Executive Summary Rwanda

ICT centric innovation
ecosystem country review

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I am proud and pleased to present this study, the second of a series of country reviews that can help strengthen the capacity of ITU Member States to integrate ICT innovation in their national development agendas. This ICT Centric Innovation Country Review provides a roadmap and a framework for the journey toward a digital economy.

Innovation plays a major role in the global development agenda by enabling digital transformation and creating new and improved services for citizens. Bringing multiple stakeholders and sectors together to strengthen innovation ecosystems is essential to unlocking opportunities and ensuring sustainability. ”

Brahima Sanou
Director, Telecommunication
Development Bureau, ITU

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The key to winning the future for the next generation is job creation through the powerful combination of innovation and entrepreneurship.

Under the Smart Rwanda Master Plan, Rwanda's digital transformation journey has taken off, but a lot more remains to be done. The Digital Innovation Framework will be instrumental in accelerating the growth and maturity of our technology ecosystem and enabling the young people of Rwanda and Africa create tech profitable enterprises that will transform education, healthcare, finance, government and other key domains of our economy. ”

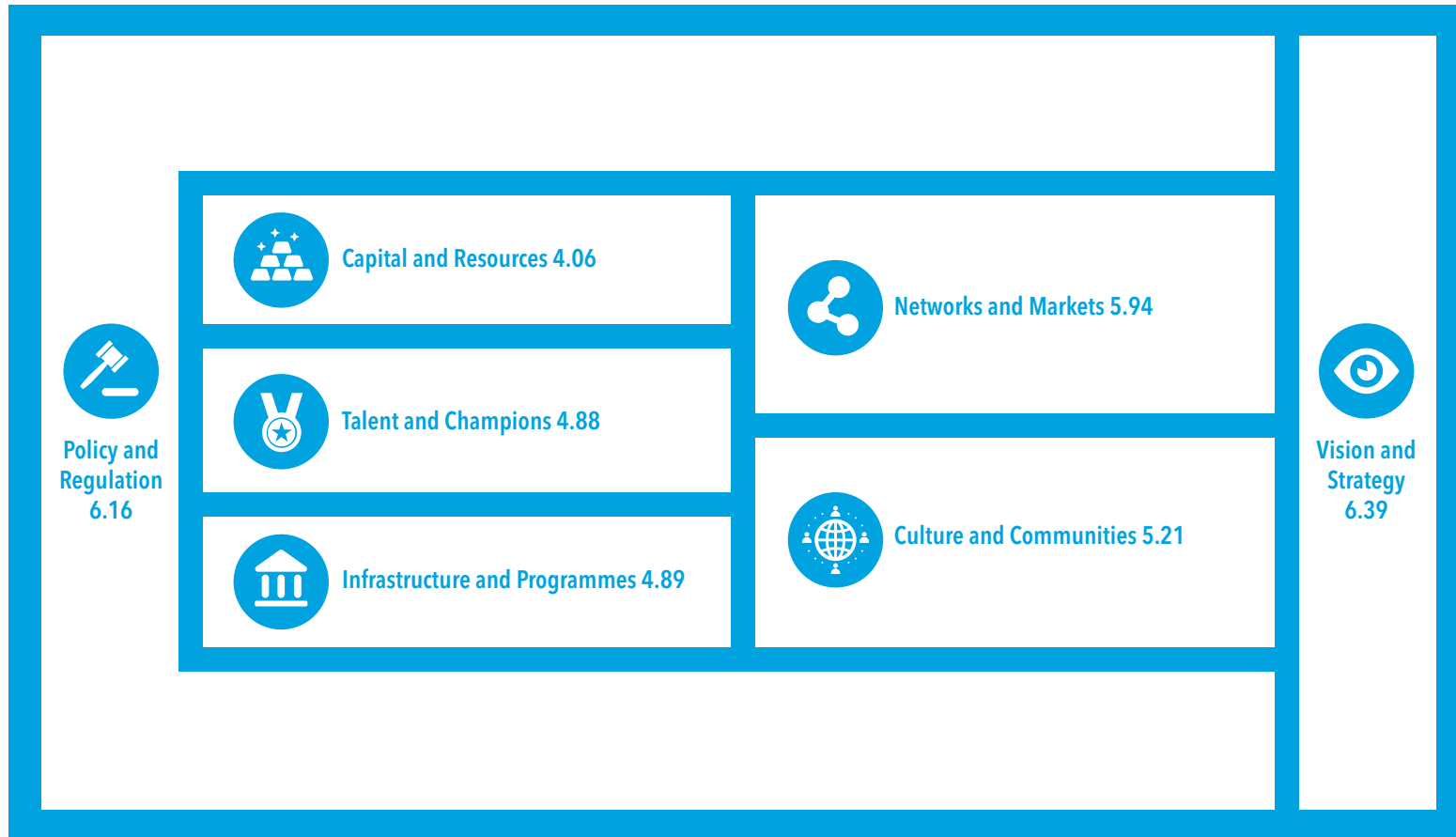**Hon Jean Philbert Nsengimana**
Minister of Youth & ICT,
Rwanda

This is a brief summary of the ICT Centric Innovation Ecosystem Country Review for Rwanda, available from the ITU. That report provides insights into key issues related to innovation in Rwanda, based the views and needs of the 6 main stakeholder groups, Public Sector, Private Sector, Entrepreneurs, Entrepreneurial Support Networks, Finance, and Academia, and the inputs of global experts, fellow international organizations and good practice owners from around the world.

ITU, and especially the BDT, has been actively fostering ICT led development for numerous years. In 2014, at the ITU WTDC in Dubai (United Arab Emirates), its membership approved a strategic and operational plan for the BDT that includes strengthening ITU Member State capacity to integrate ICT innovation in national development agenda. This priority has been reaffirmed in SDG goal 9.

▶ Rwanda has been rapidly developing in recent years. The country met most MDGs by 2015 and has seen 8% or higher economic growth since 2001.

▶ While poverty remains an issue, with a GNI of 700USD per capita in 2015 and a heavy reliance on subsistence farming, the government is pursuing an aggressive digital strategy to transform the country into a knowledge based-economy.

▶ Rwanda's ICT centric innovation ecosystem is currently at an early stage of development, but rapid progress is happening with the key pillars of support networks, capital and talent.

▶ Strong leadership, a clear vision and investments in a national fiber optic backbone, 4G and other digital infrastructure have prepared Rwanda for success as the ecosystem develops.

▶ The market's capacity to absorb ICT products remains limited by income levels, low penetration of smart devices and digital literacy.

▶ Entrepreneurs have opportunities to develop solutions to domestic needs, strengthening ICT awareness and usage and bringing higher value to many sectors of the economy.

▶ Public procurement is helping to support the market, but innovators need to be better organized to win large businesses with government.

ITU-D Innovation Platform: Innovation Ecosystem Canvas

Capital and Resources 4.06

Networks and Markets 5.94

Policy and
Regulation
6.16

Talent and Champions 4.88

Vision and
Strategy
6.39

Infrastructure and Programmes 4.89

Culture and Communities 5.21

This Ecosystem Canvas is an at-a-glance overview of the key components in the innovation ecosystem. Scores are based on stakeholder interviews on a 0-10 scale.

Current landscape

VISION AND STRATEGY:
The need for a clear direction for the ecosystem, an agreement on major issues and collaboration in moving forward. In Rwanda, the Vision 2020, NICI and SRMP strategies have set a strong direction for the ecosystem. However, these haven't fully incorporated roles for many ecosystem stakeholders, and going forward need to prepare to shift to private sector leadership.

CAPITAL AND RESOURCES:
Investment, public and private, domestic and international, and funding for research, support programmes and other key activities. Very little private investment is available in the ecosystem. Most resources come from government procurement, with some additional resources coming from abroad. Some efforts are trying to address this, but are at an early phase.

NETWORKS AND MARKETS:
Access to domestic, international and B2B markets. Work of formal and informal networks and clusters. Low ICT adoption and incomes have limited the growth of the domestic market. Regional integration and public procurement have supplemented the domestic market. Clusters are underutilized, and networks aren't comprehensive, but both are present.

INFRASTRUCTURE AND PROGRAMMES:
Traditional, hard infrastructure (esp. connectivity) and soft (knowledge) infrastructure, including programmes to foster innovation. Hard infrastructure is well established. But, last mile connectivity remains an issue in some areas. ICT usage is still very low, due to high costs and low awareness. Soft infrastructure is underdeveloped, especially outside Kigali.

TALENT AND CHAMPIONS:
The availability and distribution of appropriate technical and soft skills, and the work of leaders in the ecosystem. Both soft skills and technical skills need to be strengthened, especially in terms of hands on experience. Good practices, such as CMU, AIMS, ALU, ICTP and Rwanda Centers of Excellence represent early efforts by the government and ecosystem to address these issues through improved training and talent mobility.

CULTURE AND COMMUNITIES:
Entrepreneurial interest, risk acceptance and a culture of innovation, along with the communities to help foster them. Entrepreneurial interest is driven by a need to create new businesses and jobs for young people. Risk aversion is a minor issue, but is made worse by vulnerability to economic shock, communities are working, but at an early phase.

POLICY AND REGULATION:
The essential work of government, including policies related to taxes, immigration, IP, trade, and other issues. Generally, the public sector is engaged in their role as stakeholders. Some stakeholders noted the potential of collaboration systems and would like to see their wider adoption, especially on specific policies, such as taxation and procurement procedures.

Key points

ICT sector skills gap

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
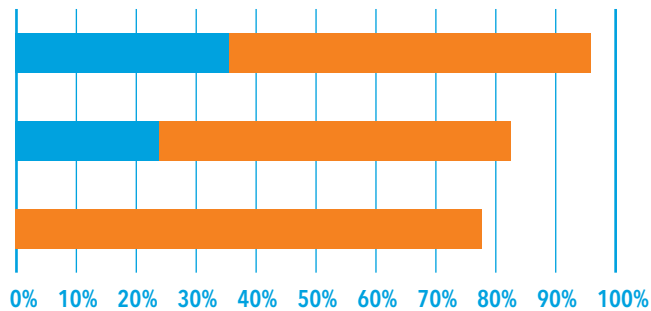
Skills gap

The lack of appropriate human capital was a major issue raised by respondents. Though the number of available graduates in technical soft (communications and business) and support (legal, administrative and accounting) skills were noted as issues, hands on experience in these areas was potentially a bigger issue.

Mobile money in Rwanda

Number of subscribers **Volume of transactions** **Value of transactions** *(in Million RwF)*
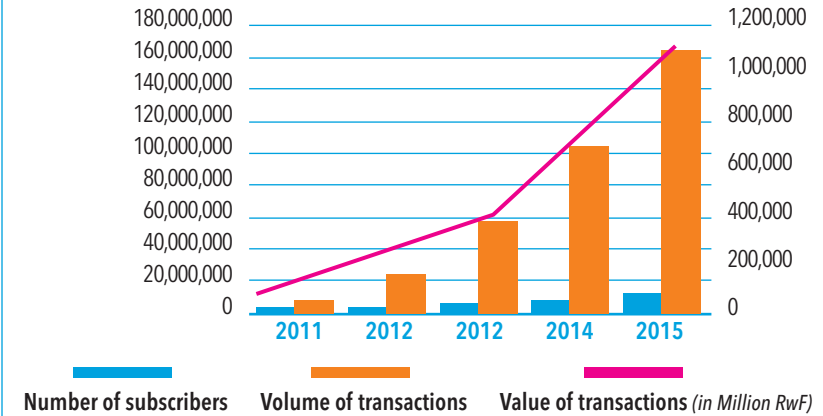
Mobile payments	2011	2012	2013	2014	2015
Number of subscribers	639,673	1,440,541	2,480,449	6,480,449	7,663,199
Volume of transactions	3,420,885	22,191,674	57,147,777	104,800,000	168,612,455
Value of transactions *(in Million RwF)*	51,024	161,808	330,378	691,500	1,093,497

Mobile Money

It was often reported that consumers were slow to adopt new technologies. However the rapid adoption of mobile money shows that this likely stems from the appropriateness and perceived value of solutions, rather than other factors.

Innovation strategies

The NICI, Smart Rwanda Master Plan, and Vision 2020 strategies have led to tremendous progress, and upcoming projects, such as the Kigali Innovation City have the potential to further accelerate ecosystem development.

RWANDA

KIGALI

Fibre optic access

The development of communications infrastructure has been rapid, bringing connectivity to all districts of the country. Issues of ICT awareness and usage still limit markets, but these developments are encouraging.
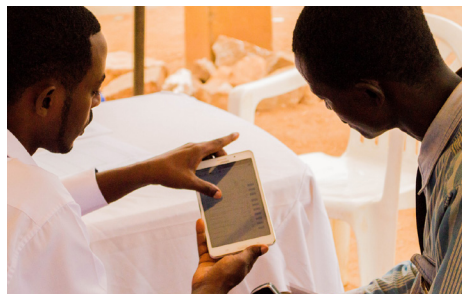
Irembo

As in many developing contexts, the ecosystem leader and the primary consumer of ICT services is the public sector through public service transformation and similar projects. This is often essential in establishing an ecosystem, but a shift to private leadership and consumer or B2B products should be a priority.

Good practices

Telecentre

The Rwanda Telecentre Network provides basic level access to ICT tools and infrastructure, allowing many people, especially in rural areas, who would not otherwise have access to use ICT services. They were discussed as a strong base for expanding rural infrastructure, as well.

Outreach efforts

ICT outreach efforts, including promotion of government and banking services, providing an introduction to ICT services. It has been seen as responsible for much of the rapid acceptance of mobile money services and the adoption of the public service transformation efforts.

Hehe Internship program

When Hehe Labs found that they could not access graduates with the skills and experience they needed, they launched a 6 month training and internship programme to train potential programmers and designers. This mirrors good practices observed in many ecosystems.
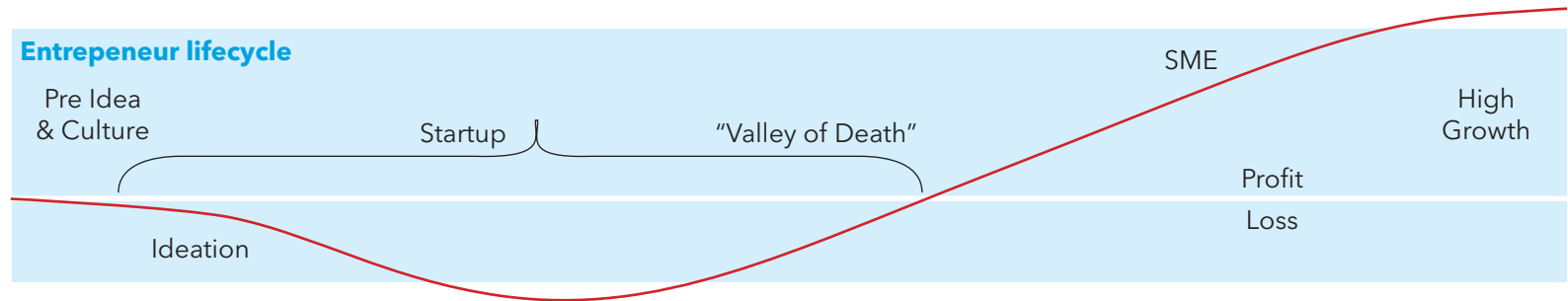
KLabs

Support services through KLabs and Impact Hub Kigali, are a good start toward developing innovation support networks, if only a start. Notable are KLab's "Face the Gorillas" investment event and Impact Hub's work developing an entrepreneurial community.

Carnegie Mellon Class

Attracting CMU Rwanda is a good practice in efforts to strengthen human capital in Rwanda. CMU brings internationally recognized ICT education to the country, has experience developing key connections with the private sector, and is proposed to anchor Kigali Innovation City.

Stakeholder interface canvas

Entrepeneur lifecycle

Pre Idea & Culture

Startup

"Valley of Death"

SME

High Growth

Profit

Loss

Ideation

Entrepreneurship Phase	Pre-Idea	Ideation	Startup	The "Valley of Death"	SME
Entrepreneurs	Entrepreneurial Interest	Engage with problems	Develop business models	Build collaboration	Expand
Finance	Research funding	Seed funding	Angel investment	Venture capital	Business finance & loans
Entrepreneurial Support	Entrepreneurial events	Hackathons & competitions	Coworking & support	Incubators & accelerators	Business association
Private Sector	Success stories	Research programs	Lab programs	B2B & Support services	Skill training programs
Academia	Entrepreneur community	Basic research	Spin offs	Soft skill training	Human capital
Public Sector	Vision & strategy	IP & R&D support	Tax support	Public procurement	Trade policy

The stakeholder interface canvas quickly analyses the work of the ecosystem in covering the key activities to support innovations from pre-ideation to high growth. It describes the role each stakeholder group can take on to support entrepreneurs and innovators at each stage of their lifecycle. It is colour coded to show areas which are well-supported (green), insufficient (yellow), missing (red) or weak, but with specific programmes underway (blue).

Recommendations

The following recommendations were developed based on the needs and priorities of the stakeholders in the Rwandan innovation ecosystem. Each is presented alongside an example of a good practice and a potential project which would contribute to achieving the recommendation.

CREATION OF SKILLED LABOUR IN THE MARKETPLACE

There is a need to guide more young people into ICT careers, through community outreach, mentorship and strengthened curricula. Along with this, stronger links should be fostered between the public sector and academia to provide hands on experience and more specific skills training. Finally, it may be necessary to facilitate firms hiring international talent as a short term solution to the lack of human capital.
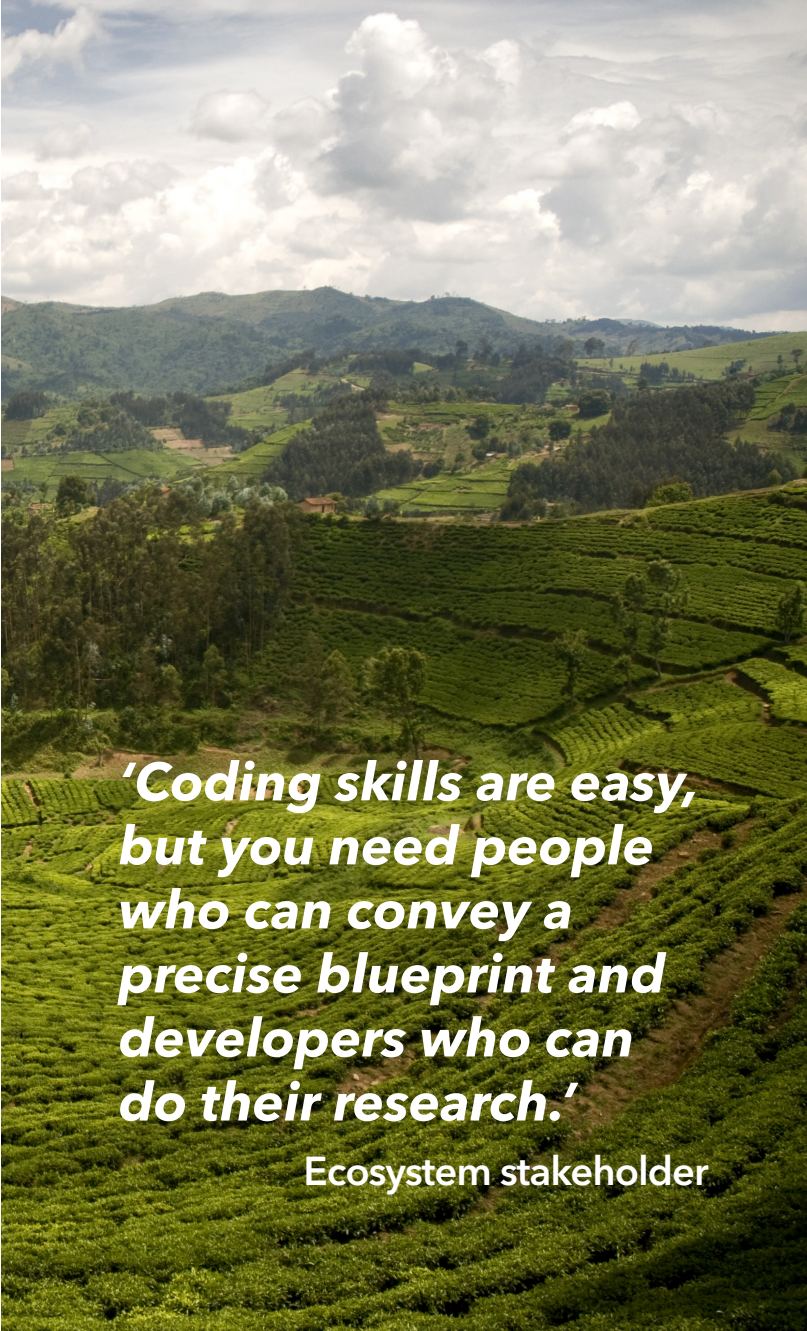
Good Practice: Start Up Chile has successfully attracted international entrepreneurs, with part of the requirements being that they serve as mentors and work with Chilean education.

Project: Foster Young People in ICT Careers: A combination of expanded outreach for ICT careers and a programme to develop ICT curricula, mentorship and internships together with the private sector. Estimated cost: $2 million

GUIDING INNOVATION ACTIVITIES

The process of public service transformation should be accelerated and completed, in parallel with the establishment of public

'Coding skills are easy, but you need people who can convey a precise blueprint and developers who can do their research.'

Ecosystem stakeholder

data sandboxes to encourage entrepreneurship based on big data from the public sector. Entrepreneurship and innovation focusing on domestic issues should also be incentivized, using ICT innovation to benefit development efforts. Programmes should also try to bring international entrepreneurs and firms into the ecosystem to develop more success stories.

Good Practice: The Kenya Revenue Authority is extending their innovation leadership via MoUs with various key innovation networks and an annual competition to foster innovation based on public data.

Project: Accelerate and Complete Public Service Transformation: Develop a digital agency to complete public service transformation, and develop API, open data and other standards, and create an open data sandbox service through a lab or cluster. Estimated cost: $2.5 million

STRENGTHEN INFRASTRUCTURE AND ICT MARKETS
To improve domestic markets for innovative ICTs, there is a need to strengthen connectivity among poorer communities through subsidies and last mile solutions. Along with this, there should be an effort to improve public trust and infrastructure resilience through cybersecurity investment and similar efforts.

Good Practice: The Rwanda Telecentre Network has been highly successful at providing access to ICT services in rural areas. Their network can be leveraged to further develop infrastructure.

Project: Strengthen Connectivity Among Poorer Communities: Foster a TTO programme and work together with domestic and international ecosystem stakeholders to leverage the RTN to develop last mile solutions. Estimated Cost: $2 million

DEVELOP SUPPORT FOR ENTREPRENEURSHIP
There is a need to develop support networks, investment, B2B services, and soft infrastructure. These are key supports that entrepreneurs will need to succeed in Rwanda as the ecosystem develops. Also, developing an ICT bridge cluster, encouraging collaboration between ICT firms and other key verticals will help innovators develop.

Good Practice: The Input Programme in Hungary works to develop education, mentoring and market access for innovators in that country, in part by a network of support services throughout the country.

Project: Rwandan Hub Network: Create a central board to provide good practices and resources for hubs and labs, connect innovators and services, and connect services with international resources, working with local ecosystems and existing networks to do so. Estimated Cost: $5 million, $5 million matching funds

CATALYSE AND DEVELOP A SUSTAINABLE SINGLE REGIONAL DIGITAL MARKET
Working together with Smart Africa and neighbouring countries run reviews of ICT centric innovation

ecosystems, find possibilities to align programmes and policy and develop linkages, and create a sharing platform for good practices on a regional level.

Good Practice: EIT Digital and Startup Europe in Estonia have mobilized a pan-European network of over 130 top ecosystem stakeholders to strengthen ICT innovation across the EU.

Project: Fostering a Single Regional Digital Market: Develop country reviews, an experience sharing platform and shared ICT policy frameworks throughout the Smart Africa countries.
Estimated Cost: $1.5million, $1 million matching funds

REVISE LEGAL FRAMEWORKS AND DEVELOP AN IMPLEMENTATION PLATFORM
An institution for engagement between stakeholders, should gather for regular consultation and collaboration, developing new projects, implementing these recommendations and helping to

revise legal regimes connected to taxes, immigration, IP, public procurement and other areas related to innovation.

Good Practice: The Supply Side Optimizer Innovation Agency Model developed by NESTA works to connect the public and private sectors and develop partnerships and linkages.

Project Ecosystem Bridging and Implementation Institution: Create an agency to develop programmes and policies in collaboration with other stakeholders. Estimated Cost: $600,000, plus project funds.

The innovation ecosystem in Rwanda has been undergoing rapid development, and a number of fundamental shifts which have positioned the ecosystem for success in a number of key ways. The proposals presented here suggest ways to build on those shifts and more effectively develop an innovative economy. The report started with a workshop bringing together key stakeholders and

laying out their vision and priorities for the ecosystem in a collaborative document. Continuing this journey, the report presents tools, methodologies and frameworks that bring the benefits of digital innovation, and it suggests where the study can be expanded and repeated, especially following the development of the ITU-D Innovation Policy Toolkit, which will detail the process for Member States to replicate.

Many opportunities remain untapped in order to create new services, new jobs and new growth for Rwanda. Successful policy experimentation in Rwanda will require that each stakeholder think critically about their role, their opportunities, and their commitment. Much work remains to convert such a report into tangible programmes, but the tools and framework in this report will empower stakeholders to accelerate their journey towards transforming Rwanda into an innovation driven society.
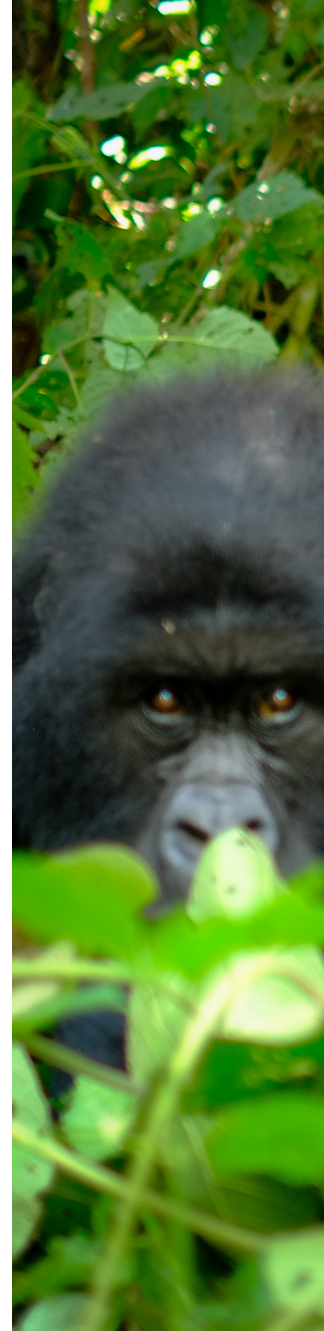
'93% of the population may be covered, but not 93% of the country. You can go and check in with the gorillas and have full signal, but it's not everywhere.'

Ecosystem stakeholder

To **implement and develop** the above recommendations, specific initiatives and projects have been suggested, totalling **USD $20 million** with approximately 50% driven by the public sector, and roughly 30% by the private sector as matching funds and initiatives, and the rest by international organization with vested interest in the common regional agenda. These suggestions offer by no means definitive budgets or project plans, but rather meant to give a good example of what it will take to start changing the direction of digital innovation in Rwanda.

The ultimate goal of this report is to empower the stakeholders to take advantage of the preparations which have laid the groundwork for success and to drive their own destiny in creating a vibrant ecosystem. By empowering these stakeholders, not only can Rwanda become a regional leader in ICTs with an innovative private sector and all of its associated economic benefits, but innovation can transform the lives of people on the ground, through new technologies and services.

Acknowledgements