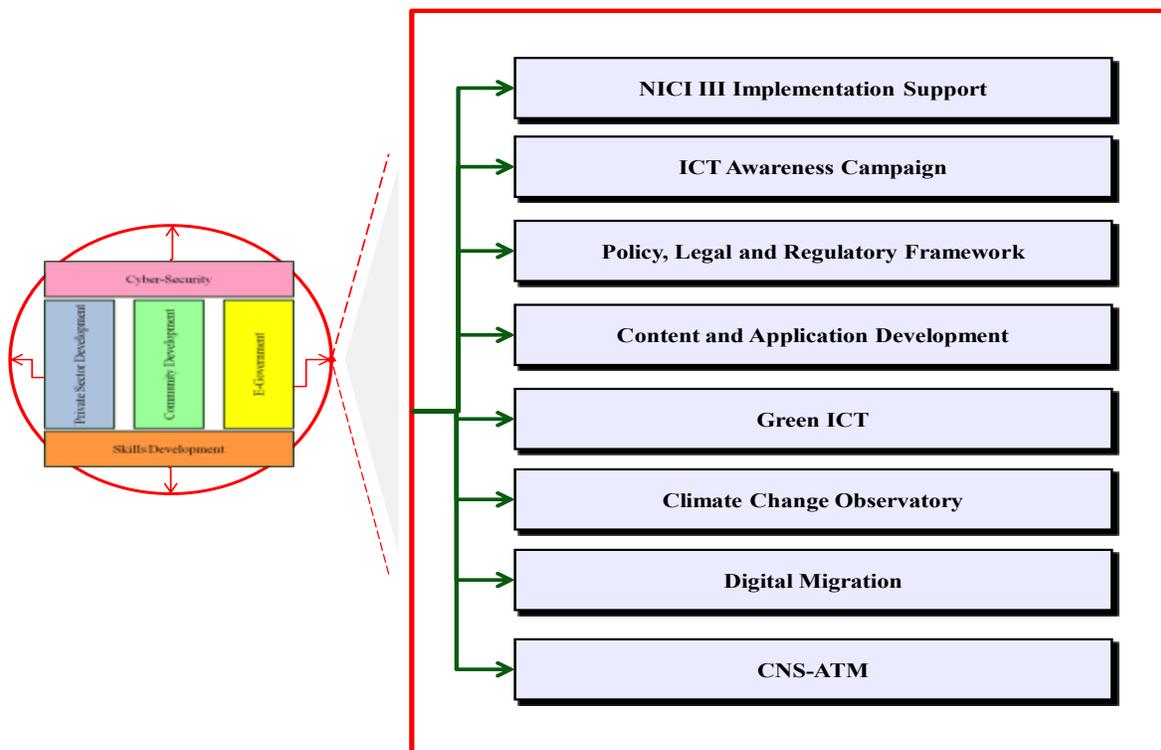


Figure 11: Cross-Cutting Projects



## NICI III Implementation Support

**Purpose:** To ensure the successful implementation of NICI III projects

**Description:**

NICI II evaluation revealed that inadequate project support was a major shortcoming during the implementation phase. Therefore, this project aims to increase and provide additional technical and project management support for all NICI III initiatives.

**Activities:**

1. To recruit and train NICI III implementation support staff

**Expected Outcome:**

1. Provision of adequate support staff for NICI III projects
2. Centralised coordination of all NICI III projects
3. Effective internal monitoring and evaluation of all NICI III projects
4. Increased success rate of NICI III initiatives
5. Job creation
6. Skills and knowledge transfer

**Outcome Indicators:**

1. All implementing institutions equipped with adequate NICI III support staff
2. Quality of M&E in each implementing institution
3. Number of jobs created

## ICT Awareness Campaign

**Purpose:** To increase awareness and utilization of ICTs

**Description:**

This project aims to promote and improve citizen understanding of ICT benefits thereby fostering utilization and ownership of Rwanda's ICT vision.

**Activities:**

1. Develop and implement an ICT communications and media plan
2. Launch monthly public ICT awareness campaigns
3. Sensitize Rwandans to develop content
4. Develop and implement annual national ICT competitions to foster innovation and entrepreneurship
5. Deploy additional ICT buses
6. Organize and participate in domestic and international ICT symposiums at least biannually.

**Expected Outcome:**

1. Increased public awareness of ICT benefits
2. Increased understanding and support of national ICT initiatives
3. Increased opportunities in entrepreneurship
4. Increased demand for ICT products and services



### **Outcome Indicators:**

1. Number and range of ICT awareness campaigns
2. Number of ICT publications
3. Coverage of ICT Buses
4. Number of households using ICTs

## **Policy, Legal and Regulatory Framework**

**Purpose:** To continuously improve and strengthen Rwanda's enabling environment and position Rwanda as an ICT Hub

### **Description:**

The existing policy, legal and regulatory framework is a good foundation but requires continuous improvement to facilitate swift adaptation to changing trends and technologies. This project allows the continued improvements of the country's policy, legal and regulatory framework to ensure that Rwanda can become an ICT hub that sustains business development and investments in ICT.

### **Activities:**

1. Adopt and enforce ICT bill regulations
2. Continuous review and improvement of existing policies, laws and regulations in order to accommodate emerging trends
3. Implement incentives that can attract investors and position Rwanda as an ICT hub
4. Develop, implement and enforce regulations establishing converged licensing framework
5. Develop, implement and enforce regulations establishing licensing framework for terrestrial digital broadcasting
6. Develop, implement and enforce regulations enforcing the electronic transaction law
7. Identify and adopt best practices including policies and incentives particularly in e-Government, cyber security and private sector development focus areas
8. Ensure that all ICT policies and laws are in harmony with international laws, treaties, standards and conventions
9. Develop and implement mechanism to capture and continuously monitor ICT/ICTE sector contribution to the economy such as the Monitoring Information Technology Impact in Rwanda (MITIR) approach
10. Develop and implement a policy for international firms to partner with the PSF ICT chamber members and ensure skills and knowledge transfer in ICT

### **Expected Outcome:**

1. Increased trust and confidence in ICTs
2. Increased utilization and diffusion of ICTs in business services
3. Increased local capabilities to implement GoR initiatives
4. Increased knowledge and skills development of domestic ICT sector
5. Increased job creation
6. Increased revenues for domestic companies, hence greater contribution to GDP
7. Compliance with ICT laws, standards, guidelines, and procedures

**Outcome Indicators:**

1. Full adoption of ICT bill
2. Number of new ICT companies, national and foreign
3. All ICT companies meeting national requirements

**Content and Application Development**

**Purpose:** To increase innovation through content and application development

**Description:**

This project compliments GoR efforts to bridge the digital divide and empower Rwandans to participate in promoting and ensuring good governance. It aims to promote and support the creation of locally relevant content and applications that will increase Rwanda's web presence and build a software industry.

**Activities:**

1. Establish a Rwanda Multimedia Academy
2. Develop online content in English and Kinyarwanda for all key sectors
3. Expand the Kinyarwanda, English and French glossary
4. Develop and implement interactive tools and programs to increase citizen participation
5. Public awareness and sensitization on content development

**Expected Outcome:**

1. Increased presence of local content
2. Job creation
3. Increased ICT utilization
4. Development of a software industry

**Outcome Indicators:**

1. Number of locally developed innovations
2. Number of jobs created
3. Number of software developers
4. Rwanda Multimedia Academy fully operational by 2013

**Green ICT**

**Purpose:** Environmental protection and sustainable development

**Description:**

Rwanda has vast amounts of outdated ICT equipment, which pose serious environmental consequences to Rwandans, if not disposed of properly. Furthermore most processes in government and private sector are paper-based which is not only costly but also negatively impacts the environment. This project aims to leverage ICTs in environmental management conservation. Green ICT entails initiatives to reduce e-waste and enable efficient energy generation, consumption and distribution. It also aims to further support Rwanda's environmental management policies.



### Activities:

1. Implement and enforce a policy requiring all public servants to utilize deployed e-Government tools and applications
2. Establish mechanisms to recycle and refurbish old computers and other ICT hardware that can be used in schools and local government offices countrywide
3. Develop and implement a “smart building” policy for commercial buildings through automation of occupancy based lighting and heating solutions
4. Adopt and support the SMART Grid technology (PSD Project 8)
5. Form partnerships with global Green ICT institutions
6. Increase awareness and sensitization around this initiative

### Expected Outcome:

1. Reduced carbon emissions
2. Reduced energy waste
3. Adoption of green ICT best practices

### Outcome Indicators:

1. Number of refurbished IT equipment being utilized by 2013
2. Proper IT equipment recycling mechanism in place by 2013

## Climate Change Observatory

**Purpose:** Create a climate change observatory that will contribute to combating green house gases and responding to climate change challenges

### Description:

The project was adopted by COMESA in 2007 and is aimed at collecting atmospheric observations to contribute to meteorological forecasting and monitor climatic conditions and build scientific and engineering capacity within Rwanda. This centre will focus on making climate change understandable for the general public. It is also meant to be a reference centre where all stakeholders can exchange knowledge and share initiatives related to mitigation and adaptation to global warming.

GoR in collaboration with MIT is in the planning stages of building an AGAGE (Advanced Global Atmospheric Gases Experiment) climate change observatory – the first of its kind in Africa – on Mt. Karisimbi. The site was chosen on the basis of scientific evaluation of a number of six sites.

### Activities:

1. Resource mobilization
2. Erect and install cable car
3. Capacity building of observatory engineers and technicians
4. Development of university education programs in climate science

### Expected Outcome:

1. Capacity to monitor climatic conditions and meteorological forecasting
2. Enhance regional and international cooperation on climate change
3. Increased capacity to respond to climate change challenges



### **Outcome Indicators:**

1. Cable car installed at Karisimbi by 2013
2. Number of Rwandans trained in meteorology
3. Climate science programs offered in institutions of higher learning

## **Digital Migration**

**Purpose:** To fully integrate the economic, social and political aspects of the country

### **Description:**

The limited radio and TV signal coverage in numerous parts of the country continue to disenfranchise Rwandans, thereby limiting their participation in government development programmes. Furthermore, the International Telecommunication Union (ITU) recommended that analogue systems be switched to digital by June 2015. This project aims to leverage deployed broadcasting infrastructure to transition Rwanda's broadcasting from analogue to digital and further current efforts to complete Rwanda's digital migration.

### **Activities:**

1. Enforce and implement the digital migration policy
2. Assess market and consumer needs to facilitate market and business development
3. Set switch-on and switch-off schedule
4. Define system and network standards
5. Increase awareness and sensitization around this initiative

### **Expected Outcome:**

1. Successful digital migration by 2015
2. Increased citizen participation in development programs
3. Increased content development

### **Outcome Indicators:**

1. 50% of Rwandan households migrated to digital by 2013

## **Communication, Navigation, Surveillance – Air Traffic Management (CNS-ATM)**

**Purpose:** To develop a seamless, globally coordinated system of air navigation services that will cope with worldwide growth in air traffic demand

### **Description:**

This project aims to foster the implementation of a seamless, global air management system that will enable air craft operators to meet their planned times of departure and arrival, and adhere to their preferred flight profiles with minimum constraints and without compromising agreed safety levels. Rwanda has been selected to host the Communication Navigation Surveillance /Air Traffic Management (CNS/ATM) for all COMESA member states and therefore must be ready to effectively manage the system. It will enable a regional unified air space management that would control navigation services. The centre will be based at Karisimbi in the Northern Province, where GoR has deployed communication infrastructure. This project is also aimed at ensuring that Rwanda is ready to host regional CNS-ATM.

**Activities:**

1. Develop legal, regulatory and institutional framework
2. Develop and implement a technical framework
3. Develop an implementation plan
4. Build local capacity to manage CNS-ATM
5. Acquire and deploy CNS-ATM equipment
6. Increase awareness and sensitization around this initiative within the region

**Expected Outcome:**

1. Improved national and regional airspace safety and security
2. Improved airspace and airport operational efficiency
3. Increased availability of user-preferred flight schedules and profiles thereby positioning Rwanda as a logistics hub
4. Minimised deferring of equipment carriage in the region
5. Generate income for the country
6. Elevate Rwanda's ICT status

**Outcome Indicators:**

1. CNS-ATM fully operational by 2013
2. Number of flights to Rwanda
3. Number of incidents in flight control

**PART 4: INSTITUTIONAL AND IMPLEMENTATION FRAMEWORK**

*This section describes the institutional and implementation framework of the NICI III plan including specific roles and responsibilities for each institution and the framework that will guide the development of FY2013 - 2015 projects.*

**4.1. NICI III Institutional and Implementation Framework**

Success of the NICI III Plan will depend on the effectiveness of its implementation. NICI II evaluation revealed deficiencies in project planning, coordination, monitoring and evaluation and as such recommended the strengthening of planning, coordination and M&E functions in RDB. NICI III aims to address these issues by creating a strong institutional framework to support implementation in order to achieve tangible and measurable outcomes.

NICI III implementation requires the participation of all stakeholders including the National ICT implementation steering committee, the project implementers, RDB as well as a strong monitoring and evaluation component.

The figure below illustrates the NICI III institutional framework.

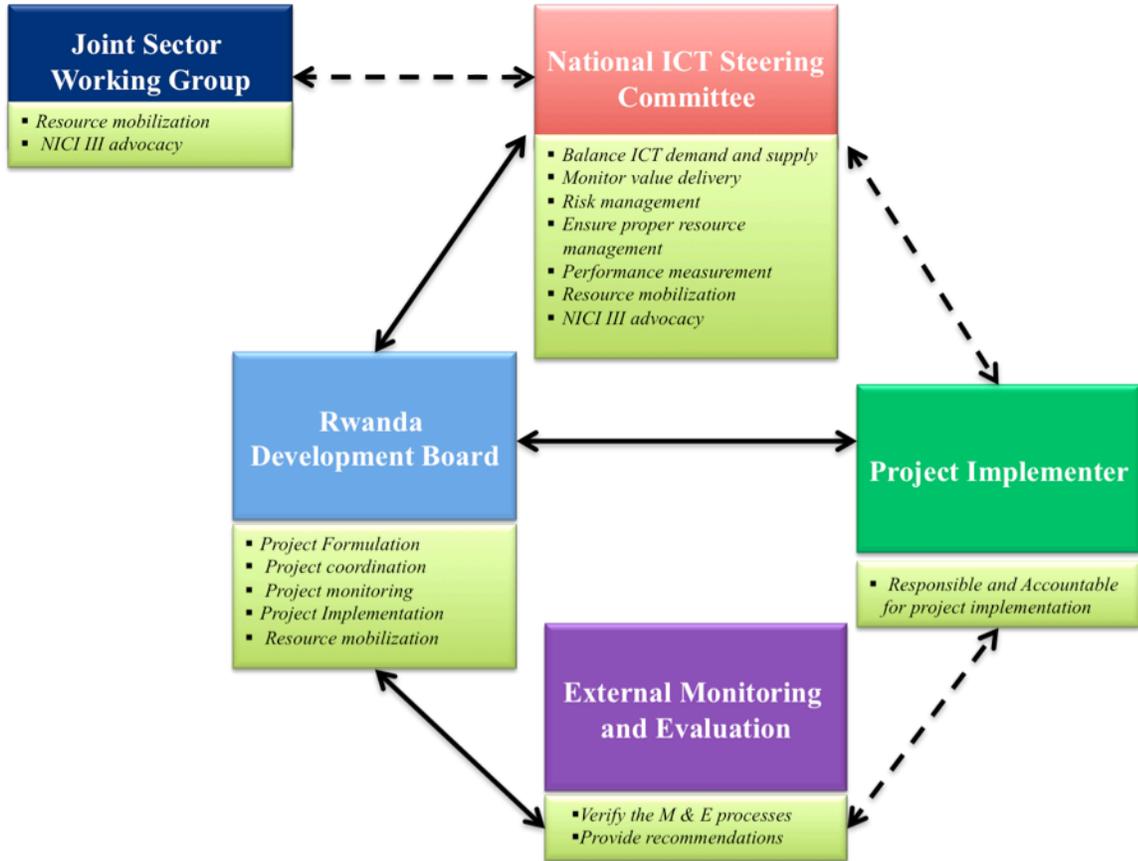


Figure 12: NICI III Institutional Framework

#### 4.1.1. National ICT Steering Committee (NISC)

The NISC will be chaired by the Minister in Charge of ICT in the Office of the President (MINICT) as it is the lead government agency charged with ICT. For increased accountability and effective implementation, a steering committee will oversee the plan. NISC will be comprised of eminent Rwandan and international experts providing strategic direction and guidance to the NICI process as well as other GoR ICT initiatives. This will expedite decision-making, foster and increase participation of all stakeholders. MINICT roles and responsibilities are to:

- Develop and disseminate ICT policies, strategies and programs, and mobilize resources for sector programs.
- Oversee and coordinate the implementation of national ICT programs as well as Institutions and Agencies under supervision.
- Monitor and evaluate the implementation of sector and sub-sector policies, strategies and programs.
- Promote the integration, adoption and use of ICT in all areas of our society and economy.
- Coordinate with international agencies and institutions working in the sector of ICT.
- Promote institutional and human resources capacities and professional skills development in the sector.

Given the above roles and responsibilities, MINICT will set the NISC agenda. NISC roles and responsibilities are to:

- Balance the demand and supply for ICT to ensure ICT investments are aligned with the National ICT vision;
- Monitor value delivery to ensure ICT initiatives/projects attain optimum benefits;
- Risk management of new ICT initiatives/projects to facilitate transparency and understanding of compliance requirements;
- Ensure proper resource management to facilitate knowledge and infrastructure optimization; and
- Performance measurement to track strategy implementation.

The NISC will report to the Office of the President to ensure accountability and effective implementation of the NICI plan. NISC will also collaborate with the joint-sector working group (JWG) to review NICI III progress and mobilize resources. The ministry will form technical and policy and strategy committees comprised of national and international experts that will advise key national ICT strategic initiatives, and more importantly advise long-term strategic alignment of ICT to National goals. These committees must ensure that projects are implemented taking into account the most suitable business models. The roles and responsibilities of the NISC are follows:

- Bi-annual review of the NICI III implementation progress to ensure that appropriate improvements are incorporated and aligned with NICI III objectives
- Mobilization of resources
- NICI III advocacy

## **Project implementer**

The NICI II medium-term review and final evaluation identified lack of project ownership by Ministries, Departments and Agencies (MDAs) as a major shortcoming. Accordingly, in NICI III, each project will have a nominated project manager/implementer. The project implementer is a specific institution in charge of executing specific projects under the NICI plan. The roles and responsibilities of the project implementer are as follows:

1. Creating, establishing and managing project plans while ensuring that projects are completed on time and within budget
2. Communicate project progress to RDB on a monthly basis
3. Control and manage the operational budget
4. Coordinate project activities and consult with RDB to ensure project deadlines and objectives are met.

### **4.1.2. RDB**

RDB will lead implementation of the NICI III Plan as the designated coordination and implementing agency of GoR ICT initiatives. The Planning and Coordination and New Project Development (NPD) divisions within the ICT Department will assume the functions of the NICI III Secretariat given their mandate as follows:

- RDB Planning and Coordination division is mandated to plan and coordinate all GoR ICT projects in collaboration with all relevant MDAs to ensure implementation in a harmonised and coordinated manner.
- RDB New Project Development division is mandated to coordinate and oversee the successful implementation of all GoR ICT projects in collaboration with the project implementing institutions.

NICI II evaluation identified the lack of capacity within the above divisions as the main obstacle to the successful implementation of the NICI projects. Therefore, these divisions must be strengthened and equipped with the right resources, particularly the monitoring and evaluation and policy and strategy units of the planning and coordination division, to ensure successful implementation going forward.

RDB will work hand-in-hand with stakeholders (focus area working groups-FWG) in developing new projects and assessing the progress and outcome of implemented NICI projects. Focus area working groups comprise of subject matter experts from public and private sectors as well as civil society.

The planning and coordination unit will have the following responsibilities:

#### **Project Formulation:**

- Coordinate new project formulation.
- Conduct research and facilitate FWG stakeholder consultations to ensure industry participation during project formulation.
- Continuous improvement of project toolkits to ensure successful NICI III formulation.



**Project Implementation:**

- Oversee effective management of projects to ensure efficient resource utilization.
- Prepare and circulate quarterly project status reports for NICI III implementation institutions to ensure alignment with cluster and project objectives.
- Organise FWG meetings to ensure project ownership and smooth implementation.

**Monitoring & Evaluation (M&E):**

Building on international best practices the following M&E activities are proposed:

- Develop a results-based monitoring framework for all focus area projects

The recommended M&E log frame structure is as follows:

Narrative Summary	Expected Results	Primary Implementers	Objectively Verifiable Indicators (OVI)	Annual Targets	Means of Verification (MOV)	Assumptions/ Risks
Focus area Objective	Impacts					
Project Objectives	Outcomes					
Inputs/activities	Outputs					

- Select a sub-set of so-called SMART indicators for on-going data gathering and reporting (simple, measurable, attainable, reliable, and tractable)
- Define precisely the nature and format of the data to be captured
- Design data input forms for each project to enable routine capture of indicator data
- Plan and initiate periodic (monthly, quarterly, etc.) data collection by relevant implementing agencies
- Design and implement a data capture system (excel, access, etc.) and online reporting format
- Gather, validate, capture and report indicator data at regular intervals to ensure conformance with project activities, and objective verification of project outputs and outcomes
- Compile quarterly M&E reports with NICI III implementing institutions for submission to relevant stakeholders
- Provide recommendations to the NICI III implementing institutions on how to improve the implementation process

**External Monitoring and Evaluation**

RDB should continue to leverage external M&E experts to ensure objective evaluation of project outputs and outcomes. This independent evaluation should be undertaken on a yearly basis. The external M&E experts will carry out the following functions:

- Verify the M&E processes of the Planning and Coordination Unit within RDB/ICT,

independently evaluate the results of projects under implementation, identify bottlenecks in the M&E process, and make recommendations accordingly, to ensure that overall objectives are attained.

- Provide recommendations to the NICI III implementing institutions on how to improve the implementation process.

#### 4.2. NICI III Implementation Framework FY 2011-2012

NICI III implementation will have annual/biennial project cycles to ensure that the initiatives adapt to socio-economic changes and emerging technologies. This phased approach will ensure that the identified projects are executed with clear outcomes that are aligned with the overall NICI III objectives, focus area mission and objectives.

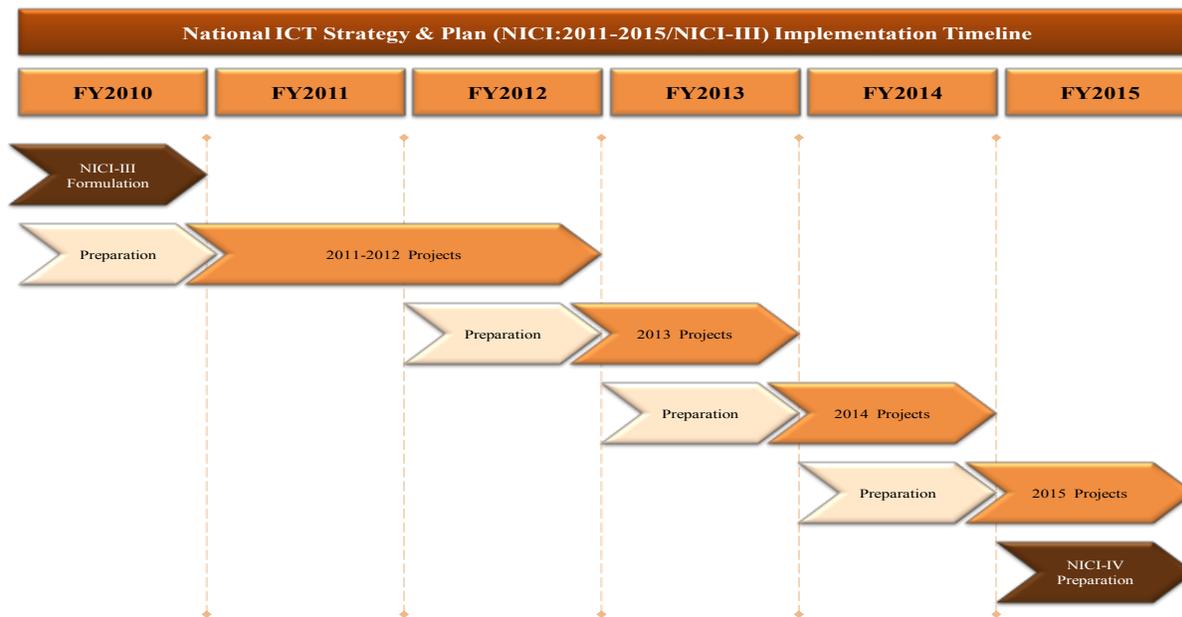


Figure 13: NICI III Implementation Framework

As illustrated in figure 13 above, the project formulation exercise was completed in the second half of FY2010, March – June 2011. Implementation of projects will commence in the first half of fiscal year 2011. Subsequent projects will follow the same cycle.

Three primary implementation institutions will be involved in the NICI III implementation process. Each institution will be responsible for the following tasks:



## National ICT Steering Committee

The National ICT Steering Committee will perform the following tasks:

Time Period	Tasks
FY 2010 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>• Validate NICI III Plan</li> <li>• Validate FY 2011/12 projects</li> <li>• Advocacy of NICI III Plan</li> <li>• Resource mobilization</li> </ul>
FY 2011 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> review of NICI III project implementation progress including quarterly M&amp;E Reports</li> <li>• Provide technical advisory support to the NICI III implementation process</li> <li>• Advocacy of NICI III Plan</li> </ul>
FY 2011 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>• 2<sup>nd</sup> review of NICI III project implementation progress including quarterly M&amp;E Reports</li> <li>• Provide technical advisory support to the NICI III implementation process</li> <li>• Validate external M &amp; E recommendations for all projects</li> <li>• Advocacy of NICI III Plan</li> <li>• Official sign off for completed projects</li> </ul>
FY 2012 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> review of FY 2012 project implementation progress including quarterly M&amp;E Reports</li> <li>• Provide technical advisory support to the NICI III implementation process</li> <li>• Advocacy of NICI III Plan</li> </ul>
FY 2012 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>• 2<sup>nd</sup> review of FY 2012 project implementation progress including quarterly M&amp;E Reports</li> <li>• Provide technical advisory support to the NICI III implementation process</li> <li>• Validate external M &amp; E recommendations for all projects</li> <li>• Validate FY 2013 projects</li> <li>• Advocacy of NICI III Plan</li> <li>• Official sign off for completed projects</li> <li>• Resources Mobilization</li> </ul>
FY 2013 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> review of FY 2013 project implementation progress including quarterly M&amp;E Reports</li> <li>• Provide technical advisory support to the NICI III implementation process</li> <li>• Advocacy of NICI III Plan</li> </ul>



## Project Implementer

Time Period	Tasks
FY 2010 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>Identify relevant Project Manager</li> <li>Prioritization of projects, jointly with RDB</li> <li>Finalize and validate project documents</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2011 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>Commence project implementation</li> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization</li> <li>Prepare and circulate 1<sup>st</sup> and 2<sup>nd</sup> quarterly project status and M&amp;E reports to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> <li>Official sign off for completed projects</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2011 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization.</li> <li>Prepare and circulate 3<sup>rd</sup> and 4<sup>th</sup> quarterly project status and M&amp;E reports to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation</li> <li>Facilitate external evaluation of FY 2011-2012 projects</li> <li>Prepare project completion reports for sign off</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2012 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization.</li> <li>Prepare and circulate FY 2012 1<sup>st</sup> and 2<sup>nd</sup> quarterly project status and M&amp;E reports to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> <li>Prepare project completion reports for sign off</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2012 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization.</li> <li>Prepare and circulate 3<sup>rd</sup> and 4<sup>th</sup> quarterly project status and M&amp;E reports to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> </ul>



	<ul style="list-style-type: none"> <li>Facilitate external evaluation of FY 2011-2012 projects</li> <li>Prepare project completion reports for sign off</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2013 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>1<sup>st</sup> review of FY 2013 project implementation progress</li> <li>Advocacy of NICI III Plan</li> </ul>

## **RDB**

RDB will perform the following tasks:

Time Period	Tasks
FY 2010 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>Conduct research and facilitate FWG stakeholder consultations to ensure sector input to new project formulation</li> <li>Identify relevant Project Managers</li> <li>Prioritization of projects, jointly with MDAs</li> <li>Finalize NICI III Plan</li> <li>Finalize and validate project documents</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2011 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>Commence project implementation together with external project managers where relevant.</li> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization</li> <li>Prepare and circulate 1<sup>st</sup> and 2<sup>nd</sup> quarterly project status and M&amp;E reports for NICI III implementation institutions to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> <li>Provide recommendations to the NICI III implementing institutions on how to improve the implementation process.</li> <li>Official sign off for completed projects</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2011 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>Coordinate new project formulation</li> <li>Oversee effective management of projects to ensure efficient resource utilization.</li> <li>Prepare and circulate 3<sup>rd</sup> and 4<sup>th</sup> quarterly project status and M&amp;E reports for NICI III implementation institutions to ensure project activities are aligned to envisaged outcomes</li> <li>Monitor and evaluate projects to ensure objective verification of project implementation</li> <li>Provide recommendations to the NICI III implementing institutions on how to improve the implementation process.</li> <li>Facilitate external evaluation of FY 2011-2012 projects</li> <li>Prepare project completion reports for sign off</li> <li>Advocacy of NICI III Plan</li> </ul>
FY 2012 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>Coordinate new project formulation</li> </ul>



	<ul style="list-style-type: none"> <li>• Oversee effective management of projects to ensure efficient resource utilization.</li> <li>• Prepare and circulate FY 2012 1<sup>st</sup> and 2<sup>nd</sup> quarterly project status and M&amp;E reports for NICI III implementation institutions to ensure project activities are aligned to envisaged outcomes</li> <li>• Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> <li>• Provide recommendations to the NICI III implementing institutions on how to improve the implementation process.</li> <li>• Prepare project completion reports for sign off</li> <li>• Advocacy of NICI III Plan</li> </ul>
FY 2012 2 <sup>nd</sup> Half	<ul style="list-style-type: none"> <li>• Coordinate new project formulation</li> <li>• Oversee effective management of projects to ensure efficient resource utilization.</li> <li>• Prepare and circulate 3<sup>rd</sup> and 4<sup>th</sup> quarterly project status and M&amp;E reports for NICI III implementation institutions to ensure project activities are aligned to envisaged outcomes</li> <li>• Monitor and evaluate projects to ensure objective verification of project implementation, outputs and outcomes</li> <li>• Provide recommendations to the NICI III implementing institutions on how to improve the implementation process.</li> <li>• Facilitate external evaluation of FY 2011-2012 projects</li> <li>• Prepare project completion reports for sign off</li> <li>• Advocacy of NICI III Plan</li> </ul>
FY 2013 1 <sup>st</sup> Half	<ul style="list-style-type: none"> <li>• 1<sup>st</sup> review of FY 2013 project implementation progress</li> <li>• Provide technical advisory support to the NICI-III implementation process.</li> </ul>

#### 4.3. Project Development and Implementation Framework FY 2013-2015

A project toolkit has been designed to aid the formulation and development of projects to be implemented in the next phase of NICI – 2015.

## PART 5: CONCLUSION

Rwanda, through the NICI process, has achieved remarkable ICT developments in the last decade by creating an enabling environment and deploying necessary infrastructure as the foundation for ICT development. These achievements are unparalleled among developing countries and are frequently cited as a best example of a government's strategic resolve to harness ICTs as a tool for development. June 2011 marks the end of NICI II and the beginning of NICI III as Rwanda continues her ICT transformation.

Through lessons learned from previous plans, the NICI III formulation process has been inclusive in order to foster ownership of the plan ensuring outcomes are concretely defined. This has been achieved through the participation of all stakeholders that will be critical to the implementation process.

A major improvement to the NICI III plan is the adoption of annual/biennial project cycles. In the rapidly evolving ICT world, it is difficult to capture opportunities and challenges in rigid 5-year plans. This new approach will ensure that the initiatives adapt to socio-economic changes and emerging technologies. This phased approach will also ensure that the identified projects are executed with clear outcomes that are aligned with NICI III focus area mission and objectives supported by a toolkit that can facilitate rapid deployment of initiatives while capturing new opportunities.

The next five years will be the most critical to Rwanda's transformation into a knowledge-based economy as NICI III aims to accelerate service development and advance Rwanda's ICT and development agenda.



## APPENDICES

### APPENDIX 1: NICI II: KEY LESSONS LEARNED AND RECOMMENDATIONS

#### 1. *NICI Pillars and Projects*

The large scope of NICI strategy & plan demands an organising principle. However, the link between pillars and lead agencies became more tenuous during NICI II implementation process and this was pointed out as a possible reason why the project status varied considerably between different pillars. It also may explain lack of coordination under NICI II. In the evaluation, some lessons learned for overall plan implementation include:

- Lack of a committed leader in each pillar, with the responsibility and authority to guide implementation of all the projects within his or her brief.
- Lack of involvement of pillar/focus area communities that constantly monitor and support the implementation effort.
- Lack of ownership of initiatives by stakeholders.
- Lack of close coordination across areas, which would have ensured that dependencies and sequencing of activities were appropriate.

#### 2. *NICI Outcomes and Impacts*

While there are many positive stories from NICI II projects, there have been little objective and verifiable evidences to verify these claims. NICI II projects had clear outputs but almost no indicators to measure outcomes and impacts. One result of this has been real difficulty on carrying out an independent evaluation of NICI II. But more importantly, the lack of measurement at output and outcome levels prevented effective monitoring of progress, financial and operational, and evaluation in relation to ultimate goals. This needs to be remedied under NICI III implementation process.

#### 3. *NICI Governance*

During NICI I and II implementation, the institution mandated to manage the process (RITA) underwent considerable institutional and management change. While in 2008 the mandate and functions of RITA was transferred to the new Rwanda Development Board under RDB/ICT, organizational restructuring was not complete until recently. This has made it challenging for the smooth and coordinated NICI II project implementation. The NICI II evaluation pointed out this fact and called for a stable and clear governance structure to be put in place and made clear to all stakeholders. At the operational level, NICI II evaluation pointed out several challenges in Governance which include:

- Detailed project selection and sequencing based on dependencies were not clearly defined.
- Lack of staff and changing relations with collaborating MDAs made it very difficult to manage and execute an ambitious set of projects.
- Project analysis and design was not elaborated – need for results based framework (or logical analysis framework) with objectives, inputs, outputs, practical indicators of successful achievement of outputs and outcomes, targets for achievement etc.
- Lack of information sharing and weak project management – consolidated project management information was not shared among stakeholders to improve relevant projects.



#### 4. *Monitoring and Evaluation*

While there are M&E specialists in RDB/ICT and Ministry of ICT since 2008, detailed recommendations to improve the M&E structure of the NICI II implementation, which were offered by consultants working on the EDPRS and subsequently picked up in the NICI II MTR, were not instituted. Feedback from NICI II evaluation clearly pointed out the importance of structured M&E to capture real outcomes of the NICI initiatives. The evaluation also pointed to the fact that a coordinated M&E approach between RDB/ICT and MINICT is essential under NICI III.

#### **Key Recommendations for NICI III**

##### **Improve NICI Governance structure**

- Improve the efficiency and effectiveness of public institutions in implementing national ICT programs.
- Facilitate the monitoring and evaluation of ICT program based on socio-economic impact factor assessment.
- Streamline information sharing and knowledge management by decreasing the transaction costs between government institutions and agencies through transparent reporting framework.
- Strengthen the coordination of public-private partnerships initiatives.
- Promote the adoption and dissemination of best project management practices in implementing national ICT planned actions.



## APPENDIX 2: SAMPLE OF NICI III PROJECT PROFILE DOCUMENT

Parameter	Parameter description
<b>1. Project Implementer</b>	
<b>Ministry/District/Third party agency</b>	<i>Specifies Implementing agency: Ministry or third party agency</i>
<b>Project Title</b>	<i>Title of the project</i>
<b>Project Description</b>	<i>Summary description of the project</i>
<b>Link with prior NICIs/ and other ICT projects</b>	<i>Specifies link to previous NICIs I and II</i>
<b>Implementation prerequisites/dependencies</b>	<i>Lists prerequisites such as prior projects, research, infrastructure, and other requirements where applicable</i>
<b>Contact Person in Parent Ministry</b>	<i>States contact person if identified or TBD (To be determined)</i>
<b>2. Socio-economic Impact</b>	
<b>Background Information</b>	<i>Provides brief background and situational analysis of project</i>
<b>Project Objectives</b>	<i>States links with EDPRS &amp; sector strategy</i>
<b>NICI goal</b>	<i>States specific NICI goal to which the project is linked</i>
<b>Project Activities</b>	<i>States specific activities to be undertaken of the project</i>
<b>Project Outputs</b>	<i>Immediate results to be realized when project activities are implemented</i>
<b>Output Indicators</b>	<i>Objectively measurable indicators resulting from of completing the outputs</i>
<b>Project Beneficiaries</b>	<i>States the beneficiaries of the project</i>
<b>Project Outcomes</b>	<i>Describes the medium term desired results benefitting the intended beneficiaries of the project</i>
<b>Outcome Indicators</b>	<i>Objectively measurable indicators of success in achieving desired outcomes</i>
<b>Location</b>	<i>States location of the project</i>
<b>Impact on Growth</b>	<i>Summary of likely impact on growth (in qualitative terms)</i>
<b>Impact on Income Distribution &amp; Poverty</b>	<i>Summary of likely impact on income distribution and poverty (in qualitative terms)</i>
<b>Impact on Job Creation</b>	<i>States impact on job creation, either number of jobs to be created directly &amp; indirectly by the project</i>
<b>Impact on Skills Development</b>	<i>Summary of likely impact on training &amp; skills development</i>
<b>Impact on Export</b>	<i>Estimated, if any, impact on foreign exchange earnings and reserves</i>
<b>Impact on Public sector Service Delivery</b>	<i>Estimated impact on Government Service Delivery</i>
<b>Other Impacts (specify)</b>	<i>Other anticipated impact of the project</i>
<b>3. Project Costs</b>	
<b>Main Expenditure Category</b>	<i>Specifies whether project expenditures are an: Investment (INV), Technical Assistance (TA), Study (ST), Training/Capacity building (CB), Running cost (RC)</i>



<b>Estimated Development Cost</b>	<i>States basis of development cost estimate</i>	
<b>Annual Operating Costs</b>	<i>States basis of annual operating cost estimate</i>	
<b>Project Lifetime (years)</b>	<i>Number of years the project is expected to be operational</i>	
<b>Medium Term Budget Estimate</b>	<i>Mid-term budget estimate</i>	
<b>2011-12 Estimates</b>	2012-13 Estimates	2013-14 Estimates
<b>4. Project Financing</b>		
<b>Potential Financing Sources</b>	<i>E.g. GoR, grants, soft loans, private finance</i>	
<b>Potential Role of Private sector</b>	<i>E.g. potential operating concession, PPP, or Joint Venture (JV)</i>	
<b>5. Project Milestones</b>		
<b>Pre-appraisal Study</b>	<i>Expected start &amp; finish dates of the project</i>	
<b>Full Appraisal</b>	<i>Expected completion date</i>	
<b>6. Project Implementation, Management, Monitoring &amp; Evaluation</b>		
<b>Supporting Agencies and Responsibilities</b>	Supporting agency	Assigned responsibility
	<i>Specific supporting agencies</i>	<i>Assigned responsibilities for each supporting agencies</i>
<b>Management/Coordination Responsibility</b>	<i>Specifies agency responsible for management/coordination of the project</i>	
<b>Implementation Responsibility</b>	<i>Specifies what agency that will be implementing the project, i.e. project manager</i>	
<b>M&amp;E Responsibility</b>	<i>Specifies monitoring and evaluation responsibility in addition to RDB</i>	

A planning toolkit for future projects to coherently and quickly aid the formulation and implementation of projects in the next phase of NICI III i.e. FY2013-2015 projects has been developed. It elaborates the roles and responsibilities of stakeholders consulted during the formulation of NICI formulation that will continue the same role in the development of new projects for the next phase. It also includes a log frame for each project that will ensure that projects are adequately monitored throughout the implementation phase.

### APPENDIX 3: NICI III STAKEHOLDERS

NICI III formulation has been driven by stakeholders to maximise ownership. The formulation structure was as follows:

- High Level Steering Committee (HLSC)
- Coordination Technical Committee (CTC)
- NICI III Secretariat
- Focus Area Working Groups (FWG)

#### High Level Steering Committee (HLSC)

The HLSC, chaired by the Minister of ICT, was composed of ministers of relevant ministries, the President of the High Court, CEO of RDB, Chairman of PSF, a Member of Senate, and Permanent Secretary of the Ministry of ICT.

#### *Roles and responsibilities:*

- Guide the NICI III formulation process and furnish critical high-level decisions
- NICI III advocacy in government
- Leadership and ownership of programs in their areas of expertise

#### Coordination Technical Committee (CTC)

The CTC, chaired by the Permanent Secretary of the Ministry of ICT, is composed of Permanent Secretaries, technical leaders of relevant ministries and other government agencies and private sector experts.

#### *Roles and responsibilities:*

- Provide technical inputs at NICI III related workshops/meetings.
- Advocate NICI III to respective professional peers and to other stakeholders
- Facilitate cloud-sourcing/consultation process of NICI III (e.g.; radio/TV shows, mobile based consultation, web based discussions, call-in discussions, etc.)

#### NICI III Secretariat

The secretariat is composed of technical and logistical staff that provides direct support to the NICI III process.

#### *Roles and responsibilities:*

The secretariat is the coordinating body for the NICI III formulation process. Logistical details, advocacy events, information management, and compiling the NICI III plan document.

#### Focus Area Working Groups (FWG)

Focus Area Working Groups (FWG) provide expert insight into the NICI III focus areas. FWG, chaired by sector experts, are comprised of government officials, the private sector, higher education institutions and civil society.

#### *Roles and responsibilities:*

FWG identified NICI III cluster priorities and respective programs. FWG are expected take ownership of focus area priorities and programs by supporting and monitoring the NICI III implementation processes.



## APPENDIX 4: NICI-2015 TASK FORCE & TEAM OF RESOURCE PERSONS

Task Force	
<b>Hon. Ignace Gatare, Dr.</b>	Minister in charge of ICT in the Office of the President
<b>Hon. Protais Musoni</b>	Minister of Cabinet Affairs
<b>Hon. Minister James Musoni</b>	Minister of Local Government
<b>Ambassador Charles Murigande</b>	Former Minister of Education
<b>Ambassador Vincent Karega</b>	Former Minister of Infrastructure
<b>Hon. John Rwangombwa</b>	Minister of Finance
<b>Johnston Busingye</b>	President of the High Court
<b>John Gara</b>	Chief Executive Officer, RDB
<b>Senator Wellars Gasamagera</b>	Chairman, Parliamentary ICT Steering Committee
<b>Sharon Haba</b>	Permanent Secretary, Ministry of Education
<b>Cyrille Turatsinze</b>	Permanent Secretary, Ministry of Local Government
<b>Caple Karangwa, Major</b>	Head of Communication & Information Systems MoD
<b>Emmanuel Hategeka</b>	Permanent Secretary, Ministry of Trade & Commerce
<b>Felix Gahamanyi</b>	Communication & Information Systems MoD
<b>Dr. Richard Gakuba</b>	Director General of e-Health, Minister of Health
<b>Patrick Nyirishema</b>	Head of ICT Department, RDB
<b>Patrick Kabagema</b>	Managing Director-Rock Global Consult
<b>Solange Mutezintare</b>	Project Manager, RDB
<b>Mike Hughes</b>	MINEDUC
<b>Twiringiyimana Remy</b>	MINEDUC
<b>Daniel Murenzi</b>	MINISANTE
<b>Paul Barera</b>	Rwanda Telecenter Network
<b>Jeffrey Kayonga</b>	Infotech
<b>Peter Kimacia</b>	C4IDEA
<b>Nina Murisa</b>	CMAC
<b>Yves Kimenyi</b>	Head of IT/ MTN RWANDA
<b>Andrew Nyanvumba</b>	CEO-Digitech Solutions Ltd
<b>Clement Uwajeneza</b>	Axis
<b>Bosco Sebabi</b>	Director of Electronic Payment Systems, BNR
<b>Jimmy Mukasa</b>	MININFRA
<b>Eddy Kayihura</b>	Lead Technical Manager, RDB/ICT
<b>Didier Nkurikiyimfura</b>	Division Manager, IT Security - RDB/ICT
<b>Sibomana Simon</b>	Digitech Solutions Ltd
<b>Chris Mulola</b>	Vice President /Internet society Rwanda chapter
<b>Moses Turatsinze</b>	M&E Officer RDB/ICT
<b>Grace Mutsinzi</b>	Division Manager, Planning & Coordination RDB/ICT
<b>Rita Kamanzi</b>	Division Manager, ICT Advisory RDB/ICT
<b>Martin Carlos Mwizerwa</b>	Head of Planning, IT Planning & Coordination - RDB/ICT
<b>Paula Ingabire</b>	Operations Advisor - RDB/ICT



James Musinguzi

Project Manager RDB/ICT

**RESOURCE PERSONS**

<b>Lucy Mbabazi</b>	Policy and Strategy Advisor RDB/ICT, Lead Consultant
<b>Serge Mushinzimana</b>	National Consultant
<b>Leonard Mungarulire</b>	National Consultant
<b>Lillian Mutesi</b>	Consultant
<b>Felix Mutangana</b>	Consultant
<b>Astrid Øksnevad</b>	Consultant
<b>Prof. Clement Dzidonu</b>	UNECA Consultant
<b>Atsushi Yamanaka</b>	JICA Consultant
<b>Dr. Jonathan Miller</b>	M&E Consultant