

**MINISTRY OF INFORMATION  
AND COMMUNICATIONS**



**GOVERNMENT OF SIERRA LEONE**

**SIERRA LEONE  
NATIONAL DIGITAL DEVELOPMENT STRATEGY**

**NATIONAL STRATEGY FOR THE DEVELOPMENT OF AN INCLUSIVE DIGITAL  
SIERRA LEONE EMPOWERED BY A DIGITAL ECONOMY**

**DECEMBER 2022**

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## FOREWORD

The world is at the **dawn of a new digital era and the 4<sup>th</sup> Industrial Revolution**. Sierra Leone must **act quickly** to leverage the new technologies and leapfrog its development. They represent an opportunity that, well harnessed, will feed into the national **aspirations of a middle-income digital economy**. To start this **collective journey** and continue addressing the significant amount of work that must be done, the Government of Sierra Leone seeks to put in place a **harmonized national strategy** for digital development that **guides all players**.

**Digital transformation is a gigantic** task that requires the coordinated efforts of government, private sector, development partners, and citizens. The co-actors and co-creators are particularly critical because of their roles in implementing the foundational elements for digitalization including electricity, connectivity infrastructure, rights of ways, literacy, and digital competence.

**Sierra Leone has made incremental strides with remarkable milestones** starting with first internet connection in 1996, the launch of the first Mobile Network Operator in 2000, the passage of the Telecommunications Act in 2006, the formation of the Ministry of Information and Communications in 2007, the release of the first national ICT Policy in 2009 along with its subsequent review in 2017, the launch of the 3G network in 2011 and 4G in 2015, the connection to the ACE submarine optical fiber cable in 2013, and the launch of the Directorate of Science, Technology and Innovation in 2018 among other national achievements. This journey has also seen the establishment of the **National Telecommunications Commission** in 2006 to its **transformation into the National Communications Authority in 2022**.

The development of the National Digital Development Strategy (NDDS) **is both necessary and essential for Sierra Leone in the quest for a digital economy**. The Strategy lays the framework to harness digital technologies boost economic development, boost competitiveness, diversify opportunities for national development and create a sustainable **knowledge-based society**. The Strategy also fortifies efforts to bridge digital and economic divides by including communities, focusing on women, rural communities, disadvantaged groups (e.g., PWD).

The NDDS will enable Sierra Leone to thrive in the digital age through, one, **getting things done in a coordinated manner**, two, **transforming from the siloed status quo to the whole-of-government and whole-of-society approach while**, three, **fortifying digital engagement across sectors and stakeholders**. The collaborative efforts between the co-actors and co-creators will synergize the emerging digital economy. The ultimate endgame is to **create opportunities and benefits for the people of Sierra Leone** through improved their quality of life and livelihoods through digital tools and opportunities, tapping emerging digital human capital for education, research and innovation driven by digital technologies while partaking the collective benefits of a digital economy.

## PREFACE

The advent of digital economies presents a great opportunity for the developing world. The Republic of Sierra Leone **risks** to be further **left behind** if it does not leverage the **immense opportunities** presented by digital technologies. Recent assessments have demonstrated the existence of **digital gaps between Sierra Leone compared with regional peers**. The gap continues widening as these countries have accelerated their ambitious digital strategies while, **internally**, the country faces the challenges of millions of unserved and underserved in the population.

There are many issues that need strategic intervention in the national digital ecosystem. **Some sectors of the economy have taken the lead** and are pushing for increased digitalization while **many others are still in an embryonic stage** such as e-commerce and digital entrepreneurship among others. Coordination and collaboration have been limited across government players with a **high prevalence of effort duplication**. Interoperability of systems, the cornerstone of digital government and society has remained a pressing issue. The human capital development sphere (education, training and professional development) agriculture, and healthcare have made great improvements individually, but their **siloed digital actions have not demonstrated sustainability**. Development partners are convinced of the potential for digital advent in Sierra Leone and are willing to contribute. Therefore, a **coordinated strategy is of the essence** to ensure to steer the digital transformation towards the envisaged digital economy.

The NDDS has been designed to complement with the National Digital Development Policy (NDDP). The NDDS seeks to start the implementation of the avowed objectives in the short to medium term. Intensive consultations with multiple stakeholders across sectors have been done to ensure inclusivity and a holistic approach. The first round of consultations for the NDDS started in 2019. In 2021 more players were engaged through workshops and interviews. Alignment has been done with overarching national plans such as the Medium-Term National Development Plan (NDP) and National Innovation and Digital Strategy (NIDS) as well as regional level plans such as the Smart Africa Group. Digital technologies touch every aspect of society. Therefore, the Strategy addresses seven focus areas for which specific strategic objectives are defined in consideration of the specific situations or contexts.

The specific objectives highlighted in the Strategy are aimed at **ensuring affordable connectivity with improved infrastructure** (colocation, metro and rural deployments), **demand-led digital educational content** in education and training institutions, **building the blocks for government e-services** (harmonized ID, data sharing, ICT standards and architecture), **revamping sectoral digital strategies** (such as financial inclusion, e-health and e-agriculture among others).

This Strategy defines a **blueprint for all actors and reference point in the continued engagement** for efficient and effective **digital transformation for inclusive digital economy in Sierra Leone** with middle-level income country by 2039.

**Hon. Mohamed Rahman Swaray**  
**Minister of Information and Communications**  
**Government of Sierra Leone**

## ACRONYMS

<b>ACE</b>	Africa Coast to Europe
<b>ACH</b>	Automated Clearing House
<b>AFCFTA</b>	African Continental Free Trade Agreement
<b>AI</b>	Artificial Intelligence
<b>AMIS</b>	Agriculture Market Information System
<b>AML/CFT</b>	Anti-Money Laundering/Combating Financing of Terrorism
<b>API</b>	Application Programming Interface
<b>ARWI</b>	Africa Regulatory Watch Index
<b>AU</b>	African Union
<b>B2B</b>	Business to Business
<b>B2C</b>	Business to consumer
<b>BAFS</b>	Boosting Agriculture and Food Security
<b>BPO</b>	Business Process Outsourcing
<b>BSL</b>	Bank of Sierra Leone
<b>BSO</b>	Business Support Organizations
<b>BTCA</b>	Better than Cash Alliance
<b>CAC</b>	Corporate Affairs Commission
<b>CAPEX</b>	Capital Expenditure
<b>CERT</b>	Computer Emergency Response Team
<b>CI</b>	Critical Infrastructure
<b>CICO</b>	Cash-In/Cash-Out
<b>CLS</b>	Cable Landing Station
<b>COE</b>	Centre of Excellence
<b>COTS</b>	Commercial Off-The-Shelf
<b>CRVS</b>	Civil Registration and Vital Statistics
<b>CSIRT</b>	Computer Security Incidence Response Team
<b>DDT</b>	Digital Development Team
<b>DFS</b>	Digital Financial Services
<b>DLT</b>	Distributed Ledger Technology
<b>DPPI</b>	Directorate of Planning, Policy and Information
<b>DSTI</b>	Directorate of Science, Technology and Innovation
<b>DTT</b>	Digital Terrestrial Television
<b>ECOWAN</b>	ECOWAS Wide Area Infrastructure
<b>ECOWAS</b>	Economic Community of West African States
<b>EFT</b>	Electronic Fund Transfer
<b>e-ID</b>	electronic Identity
<b>EISA</b>	Enterprise Information Service Architecture
<b>eKYC</b>	electronic Know Your Customer
<b>EPASL</b>	Environment Protection Agency, Sierra Leone
<b>ESO</b>	Entrepreneur Support Organization
<b>FCO</b>	Foreign and Commonwealth Office
<b>FinTech</b>	Financial Technologies
<b>FQSE</b>	Free Quality School Education
<b>FTTx</b>	Fibre to the Premise



<b>G2B</b>	Government to business
<b>G2C</b>	Government to Citizen
<b>G2G</b>	Government to Government
<b>Gbps</b>	Gigabytes per second
<b>GDP</b>	Global Domestic Product
<b>GDPR</b>	General Data Protection Regulation
<b>GEI</b>	Global Entrepreneurship Index
<b>GIS</b>	Geographic Information System
<b>GNI</b>	Gross National Income
<b>GoSL</b>	Government of Sierra Leone
<b>GSCCC</b>	Global Cybersecurity Capacity Centre
<b>HCD</b>	Human Capital Development
<b>HCI</b>	Human Capital Index
<b>ICT</b>	Information and Communication Technology
<b>ID</b>	Identification
<b>IDMS</b>	Identity Management System
<b>IFMIS</b>	Integrated Financial Management Information System
<b>IMC</b>	Independent Media Commission
<b>IoT</b>	Internet of Things
<b>IP</b>	Internet Protocol
<b>IPR</b>	Intellectual Property Rights
<b>ISOC</b>	Internet Society
<b>ISP</b>	Internet Service Provider
<b>IT</b>	Information Technology
<b>ITF</b>	Inter-operability Technical Framework
<b>ITU</b>	International Telecommunication Union
<b>IVR</b>	Interactive Voice Response
<b>IXP</b>	Internet Exchange Point
<b>JCU</b>	Joint Communication Unit
<b>KYC</b>	Know Your Customer
<b>LAN</b>	Local Area Network
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MAF</b>	Ministry of Agriculture and Forestry
<b>MBSSE</b>	Ministry of Basic and Senior Secondary Education
<b>MDAs</b>	Ministries, Departments and Agencies
<b>MFI</b>	Microfinance Institution
<b>MIC</b>	Ministry of Information and Communications
<b>MNCH</b>	Maternal Neonatal and Child Health
<b>MNO</b>	Mobile Network Operator
<b>MoF</b>	Ministry of Finance
<b>MoHS</b>	Ministry of Health and Sanitation
<b>MRU</b>	Mano River Union
<b>MSMEs</b>	Micro, Small and Medium Enterprises
<b>MTHE</b>	Ministry of Technical and Higher Education
<b>MTI</b>	Ministry of Trade and Industry
<b>MTNDP</b>	Medium Term National Development Plan

<b>NaaS</b>	Network as a Service
<b>NAMED</b>	National Monitoring and Evaluation Directorate
<b>NASSIT</b>	National Social Security and Insurance Trust
<b>NAT</b>	National Agriculture Transformation
<b>NaTCA</b>	National Communications Authority
<b>NATCOM</b>	National Telecommunications Commission
<b>NCC</b>	National Cybersecurity Centre
<b>NCII</b>	National Critical Information Infrastructure
<b>NCRA</b>	National Civil Registration Authority
<b>NCSIRCC</b>	National Computer Security Incidence Response Coordination Centre
<b>NCSIRT</b>	National Computer Security and Incidence Response Team
<b>NDDP</b>	National Digital Development Policy
<b>NDDS</b>	National Digital Development Strategy
<b>NDIP</b>	National Digital Identity Platform
<b>NDP</b>	National Development Plan
<b>NFB</b>	National Fibre Backbone
<b>NFTC</b>	National Fibre Transmission Company
<b>NIDS</b>	National Innovation and Digital Strategy
<b>NIN</b>	National ID
<b>NPC</b>	National Payment Council
<b>NRA</b>	National Revenue Authority
<b>NSFI</b>	National Strategy for Financial Inclusion
<b>NSFI</b>	National Strategy for Financial Inclusion
<b>OARG</b>	Office of the Administrator and Registrar General
<b>ODI</b>	Overseas Development Institute
<b>OGP</b>	Open Government Partnership
<b>ONS</b>	Office of the National Security
<b>OPEX</b>	Operational Expenditure
<b>P2P</b>	Person to Person
<b>PAID</b>	Patent and Industrial Design Act
<b>PKI</b>	Public Key Infrastructure
<b>PKI</b>	Public Key Infrastructure
<b>PLWD</b>	People Living with Disabilities
<b>POS</b>	Point of Sale
<b>PPP</b>	Public-Private Partnership
<b>PropTech</b>	Property Technologies
<b>QoS</b>	Quality of Service
<b>RAIC</b>	Right to Access Information Commission
<b>RTGS</b>	Real Time Gross Settlement
<b>SALPOST</b>	Sierra Leone Postal Service
<b>SCADEP</b>	Smallholder Commercialization and Agri-Business Development Project
<b>SDGs</b>	Sustainable Development Goals
<b>SL</b>	Sierra Leone
<b>SLCAA</b>	Sierra Leone Civil Aviation Authority
<b>SLEDP</b>	Sierra Leone Economic Diversification Project
<b>SLIX</b>	Sierra Leone Internet Exchange Point

<b>SLP</b>	Sierra Leone Police
<b>SLREN</b>	Sierra Leone Research & Education Network
<b>SLSB</b>	Sierra Leone Standards Bureau
<b>SLSDP</b>	Sierra Leone Skills Development Project
<b>SME</b>	Small and Medium Enterprise
<b>SMEDA</b>	Small and Medium Enterprise Development Agency
<b>SMLTDP</b>	Sierra Leone Medium Term Development Plan
<b>SOP</b>	Standard Operating Procedures
<b>SSA</b>	Sub-Saharan Africa
<b>Statistics SL</b>	Statistics Sierra Leone
<b>STEM</b>	Science, Technology, Engineering and Mathematics
<b>Tbps</b>	Terabytes per second
<b>TEC</b>	Tertiary Education Commission
<b>TVET</b>	Technical and vocational education and training
<b>UADF</b>	Universal Access Development Fund
<b>UNCDF</b>	United Nations Capital Development Fund
<b>UPU</b>	Universal Postal Union
<b>USSD</b>	Unstructured Supplementary Service Data
<b>VAS</b>	Value Added Service
<b>VC</b>	Venture Capital
<b>VoIP</b>	Voice over Internet Protocol
<b>WAN</b>	Wide Area Network
<b>WB</b>	World Bank
<b>WoG</b>	Whole-of-Government
<b>WoS</b>	Whole-of-Society

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## KEY POLICY DEFINITIONS

**Broadcasting** is the distribution of information using radio, television, the internet, intranet, and webcasting, among other methods.

**Digital divide** is the gap between communities/countries that have fully exploited digital technologies and those that have not - often associated with the resulting gap in terms of socio-economic development.

**e-Commerce or electronic commerce** is the business activities involving consumers, manufacturers, suppliers, service providers, and intermediaries on the electronic media.

**Fintech** refers to the use digital technology to enhance or automate financial processes and services.

**Information and communication technologies** relate to information technology, telecommunications, broadcasting, and multimedia.

**Information society** is a country or region where digital technology is part of everyday life.

**Information technology** is computers and telecommunications systems for the collection, processing, storing, packaging, and dissemination of information.

**Internet exchange point** is the “peering point” for interconnecting internet service providers (ISPs) and other peering points to localise national traffic routing as opposed to using international routes to accomplish inter-ISP traffic flow.

**Internet service provider** is a company that provides infrastructure for access to the internet or interconnecting other ISPs and content-based or application-based services on the internet.

**Knowledge-based economy** is a country or region where digital technologies are extensively used to drive socioeconomic and political development.

**Local Area Network** is a computer network that spans a relatively small area, mostly confined to a single building or group of buildings.

**Proptech** refers to the application of digital technology and platform economics to the real estate industry.

**Teledensity** is the number of telephone devices per 100 people.

**Voice over Internet Protocol** is internet telephony where telephone services are provided over the internet as the medium of transmission.

**Wide Area Network** is a computer network that spans a relatively large geographical area, typically two or more local area networks or LANs.

**Whole-of-Government** is an approach that integrates and mainstreams the collaborative efforts of the departments and agencies of a government to achieve unity of effort towards a shared goal.

**Whole-of-Society** is an approach of inclusivity and participation that engages multi-sectoral stakeholders, facilitates their active participation in the decision-making process, takes appropriate measures together and ensures benefits reach every segment of the society.

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## EXECUTIVE SUMMARY

**The Government of Sierra Leone has embarked on a quest to leverage digital technologies** across all sectors to advance socio-economic and human capital development. This vision is included in the Medium-Term National Development Plan 2019-2023 and serves as guidance for the Information and Communication Technology (ICT) sector development. ICT is a key asset in the fourth industrial revolution. As it increasingly penetrates Sierra Leone society, it has the potential to:

- **Empower citizens** with the skills to benefit from digital services and allow for increased **inclusion**.
- **Increase** the **efficiency** and transparency of the **government** administration and service delivery.
- **Enhance** the **competitiveness** and diversification of the **economy** with tech-driven **innovation**.

**Important milestones have been accomplished** in digital development even though the current **constraints call for more harmonized collaboration**. Past national accomplishments include the development of the first ICT strategy of 2009 and the implementation of the ACE cable landing station in 2011. Nevertheless, challenges of different orders of magnitude inhibit the pace of accelerated digital development. While some bottlenecks are sector-specific such as the limited infrastructure sharing and the lack of interconnected platforms, some others are cross-cutting such as the lack of basic utilities (such as electricity), the low purchasing power of the population, the limited institutional coordination and lack of harmonization in the ICT sector which all hamper digital implementations.

**Therefore, this Strategy brings clarity to the coordinated implementation of digital priorities**. The National Digital Development Strategy (NDDS) comes in tandem with the National Digital Development Policy (NDDP) as it defines prioritized strategic objectives across thematic areas to provide a holistic national digital agenda. These strategic objectives are outlined overleaf.

Focus area	Prioritized objective
<p data-bbox="203 262 396 352"><b>Governance, Coordination, &amp; Partnership</b></p> 	<p data-bbox="464 216 1401 247">Develop and implement an <b>institutional framework</b> to reflect <b>emerging trends</b></p> <p data-bbox="464 260 1471 291">Enhance <b>coordination between stakeholders</b> with an agenda for digital development</p> <p data-bbox="464 304 997 336">Develop mechanisms for <b>donor coordination</b></p> <p data-bbox="464 348 1455 399">Support the development and implementation of <b>harmonized digital transformation policies and strategies</b></p> <p data-bbox="464 411 1398 462">Foster transparent, <b>predictable</b>, investment, and innovation-friendly <b>regulatory frameworks</b></p> <p data-bbox="464 474 1373 506">Optimize the use of <b>scarce resources</b> for larger investments and competition</p>
<p data-bbox="172 583 427 644"><b>Digital Infrastructure &amp; Access</b></p> 	<p data-bbox="464 518 1365 575">Develop and implement a national <b>master plan</b> for robust and <b>reliable</b> digital infrastructure</p> <p data-bbox="464 585 1430 617">Ensure predictable <b>investment-enabling</b> regulation with a clear execution strategy</p> <p data-bbox="464 627 1398 684">Improve the <b>universal access</b> to digital services focusing on areas unserved and underserved by digital services</p> <p data-bbox="464 695 1321 726">Promote measures that increase the <b>affordability</b> of devices and services</p> <p data-bbox="464 737 1143 768">Reduce the <b>environmental impact</b> of digital development</p>
<p data-bbox="203 898 396 989"><b>Digital skills and Human Capital Development<sup>1</sup></b></p> 	<p data-bbox="464 795 1443 827">Ensure an enabling <b>infrastructure</b> for <b>digital learning</b> (connectivity and equipment)</p> <p data-bbox="464 840 1240 871">Foster <b>capacity building</b> and <b>coordination</b> in the education sector</p> <p data-bbox="464 884 1243 915">Mainstream the learning of <b>ICT content</b> across all <b>education levels</b></p> <p data-bbox="464 928 1468 959">Promote <b>inclusive</b> digital learning (focus on women and other disadvantaged groups)</p> <p data-bbox="464 972 1049 1003">Increase the digital skills of the current <b>workforce</b></p> <p data-bbox="464 1016 886 1047">Develop a pool of <b>ICT professionals</b></p> <p data-bbox="464 1060 1459 1092">Promote <b>ICT knowledge dissemination</b> and engagement through <b>informal</b> channels</p> <p data-bbox="464 1104 1382 1136">Leverage <b>ICT channels</b> to improve <b>access</b> and <b>quality</b> of education (e-learning)</p> <p data-bbox="464 1148 1013 1180">Promote <b>R&amp;D</b> on <b>ICT</b> at higher education levels</p>
<p data-bbox="180 1354 418 1383"><b>Digital Government</b></p> 	<p data-bbox="464 1205 1224 1236">Develop and implement <b>harmonized ICT strategies &amp; standards</b></p> <p data-bbox="464 1249 1057 1281">Standardize the government digital <b>infrastructure</b></p> <p data-bbox="464 1308 1203 1339">Develop the building blocks for a <b>harmonized digital ID</b> system</p> <p data-bbox="464 1352 1159 1383">Implement new <b>digital</b> government <b>services</b> across sectors</p> <p data-bbox="464 1396 1289 1428">Improve <b>efficiency</b> and <b>transparency</b> in public administration with <b>ICT</b></p> <p data-bbox="464 1440 972 1472">Develop the <b>digital health</b> sector (e-health)</p> <p data-bbox="464 1484 1198 1516">Develop the <b>digital agriculture</b> sector (e-agriculture, AgriTech)</p> <p data-bbox="464 1528 1211 1560">Enhance the <b>postal service</b> to become a <b>platform</b> for e-services</p> <p data-bbox="464 1572 1240 1604">Enhance the <b>ICT culture</b> of actors in the private and public sectors</p>
<p data-bbox="203 1644 396 1734"><b>e-commerce and Digital financial services</b></p> 	<p data-bbox="464 1644 976 1675">Streamline the <b>enabling regulation</b> for <b>DFS</b></p> <p data-bbox="464 1688 1167 1719">Ensure an <b>interoperable</b> and secure financial <b>infrastructure</b></p> <p data-bbox="464 1732 1170 1764">Encourage <b>DFS competition</b>, user <b>protection</b>, and adoption</p>

<sup>1</sup> The digital initiatives aligned with the HCD program are comprised of two thematic areas: Digital skills (including education) and Digital Government (including health and agriculture).

	Create the building blocks for the development of <b>e-commerce</b>
<b>Emerging technologies, innovation, and digital entrepreneurship</b> 	Enhance dialogue and institutional <b>collaboration</b> in the entrepreneurship <b>ecosystem</b>
	Develop and <b>improve policies</b> for digital innovation and entrepreneurship
	Enhance the <b>access to capital</b> for digital ventures and the <b>ease of doing</b> tech-business
	Untap digital innovation and <b>support</b> the <b>scaling-up</b> of tech solutions
	Assemble a group of <b>growth entrepreneurs</b> and help build their digital capabilities
	Support the <b>demand</b> and <b>uptake</b> of innovative digital solutions
	Build a <b>local ICT</b> industry and <b>digitalize</b> traditional sectors
	Support the <b>local internet</b> and cloud infrastructure ecosystem
<b>Data Governance and Cybersecurity</b> 	Further develop legal and <b>regulatory</b> frameworks on cybersecurity and <b>data protection</b>
	Support institutional leadership and <b>coordination</b> for cybersecurity <b>response</b> and strengthen <b>cooperation</b> at national, regional, and international levels
	Build <b>human capacity</b> , increase <b>awareness</b> , and gain exposure to cybersecurity
	Protect <b>vulnerable assets</b> with response readiness and <b>risk</b> assessment to prevent cyberattacks
	Protect <b>personal data</b> in digital transactions and communications
	Facilitate the use of ICT for <b>national security</b>
Enhance the <b>openness</b> and exploitation of <b>data</b>	

Some actors have started planning for their digital development pipelines. While specific players champion them, their successful implementation hinges on the engagement and coordination of multiple MDAs, development partners, and private sector institutions. This strategy includes a combination of relevant implementation arrangements by some key players, which are in line with the above-described strategic objectives and defined timeframes. Along with the institutional framework stipulated in the NDDP, these elements help create a responsibility matrix for the digital development in Sierra Leone.

The way forward includes a robust framework to evaluate the outcomes of the prioritized objectives. This is especially relevant for a holistic national effort such as digital development which remains high-level. Therefore, at a more granular level, the detailed goals and activities of the project must be implemented across the different sectors of the ecosystem to be monitored accordingly.



## CHAPTER 1: INTRODUCTION

### 1.1. General Context

**Digital Technologies**<sup>2</sup> have a clear potential for **facilitating socio-economic transformation**. This could create previously unknown opportunities for **all segments of the population** and could distribute the dividends of increased prosperity fairly across the population. The technologies are impacting **all areas of human activity** at a rapid rate which could be harnessed to create new jobs, wealth, and the improvement of the quality of life in the years to come.

These digital technologies could enable Sierra Leoneans to be more **“digitally empowered”** and to actively use digital services to **interface with business and government**. The technologies would give the population access to a large range of services and would lead them to participate in a digital economy where transactions are made **faster, cheaper**, and more **secure**, with most of the interaction taking place online. **Government services** could also be made **more efficient**, numerous, and sophisticated with a broader reach and better coordination across Ministries Departments and Agencies (MDAs) while encouraging formalization and traceability.

The **path of change is accelerating**: the world is at the dawn of the next technological era as we are entering the **fourth industrial revolution**<sup>3</sup> in which automation of traditional manufacturing and industrial practices continues and the world progresses toward using more modern smart technology. The country needs to be prepared as this change brings **opportunities** but also carries a **risk** of being further left behind. For instance, it will involve **new development models**: leveraging manufacturing for broader development will be less and less relevant, and the mastery of digital technologies will be increasingly important to economically thrive in the future.

Sierra Leone must therefore **act quickly** so that its young population<sup>4</sup> can **make the most of opportunities** offered by digital tools. These actions are needed to **address citizens’ rising expectations of government services** and desired improvements in the way they interact with public authorities.

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<sup>2</sup> Electronic tools, systems, devices and resources that generate, store, process or transmit data.

<sup>3</sup> It is also characterized by a fusion of technologies? blurring the lines between the physical, digital, and biological spheres.

<sup>4</sup> Most of the population is below 20 years old.

The **Government of Sierra Leone** (GoSL) has a **key role** to play in this endeavour to build an enabling environment. The government hopes to act as a **trailblazer** when it comes to offering new services to its citizens and it seeks to develop a **whole-of-government** and **whole-of-society** approach<sup>5</sup> by enhancing cooperation and collaboration in the implementation of this strategy. Sierra Leone experienced **first-hand** the importance of digital technologies during the **Ebola** crisis when mobile phones were instrumental to track, monitor, and manage the outbreak. During the **COVID-19 pandemic** this was experienced once again which demonstrates the critical need for robust digital infrastructure to provide essential services while social distancing requirements have offered unprecedented demand for digital technologies.

This **digital development process** should ultimately result in a **diversified economy**<sup>6</sup> which would consist of the opening of new market channels for small and medium enterprises (SMEs), more inclusive trade, and ultimately more robust democratic and economic development. The potential **impact** on the economy is **very significant**: the value of the global digital economy was estimated at around USD 11.5 trillion, approximately 15.5% of global gross domestic product (GDP) in 2016 and 25% expected in less than a decade<sup>7</sup>. This is **particularly needed** as the country is ranked towards the **bottom** of **most development metrics**.

Digital development is a **transformative process** and must be **well-structured** to be effectively implemented. This is the reason why several other major African governments have been eager to develop a comprehensive digital transformation strategy and that the **African Union** has built a specific framework for this purpose<sup>8</sup>.

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<sup>5</sup> It refers to the joint activities performed by diverse ministries, public administrations, and public agencies to provide a common solution to particular problems or issues and seeks to introduce coherence in the decision-making, implementation and service delivery processes across the public administration and society.

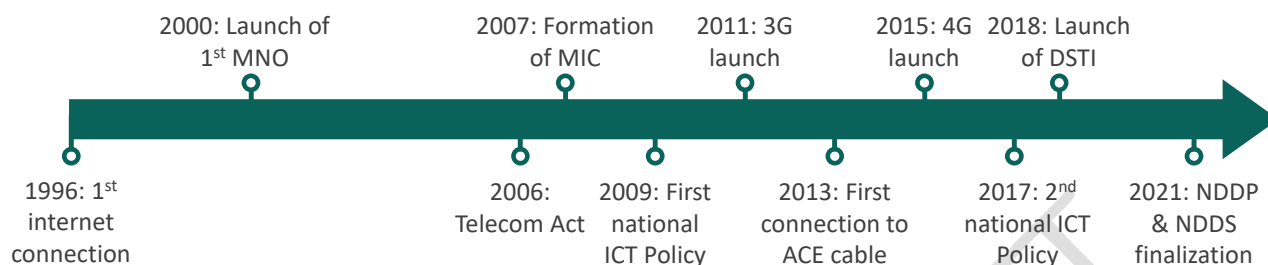
<sup>6</sup> The economy remains highly dependent on agriculture and natural resources and has struggled to diversify the labor market, increase productivity, or provide jobs for the youthful population.

<sup>7</sup> Oxford Economics, Digital Spillover, 2017.

<sup>8</sup> <https://au.int/en/documents/20200518/digital-transformation-strategy-africa-2020-2030>

## 1.2. Digital Development in Sierra Leone

Digital transformation is a **long process**. Sierra Leone started this journey over two decades ago with several milestones as highlighted in Figure 1.



*Figure 1: The Digital Development Journey of Sierra Leone*

To develop a sound strategy, a detailed understanding of the current situation is paramount. This has been done thanks to a recent World Bank report<sup>9</sup> providing a **digital economy diagnostic** of the country which confirmed Sierra Leone's potential, as well as its commitment and efforts to leverage digital technologies for transformational growth<sup>10</sup>. However, it also highlighted Sierra Leone's **low starting point** and showed that, despite recent progress, the **country's performance is poor** compared to **SSA peers** and is facing enormous challenges in progressing its digital economy as shown in Figure 2.

The **development of access** has been quite slow over the years and, according to the International Telecommunications Union (ITU), only about **17%** of the population were considered as **internet users** in **2019**. There is **room for improvement** since around 65% (or more) of the population were living under 3G coverage in 2020.

<sup>9</sup> World Bank. 2020. Sierra Leone Digital Economy Diagnostic. World Bank, Washington, DC. Note that the digital assessment is further detailed for each focus area and has been updated with the most recent data.

<sup>10</sup> UNCDF has also developed an Inclusive Digital Economies Scorecard for Sierra Leone

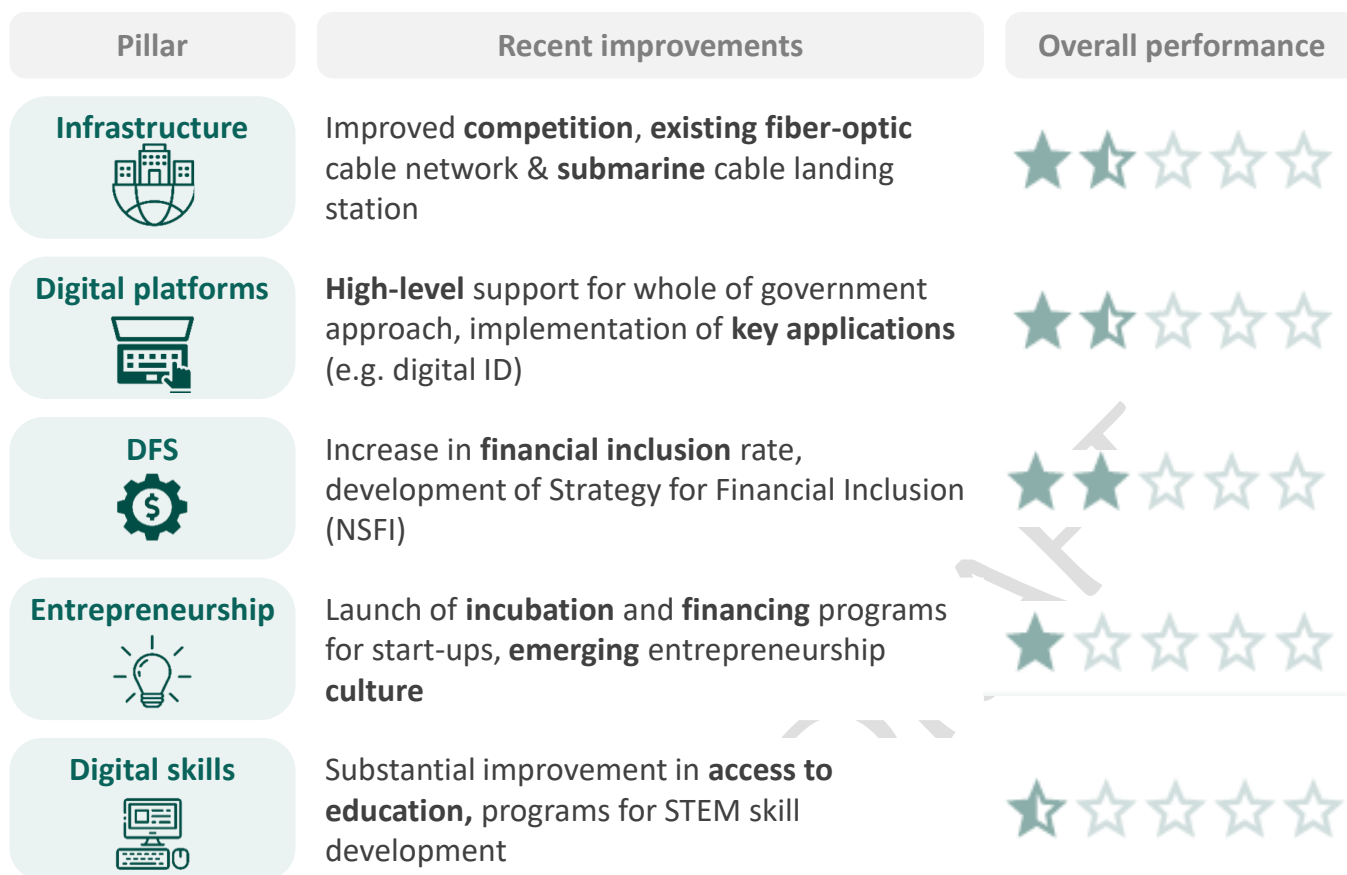


Figure 2: State of the Digital Economy in Sierra Leone

To date, digitalization efforts by the government have primarily focused on core back-office processes to address challenges specific to certain government functions, rather than citizen-facing services delivered by the government. The situation is expected to improve thanks to a recently approved<sup>11</sup> USD 50,000,000 project by the World Bank that seeks to increase digital inclusion<sup>12</sup> and enhance the adoption of selected digitalized public services<sup>13</sup>.

Some additional institutional challenges can be highlighted:

- **Limited coordination** among MDAs, which have mostly worked in silos so far, leading to poor collaboration and a duplication of efforts.

<sup>11</sup> World Bank, October 2021.

<sup>12</sup> Key results include i) people provided with new or enhanced access to broadband internet and ii) number of beneficiaries reached through targeted trainings on digital skills (disaggregated by gender and urban/rural).

<sup>13</sup> Key results will be measured by the number of public services available, G2G, G2B, G2C (including average transaction per month/ quarter/year).

- A **skills gap** within MDAs, which makes the selection and deployment of technical solutions difficult and sometimes leads to a high dependency on a small pool of qualified technicians with high attrition rates.
- A lack of **sustainable funding**: salaries often account for the bulk of MDAs’ budget and the purchase of technical solutions tend to rely on **funding from donors** which can be problematic as system usage often terminates when this external funding stops

More fundamentally, the digital development ecosystem in Sierra Leone is hampered by several **structural cross-cutting challenges** that take place **upstream** as shown in Figure 3.

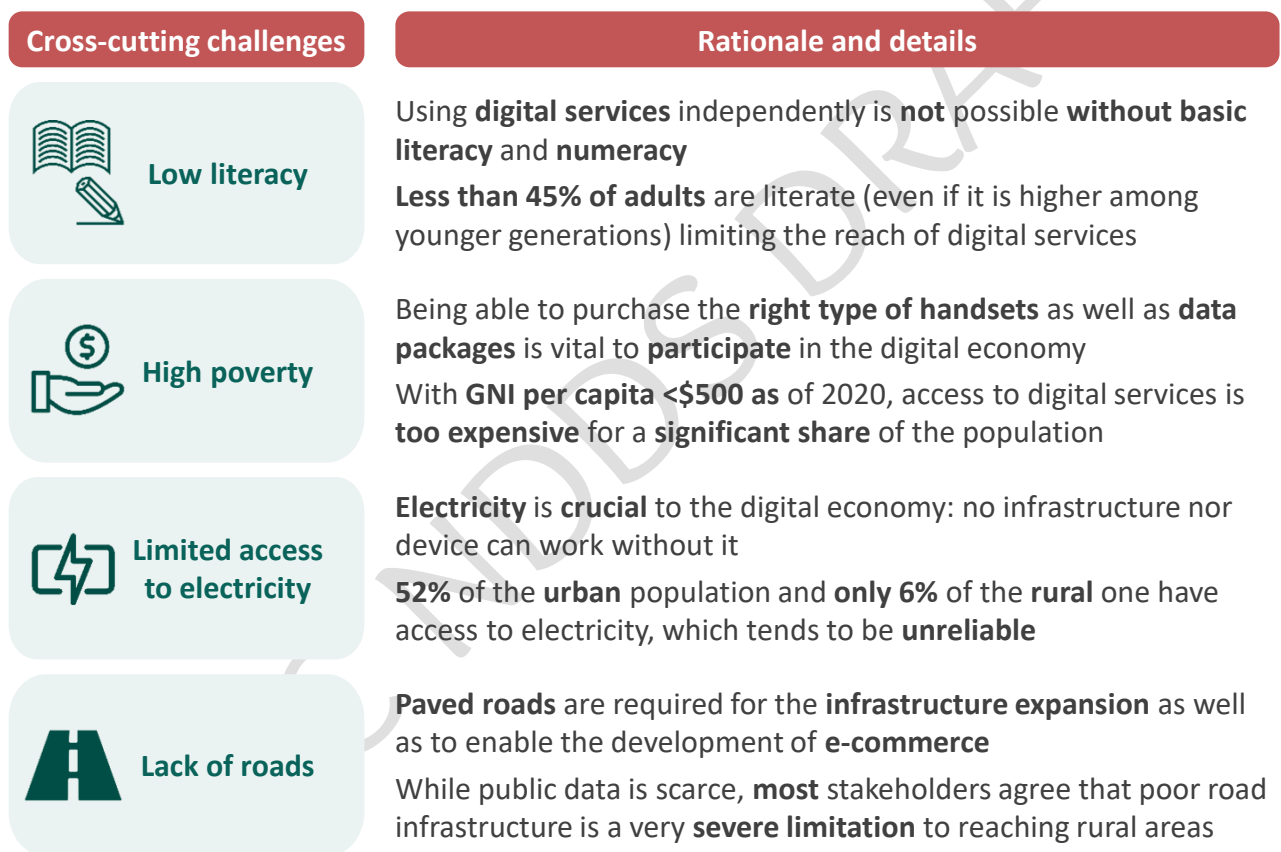


Figure 3: Cross-cutting Challenges to Digital Development

The magnitude of these cross-cutting challenges **limit market attractiveness** for investors and has been reinforced by a generally **unfavourable regulatory environment**. Sierra Leone was ranked 163 out of 190 in the 2020 World Bank Ease of Doing Business<sup>14</sup>.

<sup>14</sup> <https://www.doingbusiness.org/en/data/exploreconomies/sierra-leone#>

These **cross-cutting structural challenges** must be **addressed in parallel** to the implementation of the National Digital Development Strategy for the country to experience a successful digital transformation. Given the breadth of challenges and the number of stakeholders involved, a national digital development **strategy** needs to be **holistic** and **customized** to fit the countries specific needs.

### 1.3. Process for Strategy Design

A **first step** is to ensure the approach selected is fit for the **country's national development vision and priorities**. The Government of Sierra Leone (GoSL) outlined in the 2019-2023 **Medium-Term National Development Plan** (NDP) its vision to transform the country from a fragile nation into a stable and **prosperous democracy** and a **middle-income country by 2039**. The government is also aware of the importance of digital development as it stated in the NDP that *"building a digital economy and leveraging ICT tools to stimulate growth in all sectors of the economy will be the focus of the government"*.

Practically, this means **transitioning** the Sierra Leonean economy from a **manually driven** economy dominated by agriculture and mining to a **well-functioning digital economy** that will enable the country to achieve economic growth, reduce poverty, offer new job opportunities for the youth, and grow its Micro, Small and Medium Enterprises (MSMEs).

To achieve this ambition, the government initiated, as early as 2019, a **dual process** to develop two complementary documents: the National Digital Development Policy (NDDP) and this National Digital Development Strategy (NDDS), based on **extensive consultations**. This project was accelerated and finalized in 2021 as shown in Figure 4.

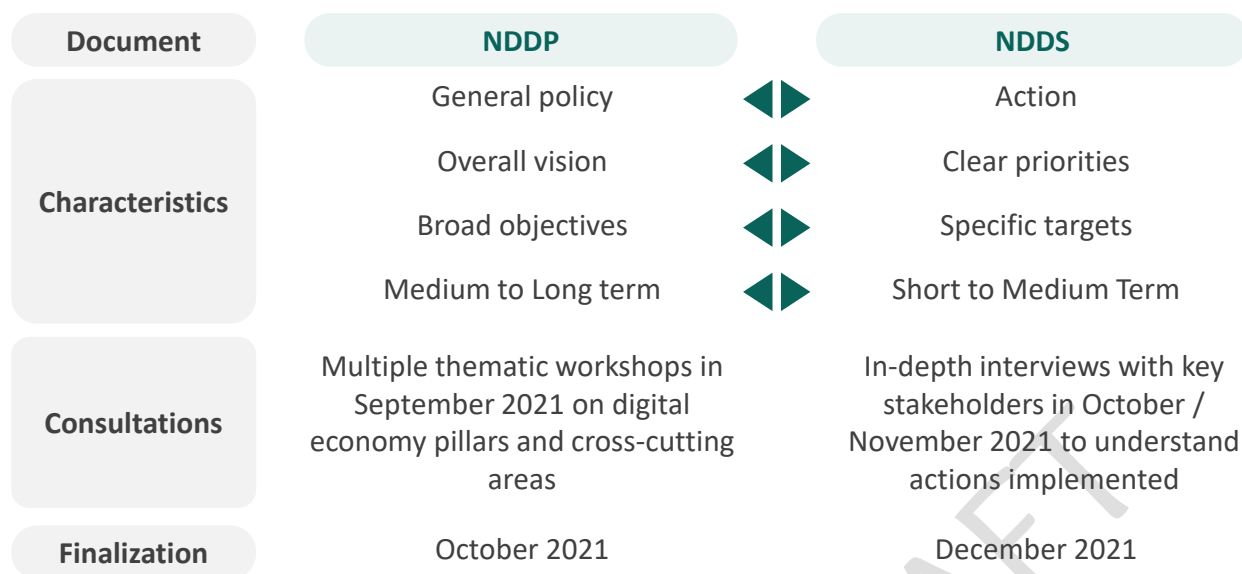


Figure 4: The Distinct and Complementary NDDP and NDDS

These documents provide a more **coordinated approach** with greater **cohesion** among MDAs and to reduce gaps by setting a **clear digital transformation agenda** for the government and promoting the development of a vibrant ICT sector.

The **Policy** is the guiding document for digital development and its utilization on a national scale sets out to break all barriers to the advancement of the digital economy of Sierra Leone. The Policy has set out a **revised institutional framework** that aims to foster coordination and reduce the disconnect between policymakers and technical implementers within the government.

The **Strategy, on the other hand**, aims to **guide Sierra Leone’s investments** for the country's present and future digital development and to position the country among regional and global leaders in the field of digital government. The Strategy will ultimately **reduce the overall costs of running the government** and **reduce corruption** while increasing national productivity and competitiveness. While the Strategy sets a **clear direction** based on a **whole-of-government and whole-of-society approach**<sup>15</sup>, all **MDAs** must build their **own detailed plans** in line with the NDDS, with the support and coordination of MIC, for Sierra Leone to achieve true digital transformation as shown in Figure 5.

<sup>15</sup> This should disintegrate existing silos.

### What the document does

- Provide a **holistic approach** to digital development in Sierra Leone
- **Prioritize** actions to be implemented as much as possible

### What remains to be completed

- **Detailed MDA action plans** based on their precise needs
- **Coordinate digital development** to improve government **efficiency** in resource management and **public service delivery**

*Figure 5: The Role of the NDDS vs the Role of Individual MDAs*

Both the Policy and the Strategy are the results of a richly consultative process with MDAs, Development Partners, Civil Society Organization (CSOs), academia, service providers, and representatives of the private sector who participated in multiple workshops in 2019<sup>16</sup> and September 2021<sup>17</sup> as well as 25 in-depth interviews conducted in October and November 2021.

MIC NDDS DRAFT

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<sup>16</sup> Through a national consultative conference.

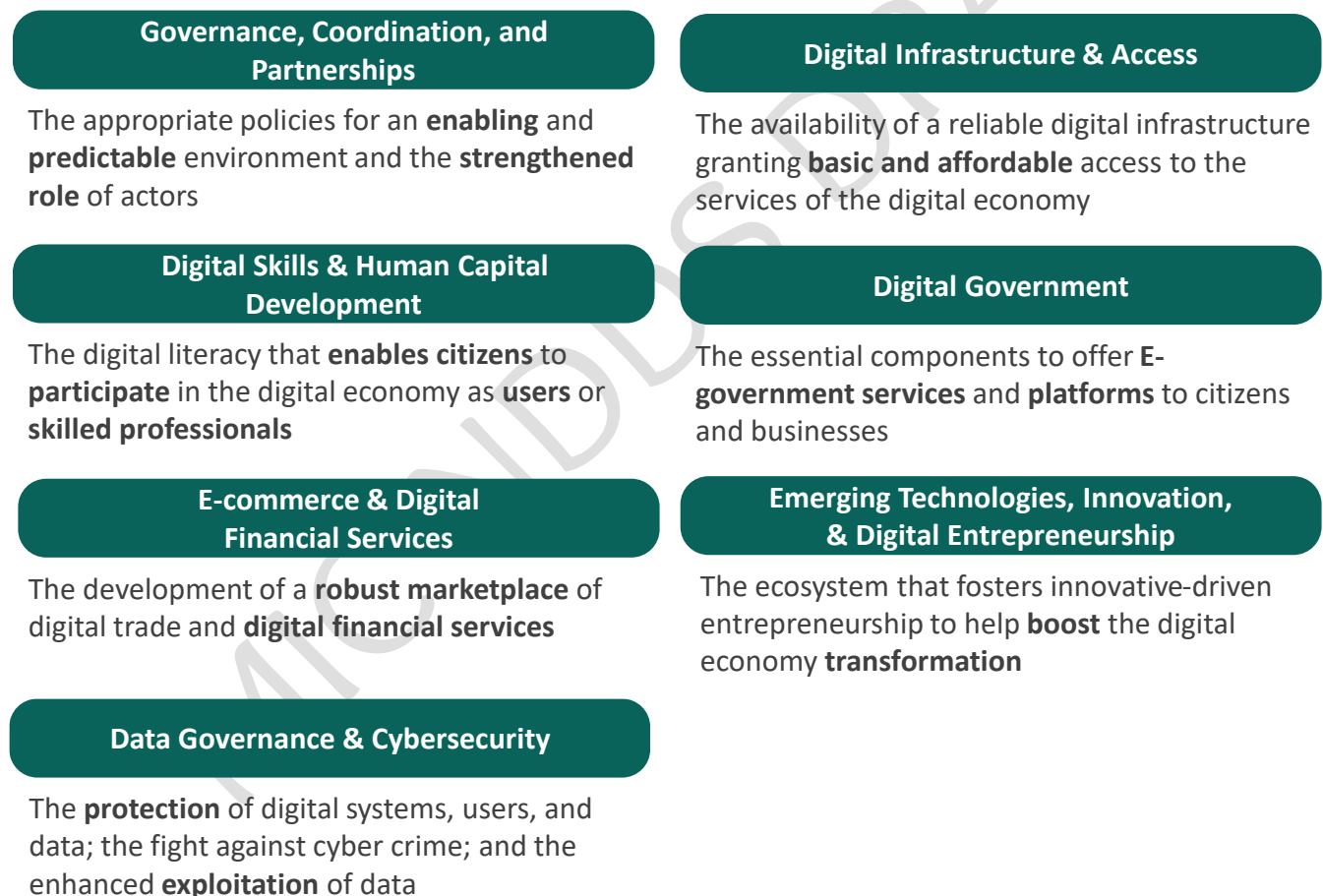
<sup>17</sup> As part of consultation workshops also implemented for the NDDP finalization.



## 1.4. Structure of the Document

The document will deep dive into **seven focus areas**. They are all in line with the **comprehensive framework** that was developed for the **NDDP**, which was based on benchmarks<sup>18</sup> and ensured **consistency** with other **key national documents** such as the **NDP** and the Directorate of Science Technology and Innovation (DSTI)'s National Innovation & Digital Strategy (NIDS)<sup>19</sup> as well as Sierra Leone's **commitments** with the African Union and Smart Africa.

**Similar categories** in the NDDP and NDDS have been used for consistency and links across both documents as shown in Figure 6.



*Figure 6: Harmonized Structure between NDDP and NDDS*

<sup>18</sup> This includes African Union's Digital Transformation Strategy for Africa 2020-2030; Pathways for Prosperity Commission's Digital Roadmap, 2019; World Bank Digital Economy Diagnostic for Sierra Leone, 2021; Kenya Digital Economy Blueprint, 2019.

<sup>19</sup> Both documents were finalized in 2019.

Compared to the NDDP, the NDDS **specifically covers a few sectors** considered to be particularly important for Sierra Leone. These include:

- **Health and Agriculture** included in the **Digital Government** focus area, and
- **Education** which has been included in the **Digital Skills & Human Capital Development** focus area.

However, **three cross-cutting areas** of the NDDP have been removed in the NDDS:

- **Gender mainstreaming and E-accessibility:** inputs will be included in different focus areas. E-accessibility, i.e., devices and services with features for People with Disabilities (PWD), is covered in Digital Infrastructure and Access. Gender mainstreaming, or the promotion of gender equality in the digital era, is featured across most areas and most notably in Governance, Coordination, Partnerships, and Digital Skills & Human Capital Development. Gender-disaggregated data is often hard to obtain while inclusivity is very dependent on the development of access in rural areas.
- **Management of scarce resources** given the narrower scope of this focus area within the context of the NDDP, it has been added to Governance, Coordination, and Partnership.
- **Digital Broadcasting and media:** this focus area is fairly independent and has a unique subset of areas for development.

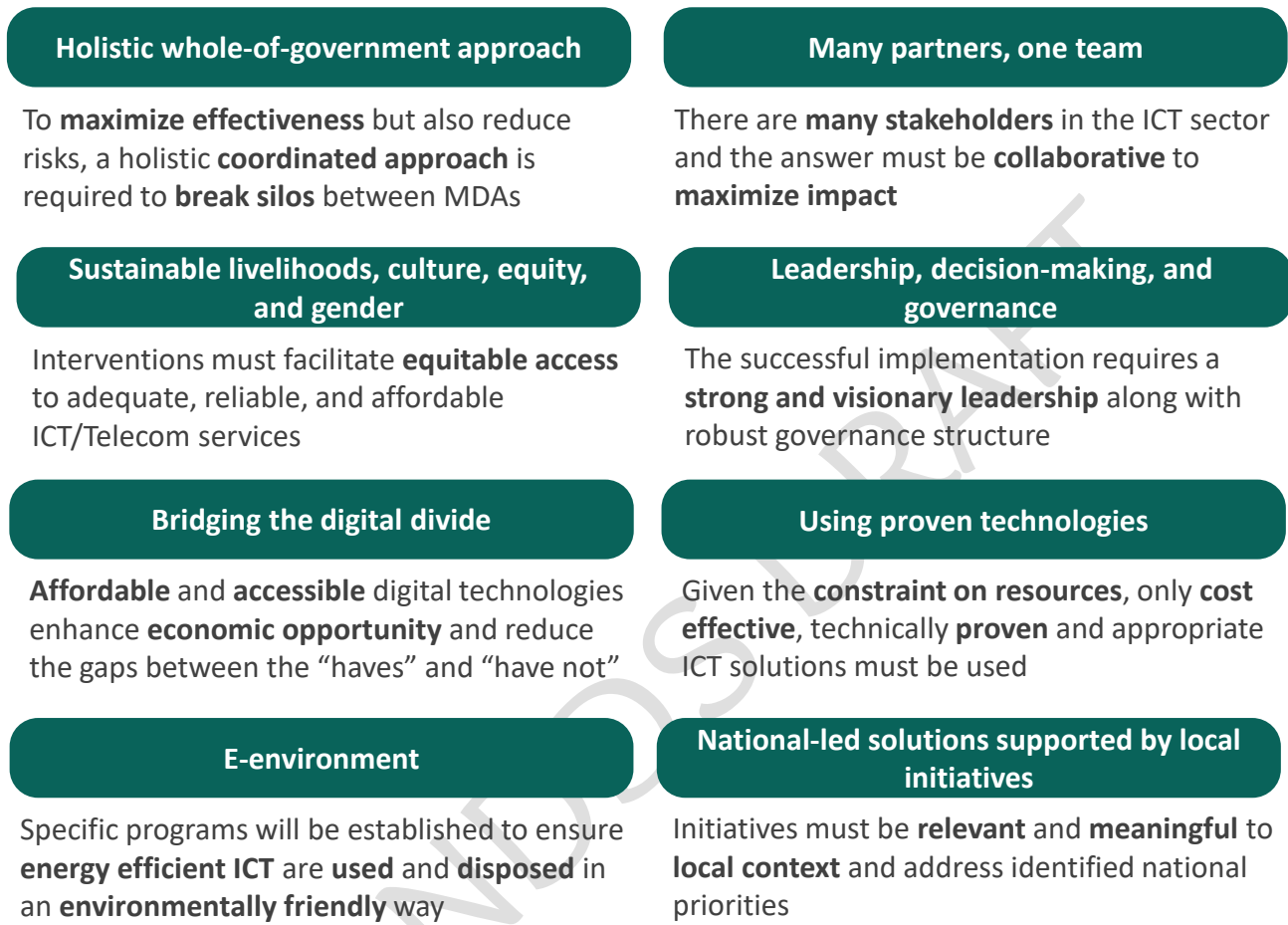
The chapters dedicated to each focus area follow the same approach with:

- An overview of the focus area providing,
  - A definition and a rationale for its relevance, and
  - A detailed status of the current situation in Sierra Leone, including benchmarks and trends.
- A review of the main challenges preventing the development of the focus area.
- An overview of the structure and hierarchy of objectives for each focus area along with the institution leading this focus so that a clear direction stands out.
- A final chapter which covers the next steps.

There is **some overlap** between focus areas as is often with a holistic approach where progress in one focus area can be very much dependent on what has been implemented in another focus area. However, for the sake of **clarity** and **brevity**, the overlaps have been **minimized** so that each focus area covers **exclusive content**.

## 1.5. Principles for implementation

To achieve its vision, several key principles will have to be applied as shown in Figure 7.



*Figure 7: Principles for Implementation*

There are **potential tensions** between competing objectives. The GoSL will find the right balance during the implementation phase between:

- Developing open data while maintaining data protection and harnessing the IP value of the data.
- Aligning to global best practices and favouring local solutions.
- Maximizing the impact of investments (with a potential bias to urban areas) while focusing on and ensuring equitable access to the most fragile individuals and underserved locations.

## CHAPTER 2: GOVERNANCE, COORDINATION AND PARTNERSHIPS

### 2.1. Context

#### Introduction

Governance, Coordination, and Partnerships are essential elements for an **enabling and predictable environment**. These fundamental components are necessary to achieving a well-functioning digital economy. Central leadership committed to driving the digital agenda and facilitating engagement across all players is paramount. The government will provide this leadership with courage, political will, and visionary thinking. Next, private actors will require appropriate policy, legal and regulatory frameworks whose provisions are aligned in the same direction to build trust and predictability for future investments in the digital ecosystem. MDAs from different sectors also need to work together through clear institutional structures to create this enabling environment. However, because of the interconnectedness of the digital ecosystem, new cooperation mechanisms with other non-state actors will be critical including NGOs and development institutions and private sector players among others.

Coordination at the local, regional, continental and global levels will be required as well, especially for implementation activities. In practical terms, Leadership, Governance, Coordination, and Partnerships focus on i) which actors are involved in governing the ICT sector, ii) what needs to be governed, and iii) how it will be governed, with the aim of creating an enabling environment for ICT investments and development.

#### Situation analysis

The Sierra Leone ICT sector is **governed by multiple stakeholders with different roles**. While there is a high-level government vision of digitally driven development<sup>20</sup> there are various other actors in the digital agenda:

- In the public sector there are different MDAs governing ICT in areas such as policy formulation, regulation, standard-setting, strategy design, collaboration building, implementation, monitoring, and resource mobilization.
- In the private sector, there are companies from several industries that leverage ICT for competitiveness (industry, mining, tourism, etc.), yet some remain unconvinced of the potential of

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<sup>20</sup> Sierra Leone Medium-Term National Development Plan 2019–2023

digitalization. Moreover, there are at least 16 private players whose value proposition is directly linked to digital development (13 DFS providers and three private MNOs).

Furthermore, the Ministry of Information and Communications (**MIC**) has the overarching responsibility to represent the government in oversight for all matters relating to ICT. It is, specifically mandated to provide **policy and technical leadership**, implement, monitor, and review the national ICT strategy, and even more importantly to **lead the coordination across stakeholders** for their digital implementations.

In the absence of a national ICT strategy, MDAs have been operating based on internal strategies, thereby making coordination challenging. Similarly, coordination and harmonisation of ICT systems and processes among non-state actors including development partners have also posed a challenge. Even though there has been considerable improvement with the enactment of new legislation and regulations in critical areas (such as E-transactions, cybersecurity, and mobile money), significant improvement remains to be made in the **implementations of these regulations** to further drive investment, competitiveness and value generation.

To address these challenges, the NDDP has defined a new institutional framework. The National Digital Development Agency (**NDiDA**) has the **mandate to coordinate**, promote, implement, monitor, evaluate and review the **national digital development agenda** in close co-creation with MDAs, as well as engage relevant stakeholders in partnerships. The National Communication Authority (**NaTCA**) as the ICT sector regulator has been **strengthened** with greater autonomy to foster a stable, predictable, fair, and competitive environment with an equitable assignment of scarce resources and user protection. The Sierra Leone Research and Education Network (**SLREN**) has been mainstreamed to catalyse digital transformation in the research and education sector. The improvements brought by these new bodies will enhance the governance of the sector.

There is a **huge opportunity for improvement compared to SSA peers**, be it for general regulation (i.e., Africa Regulatory Watch or WB Percentile of government effectiveness) or those more specific to ICT (ITU ICT Regulatory Watch) as shown in Figure 8. However, regulatory improvement needs are **not very well covered** by the **data available** as it is difficult to provide a straightforward quantitative assessment as well as the potential mismatch between the regulation in place and the actual implementation.

### Benchmark with other SSA countries

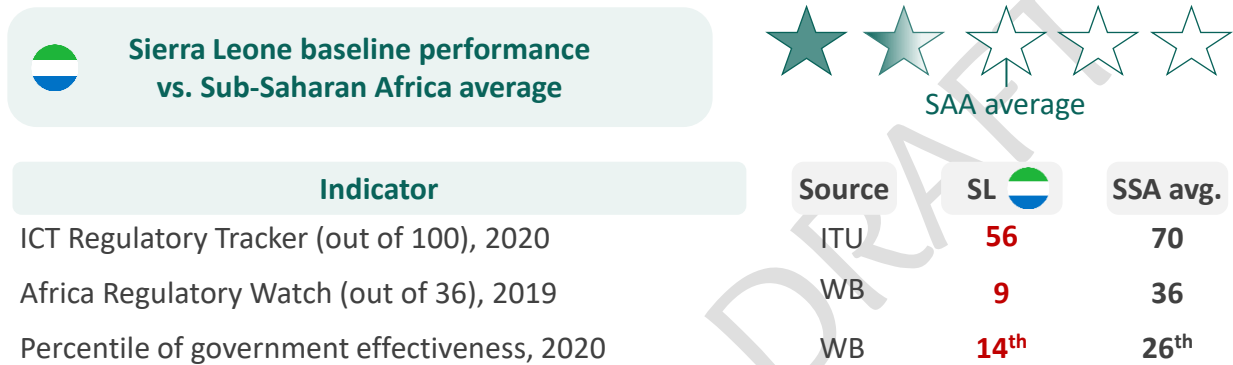


Figure 8: Performance on Governance, Coordination and Partnerships

## 2.2. Key Constraints

Enhanced leadership, governance, coordination, and partnerships that foster cohesive ICT investments and efficient co-creation in Sierra Leone is limited by key constraints. These constraints have been summarized as:

- **Limited coordination** of government ICT activities
- **Inadequate** and uncoordinated **engagement** with development **partners** by MDAs
- **Lack** of clear **operationalization** of **regulatory** framework
- **Slow responsiveness** from the government compared to the pace of other stakeholders
- **Scarce** and efficient **mechanisms** for coordination with private players
- **Inadequate funding**, procurement, and investment in ICT

## 2.3. Objectives Prioritization

The objectives of improving digital governance and coordination will be anchored on the 4 pillars shown in Figure 9.

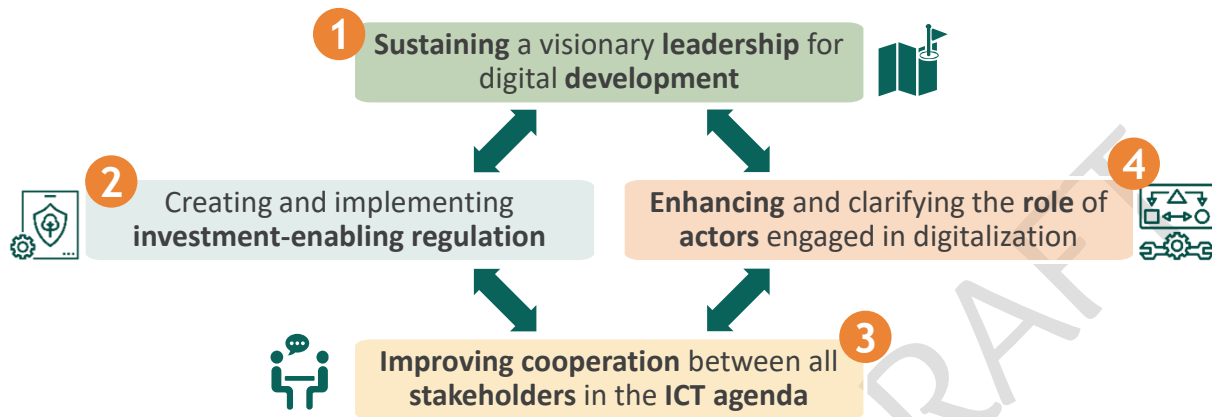


Figure 9: The Pillars of Governance, Coordination and Partnership

The four pillars are the focus of the following broad objectives and actions.

### Objective 1: Develop and implement an institutional framework to reflect emerging trends

- Review the institutional framework to account for **emerging trends**.
- **Streamline and centralize coordination** for the e-government and cybersecurity implementations through the National Digital Development Agency (NDiDA).
- **Strengthen** the sectoral **ministry** responsible for ICT to effectively coordinate across stakeholders in the digital ecosystem and review the ICT policy on an ongoing basis
- Implement the necessary **institutional framework** to properly separate the roles and responsibilities regarding policy, regulation, digital technology development, e-government implementation, innovation, and entrepreneurship
- Integrate digital transformation in legacy institutional operations and service delivery environments.

### Objective 2: Enhance coordination between stakeholders with an agenda for digital development

- Establish a **central coordinating mechanism**, with an appropriate **M&E framework**, which involves all key stakeholders to effectively implement the strategies.
- Establish **multi-stakeholder mechanisms** to assist with the implementation of digitalization initiatives such as the creation of **centralized platforms** for project management.

- Create a favourable environment for cooperation and **partnership in digitalization** among public and private sectors, civil society, and all stakeholders at local, national, regional, and international levels.
- Raise the level of awareness of the role, use, application, and **potential of digitalization** in both private and public sectors.

### Objective 3: Develop mechanisms for donor coordination

- **Prioritize** digital investment in **development** assistance policies and **programs**.
- **Develop** resource **mapping** and information systems for the public **investment programs** as well as development partners' information.
- Increase awareness of a **focal point** in resource mobilization for digitalization among those in leadership.
- Enhance coordination with **development partner interaction** to prioritize policies and push **gender mainstreaming**.
- Enhance cooperation, economies of scale, and productivity in digital **investments**.

### Objective 4: Support the development and implementation of harmonized digital transformation policies and strategies

- Develop and implement **harmonized** national and sectorial digital strategies.
- **Align** national digital strategies to regional and **continental strategies**.
- **Implement** appropriate international **treaties, standards** and best **practices**.
- Implement **change management** procedures and policies to maintain the political will and **sustainable implementation** of digital strategies
- **Benchmark** with regional and global digital transformation and development framework.
- Empower and facilitate Sierra Leone's participation in the **Global Knowledge Society**.
- Structure the national digital trajectory and economy to increase **international standings/rankings**.



### **Objective 5: Foster transparent, predictable, and investment and innovation-friendly regulatory frameworks**

- **Pass key legislations and regulations** and ensure proper **implementation** for greater investments and competition in ICT.
- Develop the **capacities** of **policymakers**, regulators, and other public sector players for the implementation of new policies.
- **Enhance** the **coordination** between the financial and technical **regulatory bodies** to ensure harmonization and clarity for the regulation of new digital services such as e-money (USSD short codes assignment).
- Develop and implement **inclusive** and **holistic** policies and regulations.
- Develop new policies and **regulatory frameworks** to include emerging business areas such as Fintech, smart agriculture, smart health, and smart cities.

### **Objective 6: Optimize the use of scarce resources for higher investments and competition**

- Promote a **technology-neutral framework** aimed at facilitating the deployment, exploitation, and development of core digital infrastructure (national fibre optic network, higher tier data centres, business continuity and redundancy infrastructure), core digital capabilities, new digital products and services.
- Develop policies that address the **spectrum issues** around emerging technologies such as IoT (Internet of Things) devices to ensure fair markets and to allow new technologies and businesses to thrive.
- Build guidelines to migrate from analogue to **digital terrestrial television** (DTT), develop a DTT broadcasting platform, facilitate access and uptake, and benefit from the use of the digital dividends.
- **Coordinate** and manage the government-owned **space assets**.
- Develop and implement strategies for **optimal utilization of scarce critical resources** such as spectrum and management of IP addresses including migration from IPv4 (numeric addressing) to IPv6 (alphanumeric).

## CHAPTER 3: DIGITAL INFRASTRUCTURE AND ACCESS

### 3.1. Context

#### Introduction

Digital infrastructure refers to the wide range of electronic technologies such as fiber cables, masts, antennae to convey radio signals, physical networks, and user access devices required to **access digital services**. The **links** between **connectivity** (with broadband infrastructure first among them) and **economic growth** are **well documented**<sup>21</sup>. A key example of this is the introduction of the **internet** as it promotes inclusion, efficiency, and innovation by lowering the cost of transactions, expanding markets and services to excluded communities, and making supply chains more efficient.

Achieving a **reliable, fast, and affordable connectivity** is a **prerequisite** for the development of digital services for people, businesses, and government, and will then allow for the development of basic telecommunication services, e-government, e-learning, e-health, digital financial services, e-commerce, among others. Note that the development of **other basic infrastructure** (especially roads, electricity, water, etc.) is a **must** and should be also **prioritized in parallel**.

#### Situation analysis

The access-enabling digital infrastructure in Sierra Leone can be assessed by examining the different stages of its connectivity network. That is, analysing its gateway for international connectivity (first-mile), its backbone network bringing connectivity within the country (middle-mile), and the network reaching the end-user (last-mile). The regulation is transversal across these stages as an intangible aspect of the infrastructure (invisible-mile). Over the years, great strides have been made to improve the digital core infrastructure in Sierra Leone. Among the milestones, the landing of the **ACE fiber submarine cable**, which connects Sierra Leone to the internet (first-mile) as shown in Figure 10 was pivotal.



Figure 10: First-Mile ACE Fiber Cable Landings

<sup>21</sup> CDC Group Impact Study: 004 of August 2019

The World Bank indicates that this improved international connectivity through the ACE cable contributed USD 1 billion annually to the country's GDP between 2011 and 2016<sup>22</sup>.

Since December 2020, the fiber landing station (which was previously controlled by SALCAB) has been managed by the private company **Zoodlabs**<sup>23</sup>. It is responsible for the **wholesale of internet fiber** bandwidth to MNOs and ISPs nationwide through a Network as a Service (NaaS) model, and it also has a license to deploy metro fiber in Freetown. As a result, the international network capacity increased from 80Gbps to 0.5Tbps and the cost paid by MNOs and ISPs for international wholesale was reduced by 50%<sup>24</sup>. After ensuring global exchange points from Lisbon, Paris, and Cape Town, an expansion of the ACE is planned for the end of 2023 at the latest. For this, the considered options might be terrestrial or submarine such as the Africa2 cable consortium.

Additionally, the country saw the implementation of a **National Fiber Terrestrial Backbone** and the ECOWAS regional backbone infrastructure (ECOWAN) in the middle mile as shown in Figure 11. It started with the construction of a 660-kilometer terrestrial fiber optic backbone link, funded by the Islamic Development Bank. This link stretched from Freetown to Zimmi at the Liberia border and onwards to



Gbalamuya at the border with Guinea, connecting 28 cities along the way.

It has been complemented with funding by the Exim Bank of China and the country now has **1,010 km of in-country fiber network connecting major cities and towns** and about 50%<sup>25</sup> of the country is covered for potential broadband and other electronic services for end-users.

*Figure 11: Middle-Mile Fiber Connectivity*

<sup>22</sup> The Implementation Completion and Results Report (ICR) for the West Africa Regional Communication Infrastructure Project (WARCIP) Sierra Leone.

<sup>23</sup> The objective was to address the inefficient operation of the international gateway by the state-owned Sierra Leone Cable Limited (SALCAB)

<sup>24</sup> From a scale of USD 20 up to USD 40 per Mbps, to a scale of USD 10 per Mbps up to 20%. <https://owlpress-sl.com/zoodlabs-outlines-development-infrastructure-plan/>

<sup>25</sup> Source: interviews with key informants.

In terms of soft infrastructure, to improve the local Internet ecosystem and connectivity performance, an **Internet Exchange Point (IXP)** was due to be established in **2010** with support from the Internet Society (ISOC) and other stakeholders<sup>26</sup>. The Sierra Leone Internet Exchange Point (SLIX) is expected to allow ISPs to exchange data traffic locally rather than over international links<sup>27</sup>.

When it comes to user access (last-mile), the different operators in Sierra Leone have put in place a combination of technologies. There are **four MNOs** in the country (with differing market shares). The MNOs have from **2G to 4G radio access networks** to provide data and voice services. Recently, most **MNOs** have **started deploying metro fibre networks for interconnecting their cell sites, as per their 4G license conditions but not for last-mile solutions**. There are 14 ISPs in the country which use a combination of technologies (fibre, VSAT, and WiMAX) to reach users. The ISPs are smaller in size and mostly focused on Freetown. Apart from the limited infrastructure between MNOs and ISPs, **network expansion is hampered by commercial unviability in rural areas**. This is mainly due to the high costs of individual deployments (which can be four times more expensive than in urban areas<sup>28</sup>) and the low purchasing power of users. This situation has left millions of people unconnected.

To help address this, the **UADF** seeks to promote **access in unserved** and **underserved** areas. Despite the need for bridging important digital gaps for women and other disadvantaged minorities such as people with disabilities, the priority of digital inclusion and universal access is to reach the large unconnected segments regardless of demography and geography. Restructured in 2018<sup>29</sup> and enjoying increased autonomy, UADF receives funding from MNOs and ISPs which contribute 0.75% of their gross revenue (it used to be USD 150,000 per operator)<sup>30</sup>. As of 2021, four towers had been installed by the UADF at an average cost of USD 300,000 each. The emerging solar towers are less costly than previous macro towers and are intended to connect areas with a population of under 2,000 people. **The order of magnitude of this impact is limited compared to the challenge** of reaching universal access (that is every individual or business to be digitally enabled) since close to 3,000,000 people live outside 3G coverage.

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<sup>26</sup> NATCOM Annual Report 2009.

<sup>27</sup> Even though the number of IXPs in African countries has increased 58% from 2012 to 2020, Sierra Leone still has one.

<sup>28</sup> Source: interviews MNOs and ISPs.

<sup>29</sup> It was found that under NATCOM, UADF's impact on improving universal access to telecom services was limited.

<sup>30</sup> Source: Interview with UADF.

Additionally, the UADF's actions were slowed down in the past due to different interpretations of its regulations by its players (i.e., the definition of MNOs' gross revenue as the base for contribution). This has called for increased clarity and specificity in view of its mandate and regulations.

NATCOM, established in 2006 as the telecommunications regulator and is tasked with the **regulatory framework for ICT services** (invisible mile), has transitioned into the National Communication Authority (NaTCA) by an Act of Parliament. NATCOM successfully improved the standardization and visualization of providers' Quality of Service KPIs as well as regulations on numbering, tariffs, mobile money, consumer affairs, handset regulation, colocation, and competition and license for the cable landing station (CLS), Metro fiber, among others. The successor, NaTCA, intends to **reach an improved level of regulation** for a fair and competitive ICT environment. NaTCA will also have to deal with the general perception that the issue is less about regulations but rather the **implementation and operationalization**.

Although Sierra Leone ratified the BASEL Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal a lot more needs to be done. A study in Freetown showed that heavy metals (Cu, Pb, Ni, Cd, Ag and Hg) had elevated concentrations in the soils likely due to contamination by e-waste<sup>31</sup> which **calls for robust electronic waste (e-waste) management** action.

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<sup>31</sup> Moeckel C, Breivik K, Nøst TH, Sankoh A, Jones KC, Sweetman A. Soil pollution at a major West African E-waste recycling site: Contamination pathways and implications for potential mitigation strategies. *Environ Int.* 2020 Apr;137:105563. doi: 10.1016/j.envint.2020.105563. Epub 2020 Feb 25. PMID: 32106045.

*Benchmark with other SSA countries*

The overall assessment of the country’s situation is that, of all the focus areas, Sierra Leone has **underperformed most on the digital infrastructure and access**. This is particularly striking on the element of affordability where the cost is more than five times the UN’s “1 for 2” (i.e., 1GB for no more than 2% of monthly average income) threshold. A detailed comparisons per indicator clearly demonstrates the extend of this challenge as shown in Figure 12.

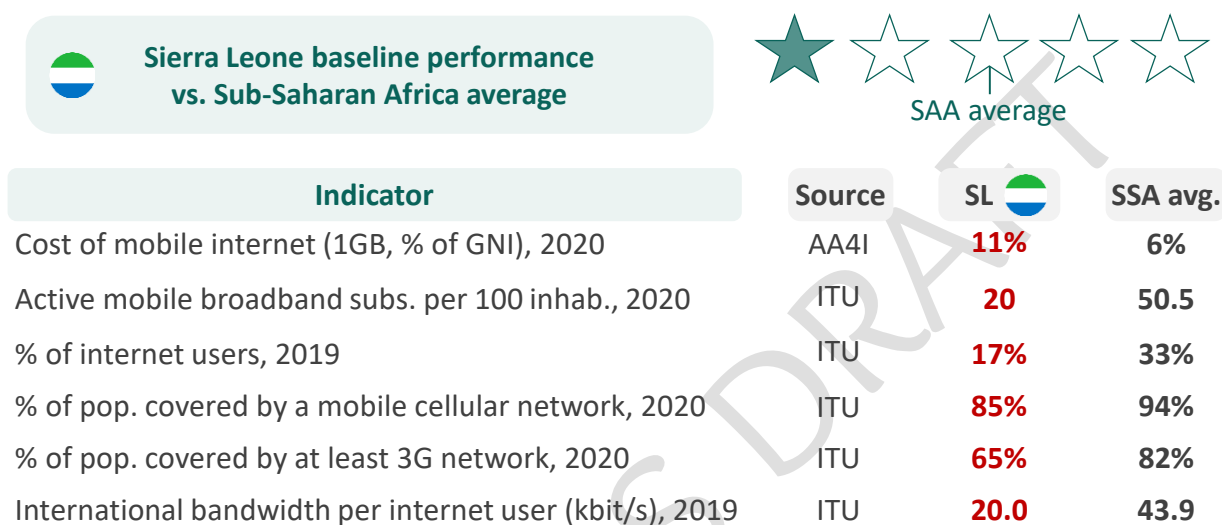


Figure 12: National Digital Infrastructure and Access Performance vs SSA Peers

### 3.2. Key Constraints

Providing affordable digital access to all Sierra Leoneans is hampered by distinct factors:

- **Lack of access to energy** access especially in remote areas with an 52% urban electricity access compared to 6% in rural areas<sup>32</sup> coupled with unreliable, inconsistent, and high-cost energy supply in areas with access.
- **Lack of backup to ACE** which means countrywide shutdown in the case of a disruption (in 2018 a cable cut Sierra Leone and other countries experienced severe disruptions lasting up to 2 days).
- **High idle capacity** in Internet international gateway with a local demand of less than 35Gbps of throughput compared to an international capacity of 0.5Tbps<sup>33</sup>.
- **Lack of an infrastructure sharing** framework for the private sector which could improve network coverage expansion by significantly lowering costs and speeding up time to market.

<sup>32</sup> EIU, Electricity access (% of population) 2021

<sup>33</sup> <https://subtelforum.com/acE-submarinE-cablE-cut-impact/>

- **Limited** solutions of fiber to homes and enterprise (FTTx) offered by ISPs to end-users (high use of microwave access networks) due to **license** limitations and lack of fully functional citywide **Metros**.
- **UADFs** financial and operational **constraints** to address the commercial unviability of infrastructure deployment in rural areas by telecommunications operators.
- **Low purchasing power** of the population (GNI per capita in Sierra Leone is one-third of the sub-Saharan Africa average), impacted further by **high taxation**<sup>34</sup> on broadband services, infrastructure equipment and handsets imports. These further limit usage (cost of 1GB is 11% of average income)<sup>35</sup>.

### 3.3. Objectives Prioritization

To catalyze faster development of digital infrastructure and access in Sierra Leone, the NDDS considers three drivers. These drivers are provision of enabling regulation to spur investment, ensuring network availability, accessibility and reliability while fostering affordability and uptake as shown in Figure 13.

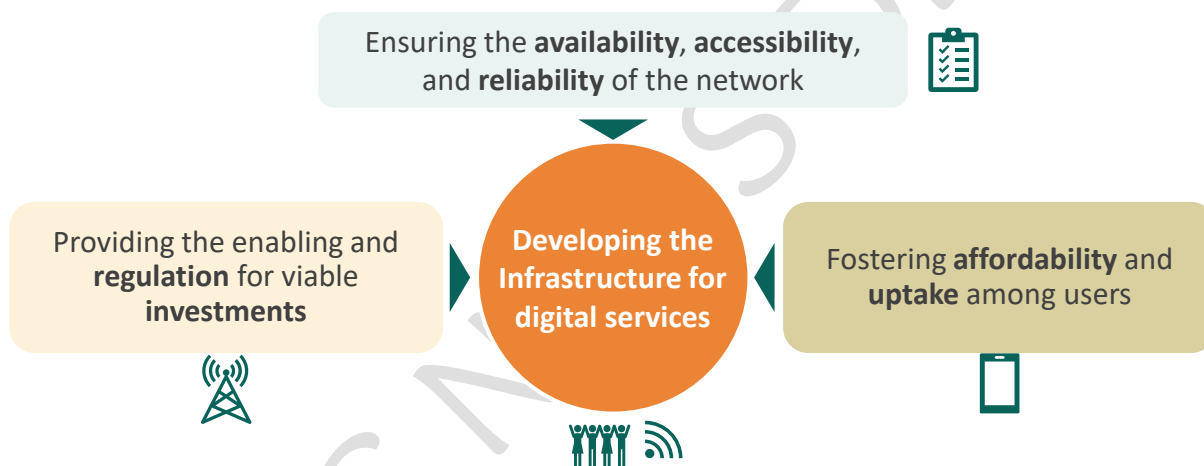


Figure 13: Drivers of Improved Digital Infrastructure, Access and Uptake

Nationwide stakeholders, such as the ICT regulator, MNOs, ISPs, and bandwidth wholesale distributors, shall conduct their digital strategies and actions considering the following national objectives.

<sup>34</sup> In regions with high taxation on telecommunications and users' low purchasing power such as ECOWAS, tax reductions are found to contribute to both digital connectivity expansion and fiscal revenue.

<sup>35</sup> [https://a4ai.org/extra/baskets/A4AI/2020/mobile\\_broadband\\_pricing\\_gni](https://a4ai.org/extra/baskets/A4AI/2020/mobile_broadband_pricing_gni)

**Objective 1: Develop and implement a national master plan for a robust and reliable digital infrastructure**

- Incentivize **infrastructure sharing** and define collocation regulation and cost models including pricing, penalty charges, and service levels to foster competition.
- Facilitate further licensed **metro fibre** network deployments by MNOs/ISPs/metro fibre operators and foster traffic **demand** and **evacuation**.
- Complete the **nationwide terrestrial** fibre-optic network with protected and efficient duct systems, ensure all sections are operational, in all districts, and establish a **reliable** service with ring protection and active interconnections with Guinea (at Gbalamuya) and Liberia (at Gebdema)
- Replicate previous successful projects for the Internet **international gateway** through another cable landing station (CLS) to ensure availability for the country's connectivity.
- Establish new **Internet Exchange Points** (IXPs) to improve the local data performance and revamp SLIX.
- Build **capacity** through different metros (middle layers) for ISPs (last-mile) to implement **fiber** to homes and enterprises (FTTx).
- **Coordinate** with **basic utility providers** (electricity, water pipelines, roads, etc.) to create a common corridor in the rollout of digital infrastructure implementing the 'dig once' policy.
- Foster **traffic evacuation** and increase capacity as traffic demand increases nationwide.

**Objective 2: Ensure predictable, investment-enabling regulatory frameworks with a clear implementation strategy**

- Pass key regulations that **enable competition** and increase penetration of ICT such as the technology-neutral licensing regime, consumer affairs, tariffs, numbering, VAS, metro fiber license, CLS license, and National Fiber Backbone (NFB) license among others.
- Monitor and ensure efficient implementation of the regulations.
- Develop a **National Broadband Strategy** and implement hard and soft tools to efficiently allocate and monitor spectrum for more advanced technology (i.e., 4G and 5G).
- Improve the tools for **QoS monitoring** and technology approvals.
- Create a **centralized** management of **rights of ways** for the deployment of infrastructure.



**Objective 3: Improve the universal access to digital services focusing on the unserved and underserved by areas**

- Support **investments** in infrastructure from the **private sector** by offering financial instruments enabled by **partnerships** with government, financial institutions, and development partners (i.e., cheaper deployment license fees for smaller towns and remote regions compared to cities).
- Streamline **monitoring** tools/metrics for **network** expansion in underserved areas.
- **Prioritize** connections to **public buildings** such as libraries, hospitals, youth centers, skills training institutions, learning institutions, local councils, and ensure MDAs' connectivity.
- Explore **financial instruments** to de-risk capital and finance new infrastructure expansion by the private sector.
- Develop and promote **policies** to increase **access** to digital services and devices for people living with disabilities (**PLWD**).
- Clarify **UADF's** mandate, include it in technical groups, improve its funding mechanisms, and make **use of new technologies** that integrate new services and are more cost-efficient (i.e., small cell multi-tenant solar towers, standalone low power communication systems).

**Objective 4: Promote measures that increase the affordability of devices and services**

- Implement **initiatives** to reduce the **price of devices** and services such as saving groups offering loans at low-interest rates and taxation on service providers
- Promote payment flexibility to clients of MNOs/ISPs especially for last-mile connectivity to homes and private sector.
- **Subsidize** telecentres and **cyber-cafes** in underserved areas.
- Consider handset distribution and usage training in **excluded, remote, and small communities**.

**Objective 5: Reduce the environmental impact of digital development**

- Assign resources for the **protection of the environment** with the expansion of the physical **network** and the increased use of electronic **devices**.
- Establish a **specific agency or empower** the Environment Protection Agency, Sierra Leone (**EPASL**) for effective management of e-waste.
- Support centers for e-waste management and **e-waste entrepreneurship**.
- Integrate **e-waste anti-dumping** mechanisms in import/export policies.

- Support and **incentivize device providers** for end-of-support collection of devices.
- **Incentivize community e-waste collection volunteers** to mop up past e-waste buildup in the country.

MIC NDDDS DRAFT

## CHAPTER 4: DIGITAL SKILLS AND HUMAN CAPITAL DEVELOPMENT

### 4.1. Context

#### Introduction

Digital skills and human capital development are the drivers of the **digital literacy** required for citizens to participate in the digital economy as savvy users and skilled professionals. Education is a basic human right and a minimum level of digital literacy is a cornerstone for human and national development (c.f., SDG indicator 4.4). This means the people's ability to access, understand, consume, and create digital products/solutions through ICT is key at different levels<sup>36</sup> for the:

- **Use** of digital technologies in daily life (basic skills).
- Performance of general **work-related** functions (intermediate skills).
- **Specialization** on ICT professions (advanced skills).

Building the digital skills of citizens, both as **technology consumers and producers**, increases the collective capacities at individual, organizational, and sectoral levels. Digital talent is the foundational pillar for digital development. This fosters digital entrepreneurship, innovation, and a more sophisticated economy. However, advancing to a knowledge-based society might widen the gaps with populations less reached by the educational system (including **women** and other disadvantaged groups) who run the risk of further exclusion.

Hence, ICT for the purpose of education (e-learning) is also vital to **expand both access and quality of general education** to drive sustainable inclusion.

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<sup>36</sup> There are several frameworks used to portray the levels of digital skills. However, most of them share the paradigm that the engagement with technology should come as early as possible in a person's life (education of children) and show an incremental approach with different levels of skills depending on the type of user (generalist or ICT professional). This specific classification of skills draws from several frameworks (i.e., EU E-Competence Framework) to portray in a simplified manner the presence of ICT in the lives of citizens.

## Situation analysis

Even though people below 25 years old account for 60% of the population, thus making Sierra Leone a **young country**<sup>37</sup>, education in the country is not driving the productivity of the future generation as it should. Though there has been **remarkable human capital**<sup>38</sup> **improvement** since the end of the conflict era, the Human Capital Index (HCI) assessment by the World Bank (2020) places the country at 36% of its potential in this regard.

Acknowledging the dire situation, education has **been central in the GoSL’s agenda**, as reflected by the medium-term NDP 2019–2023 (Cluster 1): a flagship program has been launched to increase access and quality across education levels and channels (formal and nonformal) with ambitious targets<sup>39</sup> as shown in Figure 14.

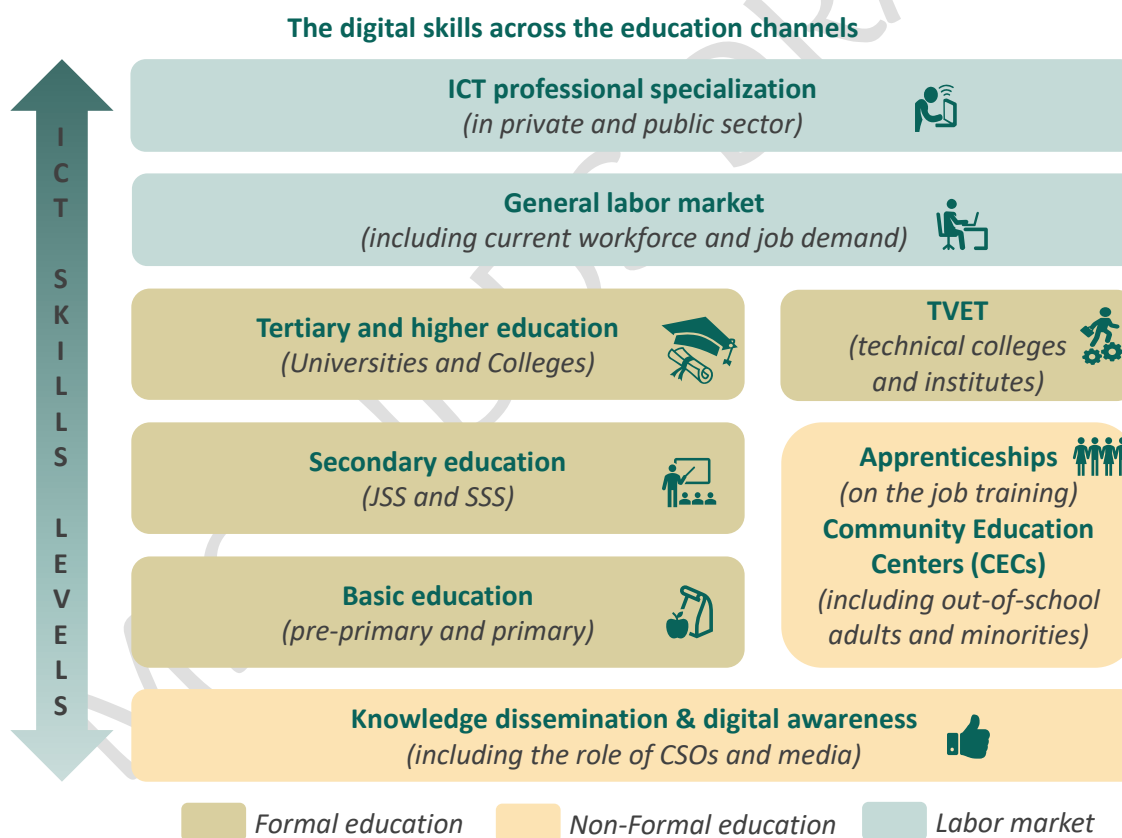


Figure 14: The Continuum of Digital Skills Development

<sup>37</sup> Median age in the country is 19.4 (UN, 2019).

<sup>38</sup> The primary school completion rate increased from 55% in 2004 to 83% in 2019 (84% for girls).

<sup>39</sup> For instance, one goal is to ensure all male and female adults and most youth achieve literacy by 2030.

Aligned with this vision, the new NDDP tackles the issue of limited digital skills and sets policy objectives for digital education as well as for life-long learning, digital awareness, and knowledge dissemination. The need for **digital skills training** in Sierra Leone **cuts across the educational channels as well as the labour market**.

In 2018, the GoSL launched the **Free Quality School Education (FQSE)** program. The launch of this ambitious program (which involved a commitment for 21% public budget allocation to education<sup>40</sup>) saw increased enrolment to education in pre-primary, primary, and secondary levels, especially for girls<sup>41</sup>, through subsidies. However, to this date, some schools still lack basic<sup>42</sup> digital infrastructure (while 80% of schools are within 3G coverage, less than 2% are connected<sup>43</sup>).

The Ministry of Basic and Senior Secondary Education (**MBSSE**) has made remarkable efforts to improve the quality of education such as through the launch of school broadcast systems that facilitated the continuity of learning during the pandemics (Ebola and COVID-19) and the review of the national curricula to integrate the 5Cs of the 21<sup>st</sup> century<sup>44</sup> which includes computational skills. Women and disadvantaged groups such as people living with disabilities (PLWDs) continue to be **underrepresented in STEM** (Science, Technology, Engineering and Mathematics) programs in tertiary education. These two account for less than 22% of the total number of STEM students<sup>45</sup>. Cognizant of this, the MBSSE launched a program to incentivize the enrolment and completion of females and PWD for an eventual career in STEM through targeted financial support (i.e., scholarships and loans).

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<sup>40</sup> The FQSE first committed to achieve 21% of the national budget to the education sector (MBSSE YB 2020), as in the previous years the expenditure had averaged 15%. However, By 2019, education accounted already for 34% of public spending (World Bank, 2020).

<sup>41</sup> The primary female school competition rate is now almost the same for boys and girls.

<sup>42</sup> MBSSE and MTHE have identified the need for the construction, reconstruction, and rehabilitation of some technical and higher education institutions and secondary schools, for which the USD 68m Education Sector Support Project (SLESSP) was signed in July 2021.

<sup>43</sup> Giga is an initiative supported by UNICEF and ITU in collaboration with DSTI.

<sup>44</sup> These are listed as: Comprehension; Computational Thinking; Critical Thinking; Creativity; and Civic Mindedness.

<sup>45</sup> <http://data.uis.unesco.org/>

The number of students in tertiary education has considerably increased in previous years (129,000 students in 2019 from 64,000 in 2012) but they need to be financially supported (in 2021, 90% of students are on a 30% government-funded scholarship). Moreover, those enrolled in ICT programs represent only 7% of the total number of students in higher education programs. This naturally leads to a small number of ICT graduates entering the job market. Moreover, given the country's pressing digital needs such as infrastructure and DFS, there is a clear need for increased **quantity and quality of digital-savvy professionals**.

Digital skills development has been largely supply-driven with limited input from employers. Within the framework of the Universities Act (2021), the Ministry of Technical and Higher Education (**MTHE**) has made provisions for new universities of technology<sup>46</sup>. There is a limited number of Technical and Vocational Education and Training (TVET) centers, with only 10 Government Technical Institutes. This poses the danger of retarded digital skills development at the lower and middle tier of human resource cadre.

Since 2019 and with support from the World Bank, the USD 22,000,000 Sierra Leone **Skills Development Project** (SLSDP) seeks to create a demand-led skills development system. It incentivizes training institutions (including STEM) to improve the relevance and quality of their programs, with a focus on unemployed and underemployed youth and women, as well as businesses wishing to address the skills gaps of their workforce. Improving digital skills is an important vertical of the program with a goal to train 8,000 people by the end of 2023 – mid-2024 (currently USD 12,000,000 has been granted to 63 institutions for this purpose).

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<sup>46</sup> Such as the Milton Margai Technical University, the Eastern Technical University and the Kono University of Science and Technology

**Private sector institutions** (i.e., Limkokwing University and BlueCrest College) have also identified skills gaps in the labor market and are seeking to increase the number of graduates with a wider range of specialized digital skills. Employers have reported a higher level of digital competencies across their graduates thanks to industry-driven pragmatic programs (i.e., in one leading institution the content is 60% practical – 40% theory with regular curricula reviews).

As stated by the medium-term NDP, the GoSL also has clear objectives for improving the non-formal education channels in the country with special attention to adults and out-of-school children. The NDDP also stresses the importance of **life-long learning, rapid skills training**, and social (new) media for digital skills and knowledge dissemination. However, in practical terms **non-governmental players have been more proactive with ad-hoc interventions**. Churches, mosques, and NGOs have established community learning centres while private sectors players have launched projects aimed at filling technical gaps and employment promotion in critical sectors such as agriculture, mining, and industry often through PPPs<sup>47</sup>.

When it comes to ICT specialization, the scarce ICT professionals are headhunted and ringfenced by the private sector. **Specialized profiles are often outsourced**, and industry players often rely on people from India, Kenya, Bangladesh, China, etc. which goes together with higher administrative costs<sup>48</sup>. Furthermore, **MDAs**, despite being the biggest drivers of demand for digital skills in Sierra Leone, are perceived to have **limited capabilities**.

In 2019, MIC conducted a diagnostic assessment of the level of digital skills among ICT personnel across MDAs. The findings indicated that the nation lacked specialist digital skills areas such as cybersecurity and research (with up to 70% of ICT staff being primarily competent in infrastructure<sup>49</sup>).

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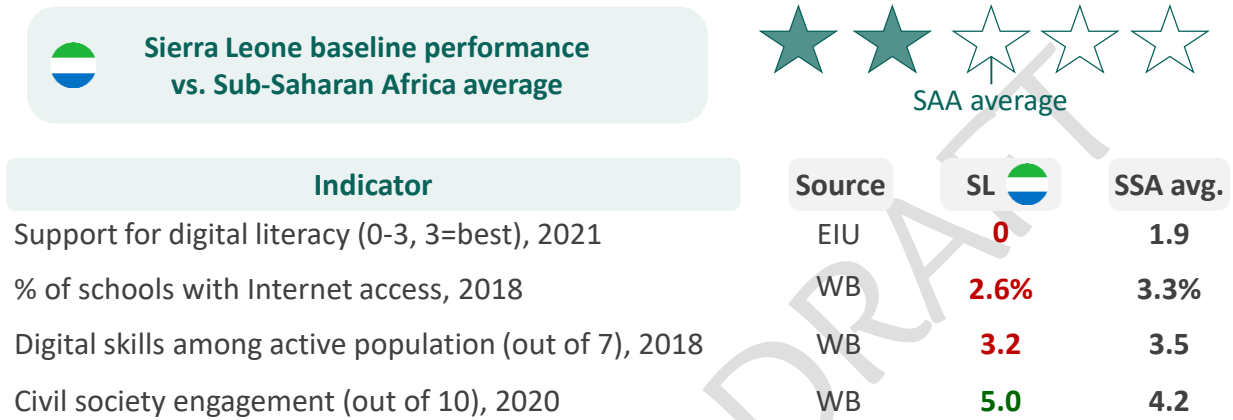
<sup>47</sup> For instance, the Toyota Corporation has been central in the latest agreement between with the GoSL to construct four vehicle maintenance centres geared towards human capital development and technical training.

<sup>48</sup> In some technology companies, up to 80% of hired developers are internationally outsourced.

<sup>49</sup> However, the diagnostic found that the ICT staff have more diverse areas of interests or focus compared to their actual competencies.

Sierra Leone performs slightly below average on most indicators regarding digital skills and learning environments for which benchmarks are available as shown in Figure 15. However, Sierra Leone shows above average performance in areas related to human capacity such as female STEM education, skillsets of secondary school graduates, social capital, and civil society participation.

*Benchmark with other SSA countries*



*Figure 15: Performance in Digital Skills vs SSA Peers*



## 4.2. Key Constraints

Providing Sierra Leone with the sufficient digital skills to leverage on digital technologies for national digital development is limited by several challenges:

- **Lack of enabling infrastructure** for connectivity (98% of schools were unconnected in 2020).
- **Limited in-service training of teachers** and lack of continuous **curriculum updates** with ICT.
- **Inadequate ICT environment** such as digital teaching aids (material, facilities, tools, and content) limiting the development of **e-learning**.
- **Lack of a comprehensive demand-driven system** where industry input is opportunistic while initiatives that push for increased relevance of educational content are scarce, leading to a severe undersupply in STEM and digital skills.
- **Incremental gender gap** throughout educational levels and in job market, peaking in the pool of available specialized ICT professionals.
- **Limited intersectoral coordination capacity** where efforts to integrate ICT in education have mostly been limited to infrastructure development and supplying computers) with inadequate resourcing, implementation, technical barriers, policy, and regulatory constraints.

## Objectives Prioritization

To drive the development of digital skills in Sierra Leone, this strategy has three overarching goals. The goals are shown in Figure 16.

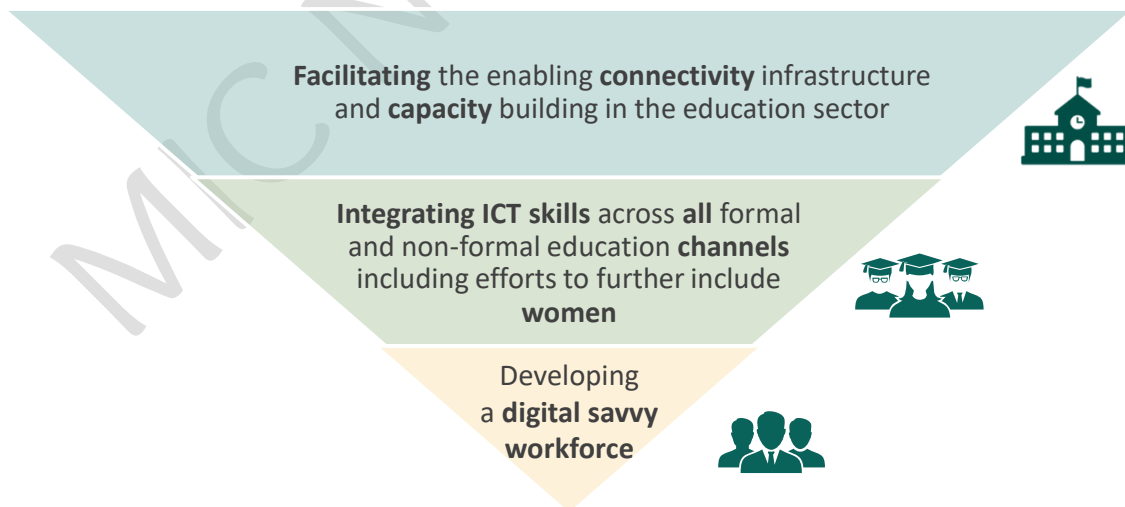


Figure 16: Driving Digital Skills for the Digital Economy

The different stakeholders in the education sector such as the sectoral line ministries, public and private institutions, and development partners could align their digital actions considering the following objectives.

### **Objective 1: Ensure an enabling infrastructure for digital learning**

- Launch **programs** to **connect schools** and make access to the Internet more affordable for educational institutions.
- Ensure institutions have the required **digital devices** (laptops, tablets, phones, computers, etc.) and ICT labs.
- Include **digital infrastructure** as a key component of the annual school **census** of schools to identify ICT needs.
- Improve **Quality Assurance** (QA) to include assessment of digital readiness/proficiency of learning institutions.

### **Objective 2: Foster capacity building and coordination in the education sector**

- Integrate digital skills in teacher training and continued professional development.
- Allow **training for teachers on ICT** with train-the-teachers programs
- **Improve teaching methodologies** to mainstream digital skills in the national curriculum.
- Facilitate **collaboration between the Ministries of Education** and **stakeholders** in ICT education including other MDAs, development partners, private sector players, and ICT accreditation and examination bodies.
- **Improve** electronic educational management **information systems** to increase the quality of management of educational institutions.
- **Partner** with **international institutions** to facilitate academic exchange programs to promote ICT in education.

### Objective 3: Mainstream ICT content across education levels

- Incorporate the learnings of ICTs at all educational levels, starting from an **early age to life-long learning and continued professional development**.
- Review **curricula** at all levels including relevant formal/informal education material to capture emerging digital era and digital development issues.
- Develop appropriate and modern ICT training programs and digital learning aids especially in **STEM**.

### Objective 4: Promote inclusive digital learning

- Establish relevant educational frameworks for **gender equality**.
- Promote **female** participation in ICT and **STEM**.
- Establish **Digital labs** in schools for girls in partnership with the private sector.
- Facilitate the training of **disadvantaged groups** such as people with disabilities in key digital skills.
- Equip learning institutions with requisite digital technologies to **facilitate training for PLWDs**.

### Objective 5: Increase the digital skills of the current workforce

- Set **demand-driven** higher education and TVET **programs** that include digital skills.
- Strengthen **apprenticeship** systems and induction programs inclusive of digital skills.
- Develop Science, **Technology**, and Innovation capacity in all sectors.
- Enhance the **technical**, managerial and operational skills to leverage on digital technologies.
- Support the right incentives for training **personnel** in ICT in the private and public sectors.

### Objective 6: Develop a group of ICT professionals

- Improve the HR development capacity of the nation's **public and private universities** and colleges offering training in high-end digital talent.
- Establish **ICT learning hubs in all districts**.
- Develop ICT professionals and technical staff for **public service**.
- Support nation-wide professional ICT skills **certification**.
- Encourage the **accreditation** of institutes that provide ICT certification.
- Encourage ICT **internships**, work-study programs, and networking.
- Build **native capacity** in ICT **specialized** areas such as cybersecurity, data science, AI, etc.

**Objective 7: Promote ICT knowledge dissemination and engagement through non-formal channels (i.e., outside schools and universities)**

- Support **peer to peer** learning platforms.
- Improve ICT skills informal learning through **radio and TV** for all citizens.
- Encourage national **awards** in ICTs.
- Set up **community level** of digital resource centres.

**Objective 8: Leverage ICT channels to improve access and quality of education**

- Promote **e-learning** platforms and methods.
- Promote the creation of **online** higher-level education institutions, E-portals of existing institutions, and supplementary **education websites** (in the mold of Massive Open Online Courses)<sup>50</sup>.
- Encourage the creation of specific **offline functionalities** targeted to those living in remote or disconnected areas such as have mobile versions, apps, and SMS.
- Establish integrated **skills information digital systems** to support evidence-based analysis and policy development in the education sector.
- Leverage televised and **broadcast education** and training systems for students especially during crises such as pandemics.

**Objective 9: Promote R&D on ICT at higher education levels**

- Incentivize new **research** on ICT especially in **universities** (e.g., AI, data science...).
- Strengthen academia and the **private** sector toward R&D on new and emerging ICT trends.
- Promote private sector **investment** in R&D through PPPs.
- Develop responsive ICT R&D to address **local challenges**.

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<sup>50</sup> <https://www.mooc.org/>

## CHAPTER 5: DIGITAL GOVERNMENT

### 5.1. Context

#### Introduction

Digital government involves the essential components to implement digital platforms and government services to citizens and businesses. They include technical standards, databases, digital systems, and applications across public institutions aimed at improving the government's core functions, in terms of both **operational processes and service delivery** (e-services). The use of ICT in the government allows for:

- **Digitally enhanced** interactions with citizens, businesses, and partners (G2B, G2C) by providing a new channel for communications, services, transactions, and feedback.
- **Standardization** of technological processes and platforms for seamless interactions across MDAs (G2G) which is key to achieving benefits such as increased economies of scale and cost savings in government operations.
- Enhanced transparency and accountability in the public sector as digitalization across African countries has been found to lower corruption and mistrust in the public sector<sup>51</sup>. Thus, e-government services built around harmonized standards, interoperability, and a user-centric approach, have the potential to increase **quality, reach, transparency, and efficiency** in the public sector.

ICT can be leveraged by the GoSL to enhance **Human Capital Development (HCD)**, which can be defined as the knowledge, skills, and health that people accumulate throughout their lives that empowers them to realize their potential as productive members of society<sup>52</sup>. It covers the **first strategic cluster of the Medium-Term NDP 2019-2023**, and targets primarily increased access and quality to basic **education, health, and food** self-sufficiency.

Digital technology has the potential to boost this national effort by **facilitating the digitalization across these sectors** (e-health, e-agriculture, and e-education) and thus increased sectoral competitiveness.

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<sup>51</sup> IMF Working Paper WP/20/68, May 2020

<sup>52</sup> There are several definitions of Human Capital, but the GoSL is following that of the World Bank (c.f., HCI) which covers SDGs 1,2,3,4,6,11 and can be understood as the prerequisites for human development (i.e., nutrition, health care, quality education, jobs, and skills).

Therefore, while Chapter 4 of this Strategy is fully devoted to the development of digital skills and e-education, digitalization of e-health and e-agriculture (AgriTech) are incorporated into the e-government due to the leading role of the public sector.

### Situation analysis

Guided by the medium-term National Development Plan (cluster 3.5), the GoSL has embarked on the process to develop the e-government ecosystem and fully **embrace a whole-of-government and whole-of-society approach** which was clearly stated in the NDDP. In practical terms, this vision focuses on the digitization of core government back-office processes led by **individual MDAs which have drafted sector-specific digital strategies**. The National Civil Registration Authority (NCRA), the Ministry of Finance (MoF), the National Revenue Authority (NRA), the Ministry of Health and Sanitation (MoHS), and the Ministry of Agriculture and Forestry (MAF) are some of the MDAs that have started implementing digitalization projects to improve the efficiency of their specific functions.

Established in 2008, the **MIC** was set up to lead the **coordination** in the ICT sector in Sierra Leone. To provide leadership in the coordinated use of ICT in MDAs and lead the e-government efforts, the MIC consists of a specialized team of ICT professionals. However, **the ministry currently** grapples with the challenge of **lack of government-wide ICT architecture, integration, and standardization** which is central to e-government and digital development. Most bodies have implemented ICT projects in **silos** with little or no consultation with MIC for ICT standards and technical guidance. Important platform rollouts such as the Integrated Financial Management Information System (IFMIS) and E-Procurement System addressed pressing challenges, but they did so without a whole-of-government approach.

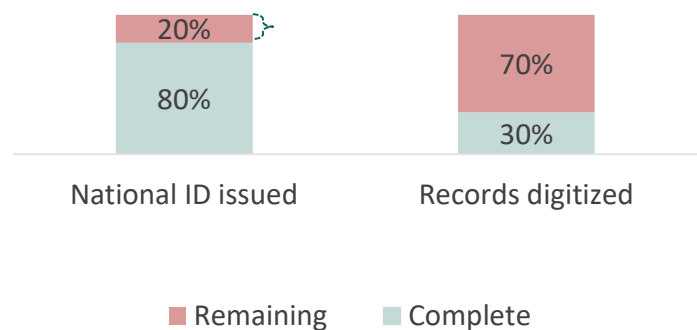
While some MDAs such as the BSL, DSTI, and MoF also push for cross-cutting e-government projects, **coordination has remained limited**. However, **MDAs expect support and guidance** from **MIC** on key ICT areas such as architecture, disaster recovery, application development, and data management. That is why the NDDP has specified an **updated institutional framework** with the National Digital Development Agency (NDiDA) which will lead e-government coordination, provide advisory support to MDAs, and drive the alignment of ICT practices and standards. Such a coordination for the development of selected digitalized public services should take place for the implementation of the **new World Bank funded Sierra Leone Digital Transformation Project (USD 50,000,000 grant)**.

This role will be key as many **challenges** hamper government **interoperability** processes. Besides the **nonexistence** governmental **ICT standardization**, there are **wide gaps of technological readiness** across MDAs, including digital capabilities of public servants. Some MDAs have **low confidence** in digital technology to enable electronic services and other still perceive ICT as non-essential support tools not aligned to work processes or service delivery. In this context, **G2G data sharing**, such as national ID, **is gradually becoming more** mainstream and some MDAs have developed bilateral interoperability processes<sup>53</sup>.

In terms of architecture, the government-wide infrastructure implemented by ECOWAN for broadband connectivity to be used by MDAs is constrained by the lack of standard internal network infrastructure. Many government bodies host their own sectoral servers, nerve centers and data centers, with different levels of specifications. Some do not meet minimum requirements. To continue leading the coordination of the e-government development, especially in cross-cutting e-government areas such as data hosting and disaster recovery, **MIC** needs to establish, **monitor**, and **enforce** a **government-wide infrastructure and standards**.

One key enabler of the e-government and other aspects of digital development is the national ID. The **NCRA** was established by the National Civil Registration Act (2016) to generate, assign, and manage the national ID (NIN) and carry out Civil Registration and Vital Statistics (CRVS) activities (registration of births, deaths, marriages, etc.). Internally, NCRA has conducted **civil registration** since 2017

**Civil Registration and Vital Statistic (CRVS) status in Sierra Leone - 2021**



*Figure 17: Status of Vital Statistics as of 2021*

leveraging the national **Identity Management System** (IDMS). As of 2021 80% of residents had national Identification number [NIN] after providing biographic and biometric data) as shown in Figure 17.

<sup>53</sup> Such as the interface between MoF’s IFMIS (which runs on the Freebalance platform) and CS-DRMS (Commonwealth Debt Recording and Management System).

However, IDMS is **limited** in capturing **other vital events** for which a new integrated CRVS system is required<sup>54</sup>. An e-ID project piloted in 2019, the National Digital Identity Platform (NDIP), leveraged blockchain technology and focused on providing access to IDs to facilitate financial inclusion through digital credit registry for e-KYC. However, the rollout stopped shortly after, and there is no plan for restarting the project at this time. The focus of NCRA has been to digitize its records and processes. In 2021 that was the case for **historic paper-based** birth and death record digitization which requires data sanitization and exhaustiveness and calls for robust data centers to host the information and information processing systems.

NCRA also plays a central role in the development of e-services since the national ID is required for security and G2G interoperability. Naturally, **several private and public actors have requested ID data** from NCRA for different purposes (e-KYC, credit reference lookup, health, elections, etc.). For this, a database has been set up to share data bilaterally, yet the responsiveness to the requests has been limited. Acknowledging its vital role and accumulating requests from other MDAs, NCRA seeks to establish a platform for **ID interoperability**. While the legal framework has already been established, the **lack of funding** (both for CAPEX and OPEX of the platform) remains an **impediment to any progress**. Engagements with development partners such as the World Bank are yet to bear fruit. There remains need for sustained effort to secure the adequate financial support.

The NCRA believes that investing in its interoperability layers would benefit other MDAs and private sector players as they would not have to support parallel redundant systems<sup>55</sup>. The funding constraint also limits the development of an open-source project (OpenIDNet) for ID verification which would be required for other players in the ecosystem to provide digital ID services.

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<sup>54</sup> Provided for in the National Civil Registration (NCR) Act of 2016. This should include the migration of IDMS and AFIS (fingerprint registry) to a new server and integral system.

<sup>55</sup> A sustainable model for ID data sharing is yet to be found as NCRA expects to continue being paid by other MDAs to answer their requests.



**Efficient points of contact with citizens** are also key for the development of an e-government ecosystem<sup>56</sup> but without integrated platforms for e-services, MDAs need to build their own client-facing infrastructures, which is cumbersome for users and involves duplication of effort in some cases. In Sierra Leone, where not all citizens have access to connectivity and the uptake of e-services remain limited, the **postal services** physical infrastructure has the potential to host a **one-stop-shop** for E-service delivery. SALPOST, the national postal office and member of the Universal Postal Union (UPU), has set a new vision to embrace ICT, diversify services to the public, and thus facilitate e-government. Under new management, SALPOST has started ensuring minimal operational requirements, enhancing its visibility and reputation, and improving data management. However, the **ambitious E-service diversification project is yet to be completed** and requires a considerable capital expenditure (i.e., USD 5,400,000 in the first four years<sup>57</sup>).

### *e-health*

The GoSL has also specifically highlighted a few priority sectors, health being one of them. ICT has the potential to strengthen health systems, scale-up interventions, improve inter-sectoral coordination, and reach underserved communities, while **reducing cost and improving** performance<sup>58</sup>. This is crucial in the context of a country with a very high maternal and infant death rates (MNCH)<sup>59</sup> and an international environment with major health risks (such as the Ebola and Covid-19 pandemics). Acknowledging this, the **MoHS** facilitated the implementation of a Health Management Information System (HMIS) hosted on DHIS2<sup>60</sup> and implemented an intersectoral coordination hub in the Directorate of Planning, Policy, and Information (DPPI). Realizing the limited use of the HMIS and data management issues, the hub drafted a **digital health strategy in 2019**<sup>61</sup> to leverage ICT for universal coverage, focusing on:

- Funding prioritization across government, private sector, and donors.
- Capacity building for digital health programs.
- Development of standards, SOPs, guides, and architecture design.
- Infrastructure and solution deployment.

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<sup>56</sup> Hendrik Scholta, Willem Mertens, Marek Kowalkiewicz, Jörg Becker, From one-stop shop to no-stop shop: An e-government stage model, Government Information Quarterly, Volume 36, Issue 1, 2019, Pages 11-26, ISSN 0740-624X, <https://doi.org/10.1016/j.giq.2018.11.010>.

<sup>57</sup> Source: interview with SALPOST.

<sup>58</sup> <https://www.afro.who.int/news/maximising-digital-health-technology-improve-quality-and-patient-safety-africa>

<sup>59</sup> <https://www.unicef.org/sierraleone/maternal-neonatal-and-child-health>

<sup>60</sup> District Health Information Software 2 (DHIS2) is an open source, web-based platform most used as a health management information system

<sup>61</sup> MoHS National Digital Health Strategy 2018-2023

- Digitalization of social health insurance scheme for affordable universal health coverage.
- Change management and compliance.

However, apart from the integration of main systems and a focus on data management and sanitation, the **bulk of initiatives** of the roadmap has **not been planned or implemented** as the strategy faces significant **funding constraints**. Moreover, MoHS has seen a **lack of continuity** in implementations due to irregular funding (for instance the Global Fund could not support MoHS during the previous year for digital training), limited engagement and willingness to institute change (which was an area addressed in the strategy), as well as rotation in project leadership and management<sup>62</sup>. The **current focus** of the ICT practice within MoHS is limited to **data sanitation** (deleting duplicate and forged entries).

### *e-agriculture*

Another **priority** sector is **agriculture** in which the GoSL highlighted the need to **improve productivity** in the MTNDP. This strategic sector dominates Sierra Leone's economy. Its contribution to the GDP was between 50% and 60% in the ten years leading to 2021, and it employs approximately two thirds of the population, especially women<sup>63</sup>. However, national food insecurity persists, and remains increasingly vulnerable to shocks (44% insecurity rate in 2018, and 53% in 2019<sup>64</sup>). The use of ICT for e-agriculture is expected to help address the situation of food self-sufficiency, improve the agricultural value chain and enhance productivity.

Acknowledging this situation, **MAF**, with continuous support from the World Bank-funded Smallholder Commercialization and Agri-Business Development Project (SCADEP) which uses a short code to establish an IVR call center to support the operations of an E-extension knowledge based mobile dissemination to farmers. Additionally, the EU-financed Boosting Agriculture and Food Security (BAFS) has started **identifying needs, sourcing, and implementing digital initiatives**. Since 2017, baseline studies were conducted leading to the National Agriculture Transformation (NAT) policy 2019-2023 program with a clear identification of constraints (wrong planting times, inefficient market rates, limited extension services, etc.) and prioritization of use cases (notably rice self-sufficiency).

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<sup>62</sup> As a new management tend to have a different vision from the previous one.

<sup>63</sup> Source: MTNDP with data from Statistics Sierra Leone, 2019

<sup>64</sup> <https://reliefweb.int/report/sierra-leone/sierra-leone-state-food-security-comprehensive-food-security-and-vulnerability>

MAF has an **increasingly wider portfolio of digital solutions**. Notably, the Agriculture Market Information System (AMIS) was developed as a one-stop E-agricultural Market for consumers, wholesalers, retailers, and farmers (over 68,000 farmer's records were captured in six provincial districts). A Geographic Information System (GIS) platform has also been implemented for mapping analysis, and the MAF's website has been revamped to enhance accessibility to farmers. However, **actual use** of AMIS and GIS has been **limited**.

Moreover, MAF started implementing a **digital farmer registry** and **voucher input system**, as well as a multilingual **Interactive Voice Response (IVR)** platform for farmer advisory services during the pandemic (around 90% of them are illiterate<sup>65</sup>). Despite those initial efforts, more comprehensive developments and rollouts with further features, as well as **integrated accessible extension services are required** to allow farming practices to be digitally enhanced. MAF's pipeline intends to provide an even wider range of digital solutions. Internal and external consensus will be required. First, MAF's ICT, Planning, and Extension services departments would require alignment on the integration of solutions and technical frameworks. Then, incumbent and new donors would have to focus on resource mobilization. A coordinated comprehensive e-agriculture strategy is key to prevent duplication of efforts and standalone systems.

#### *Benchmark with other SSA countries*

Digital government is the **focus area** for which Sierra Leone's **performance** is the **closest to SSA peers** as shown in Figure 18 and the public data coverage is satisfactory. However, the country is showing **worse-than-average performance** on a **few key indicators**, including the **e-government and e-health indices**.

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<sup>65</sup> Source: MAF ICT status report for the period of 03/2020-11/2021

The nation beats **the SSA average** with regards to **e-participation** (i.e., the use of online services to facilitate the circulation of information by governments to citizens, interaction with stakeholders and engagement in decision-making processes) and the **availability of e-government services in local languages**.

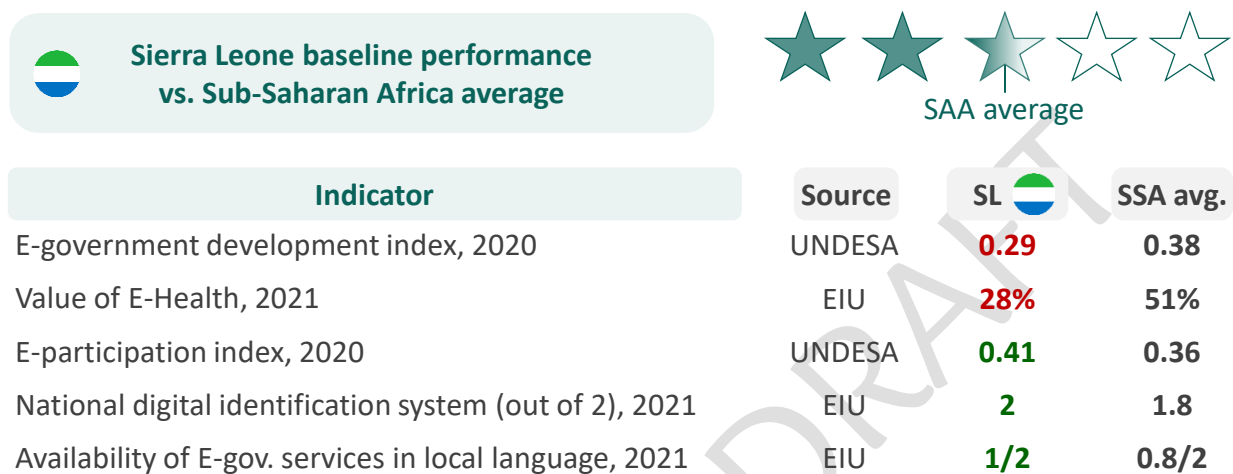


Figure 18: Performance in Digital Government vs SSA Peers

## 5.2. Key Constraints

Digitally enhanced service delivery and public administration is limited by several factors:

- Siloed implementation approach** across MDAs that mirror the government vertical organization and stunted whole-of-government and whole-of-society approach. Uncoordinated e-government efforts lead to **duplication of efforts**, increased operational variability, and constant fragmented capital injection into systems that have not shown value for money over the years. This is exemplified by the **parallel identity systems** with different standards (passports, national ID, driving license, social security, voter's ID, etc.). MDAs individually conduct their own biometric capturing and still require cross checks to validate data (i.e., data from National Electoral Commission [NEC] needs to be routinely updated with that of NCRA for each election cycle). Moreover, increased variability in national ID leads to a high probability of ghost and duplicate identity data.
- Disparity in digital readiness across MDAs** including unharmonized ICT practices and standards, uneven uptake of basic digital tools such as official websites and emails (an estimated 60% of government officials use their personal emails for work<sup>66</sup>), and digital skills gaps across staff.

<sup>66</sup> Source: Interview with MOPED.

- **Lack of interoperability for data sharing** (i.e., ID data) and manual and **cumbersome** bilateral data **sharing methods** between NCRA and several MDAs (NRA, NASSIT, Sierra Leone RSA, AGD, Payroll, Teaching Service, etc.).
- **Limited funding** affecting the sustainability and maintenance of strategies and implementations and delaying e-government cross-cutting areas such as the national ID interoperability platform.
- **Low coordination** between incumbent **e-agriculture** actors and new development partners who without a coordinated sectoral strategy can cause duplication of **effort** in the rollout of applications (i.e., new EU-financed partner “SL AgriTech Development Support” seeking to push innovation technology in agriculture might not consider MAF’s internal pipeline<sup>67</sup>).
- **Inefficient design of e-agriculture systems** which are being created as standalone solutions to cater for specific needs without considering existing platforms leading to increased variability. Also, project implementation can sometimes ignore end-users’ unique contexts and their predominantly face to face practices impact digital extension services uptake.
- **Limited addressable population by e-services**; considering that a government’s mandate includes offering services both universal and contextualized cases, the GoSL approach to leverage ICT for service delivery will be limited to efficiently drive inclusion since many of its citizens are digitally excluded.
- **Lack of digital skills and literacy of the populace.**
- **Lack of public awareness, education, and adoption of e-services usage.**

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<sup>67</sup> <https://www2.fundsforngos.org/latest-funds-for-ngos/european-union-sierra-leone-agro-tech-development-support/>

### 5.3. Objectives Prioritization

To allow the development of the e-government system, this national digital development strategy considers two axes for improvement. These are increasing the administrative efficiency and deployment of e-services to citizens and businesses as shown in Figure 19.



Figure 19: Focus Areas for Digital Government

To accomplish this, government actors, with support from donors and the private sector shall align their digital strategies with the following e-government expected objectives.

#### Objective 1: Develop and implement harmonized ICT strategies & standards

- Implement the NDDP and the NDDS with respect to digital government.
- Develop comprehensive national and sectoral **digital government strategies** in accordance with regional and global best practices.
- Leverage internationally recognized ICT standards and **best practices** adapting them to the unique context of Sierra Leone.

#### Objective 2: Standardize the government digital infrastructure

- Define a **high-level Enterprise Information Service Architecture (EISA)**.
- Define the national e-government **Inter-operability Technical Framework (ITF)** policies, specifications, and **reference models**.
- Implement a **Government Data Centre** and cloud computing infrastructure (with redundant high availability configuration).
- Improve the **centralized infrastructure** for financial transactions including IFMIS, EFT, national switch, etc.
- Facilitate the **integration** of government **databases** and software systems.

- Assist the IT departments of MDAs to **standardize** their **platforms** and services; ensure frameworks, regulations, and policies are adhered to including recommending technical standards for sectoral data centres; and enforce the use of the gov.sl domain in MDAs.
- **Implement** an e-government core **network infrastructure**.
- Establish **disaster recovery** and **business continuity** management across sectors.
- **Assess the risks, threats** and vulnerabilities to e-government **security** systems.
- Create a common infrastructure **platform for the development of e-services**.
- **Implement information security standards and best practices** to secure information assets of the digital government, citizens and businesses.

### Objective 3: Develop the building blocks for a harmonized digital ID system

- Support the harmonization of the national ID and create an **interoperability** platform for ID data sharing.
- Complete **registration exercises** with biometric information and **digitalize** ID and civil registration and vital statistics **records**.
- Define requirements for **authentication protocols** in e-services and interactions (minimum data fields, deduplication protocols, biometric formats, etc.).
- Classify the Permanent and **Residential Address** for CRVS and ID management.
- Design, develop, implement, and popularize a **secure national digital identity** (e-ID) and digital ID wallets system leveraging technology such as distributed ledger to increase uptake of e-services and DFS and facilitate financial inclusion
- Develop **online portals** for ID Verification, Civil Registration, and Vital Statistics Information sharing to the public
- Promote the development of an **open-source identity verification** and authentication portal

### Objective 4: Implement new digital government services across sectors

- Operationalize NDiDA to **plan and coordinating** e-government efforts as envisaged in the NDDP.
- Establish **electronic** government **registers** across different sectors.
- Implement and monitor a **program for digital development**.
- Ensure the **security** of sensitive **information from** businesses and individuals **on e-services**.

- Promote **Private Public Partnerships (PPP)** for developing e-services, including those to citizens and businesses (G2C, G2B).
- Leverage inter-government agreements at regional, continental, and international levels to exchange and **re-use intellectual property of e-services**.
- Develop capacity to use **big data and cloud computing** for e-services.

#### Objective 5: Improve efficiency and transparency in public administration with ICT

- **Improve** the **transparency**, accountability, good governance and reduce opportunities for corruption with the implementation of open access platforms.
- Improve resource management and **transparency** of **government** systems in key sectors such as health and education.
- Plan the development of a **robust G2P digital payment channel** for government payments to citizens (salary payments, social welfare allocations, etc.) and digital single windows for revenue collection, ensuring the digitization of the last-mile (including POSs and Electronic Cash Registers), especially in rural areas.
- Digitize and **automate** back and middle office processes across MDAs.
- Target **cost reductions** from implementing shared ICT infrastructure and services and continuously monitor the impact on efficiency.

#### Objective 6: Develop the e-health sector

- Review the **digital health sector strategy** defining focal points for donor support to allow **sustainability**
- Ensure **interoperability within the health sector** to allow the integration of different digital health solutions and **data sources** across actors
- Promote digitization and **automation** of existing **hospitals** and their **databases**, while ensuring protection of personal and patient-level data.
- Develop digital training tools for health sector **staff** in priority areas (i.e., MNCH apps) and digitize records of all personnel on Human Resource Systems.
- Develop **digital health policies** including data privacy, health insurance, and compliance mechanisms.



- Streamline **coordination** between **health and ICT sector**, leveraging the technical hub, especially for use case implementations.
- Create **data protection** and data-quality policies to enable digital health systems to support **Universal Health Coverage**.
- Develop more e-health **applications** for patients and refine existing solutions in additional areas.
- Accelerate the use of **telemedicine** and ICT-backed **distribution** models for medicine such as the use of **drones**, especially for emergencies and in rural **and hard-to-reach areas**.
- Define policies for **teleconsultations** and E-prescriptions.
- Build an online network of doctors and paramedical **staff working** directly or **remotely**.
- Protect patient safety and privacy to foster **trust in digital health** solutions.
- Support the social health insurance scheme with digital tools for affordable and universal health coverage.

#### Objective 7: Develop the e-agriculture sector

- Define a comprehensive national **AgriTech strategy** with a robust monitoring and evaluation framework.
- Enhance agricultural digital skills and literacy by providing targeted **training for farmers**, particularly for **women**.
- Support **extension workers** with diverse online and offline ICT resources and training, and integrate analogue, digital, and physical tools.
- Enhance quality **and productivity of farmers** through **information systems** with content such as IVR systems providing weather conditions, market prices, supply/demand data, improved farming techniques, health, nutrition, and educational advice
- Support the development of digital **agricultural platforms** for farm registries, livestock management, phytosanitary information, digital marketing, agricultural observatories and platform aggregation.
- Develop **e-agriculture services** such as E-vouchers for direct benefit transfers and incentives for farmers and other agribusinesses.
- Develop and implement a Monitoring and Evaluation (M&E) framework for AgriTech rollout.
- Use ICT for data **analytics** such as mapping, land use, soil types, meteorology, and hydrology.

- Build ICT **capacity in agricultural institutions** and farmer organizations based on “train the trainer” concept.
- Improve digital infrastructure and upgrade the **resource planning** software of the sectoral **ministry** with digital modules such as inventory, information, and transportation and ensure **interoperability** of systems.
- Improve **access to finance** for start-up and early-stage **AgriTech enterprises**.

**Objective 8: Enhance the postal service to become a platform for e-services**

- Facilitate funding, **capacity** building, and **digitalization** of the back and front office of the postal service
- Support the **certification** and enhanced cooperation with the Universal Postal Union.
- Implement a nationwide **digital address system**.
- Transform the postal sector as a **platform** to deliver **e-services** for businesses and citizens including **e-commerce**.

**Objective 9: Enhance the ICT culture of actors in the private and public sectors**

- Facilitate increased e-government **dialogue and public participation** between the state, citizens and **non-state actors**.
- Implement an **e-government Information, Education and Communication (IEC)** plan and conduct the regular assessment of its impact.
- Facilitate e-government **seminars**, leadership **forums**, and national **awards** ceremonies to foster engagement and nurture cooperation.

## CHAPTER 6: E-COMMERCE AND DIGITAL FINANCIAL SERVICES

### 6.1. Context

#### Introduction

The e-commerce and digital financial services (DFS) area covers the development of a robust marketplace of digital trade and financial services as a key component of the digital economy. Digital tools and marketplaces within and across sectors **foster productivity, the uptake of goods and services, and diversified economic growth**. Although ensuring digital-savvy users and access to connectivity facilitates the creation of digital marketplaces, digital financial services (DFS) and transactions are the ultimate endgame.

DFS, **financial products and services**, including payments, transfers, savings, credit, insurance, securities, financial planning, and account statements delivered via **digital/electronic technology** such as e-money (initiated either online or on a mobile phone), payment cards and regular bank accounts. They enhance the interactions between businesses and users by creating new digital channels, while reducing transaction and commercial costs. This ultimately **generates more access to financial services** for people (i.e., financial inclusion). In turn, wider financial inclusion makes the market attractive for the sale of traditional and digital goods and services online (**e-commerce**). Its development lowers the market's asymmetry of information, which increases consumption, improves efficiency through ICT-backed negligible marginal costs, and **enhances the competitiveness of the digital ecosystem**.

Unlocking the e-commerce and digital financial services will require development of a robust mechanisms for data protection, cross border data flows, and data localization; online consumer protection; and electronic signatures and electronic authentication; electronic payments; and provisions to address the digital divide/financial inclusion.

## Situation analysis

DFS can be seen as the **bedrock for digital transactions** and **e-commerce** as a catalyst for SMEs' competitiveness and job creation. In Sierra Leone, these sub-sectors have different levels of maturity and face different situations. Financial inclusion is growing globally, and Sierra Leone is no exception.

After lagging for some years, the country started **moving quickly towards digital financial products**, which was clearly shown during the COVID-19 pandemic. The number of registered DFS accounts reached 2.2 million in December 2020, up from 1.4 million in December 2019 (+63%)<sup>68</sup>, with nearly 20% of the population having access to formal financial services<sup>69</sup>. As of 2020, 10 commercial banks, two MNOs, and one Microfinance Institution<sup>70</sup> (MFI) had DFS on their portfolio of services. The banking sector acknowledges the importance of digitalization because brick and mortar channels are too expensive to expansion outside the main cities<sup>71</sup>. Digital channels stand out as the best way to address the unbanked population (80%).

The **main driver of financial inclusion** has been **mobile money** (m-money) offered by MNOs, whose agents account for the bulk of service access points. Cognizant of this growth and the intuitive tradeoff between higher regulation and increased financial inclusion, the Bank of Sierra Leone (**BSL**) as the regulator in the financial sector, launched the first mobile financial services guidelines in 2015 with a focus on MNOs' m-money. However, there is still the need to broaden the scope to provide regulations for electronic money services in general (e-money) that can be launched by MFIs in active collaboration with the NaTCA. Notably, the National Strategy for Financial Inclusion (NSFI) 2017–2020 supported by UNCDF to further drive inclusion was developed in 2015. The strategy includes DFS and 5 other thematic areas<sup>72</sup> which are currently being reviewed for the period 2021 – 2024 by the BSL and DFS stakeholders with help from a resident Consultant from the US Treasury, UNCDF and ODI.

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<sup>68</sup> Accounts active in the past 90-days. Source: UNCDF with BoSL data, 2020

<sup>69</sup> Patricia Laverley, Deputy Minister of Finance - 14 Aug 2019

<sup>70</sup> There are over 50 MFIs in the country. 5 of them are deposit-taking, out of which 1 already has a DFS solution and 2 are currently designing one and should launch them by 2022.

<sup>71</sup> One stakeholder mentioned that the cost of setting one branch averages USD 1 million.

<sup>72</sup> Responsive policy, regulation, and coordinated action; Client-centric products and services; Access to Finance for MSMEs; Financial literacy, education, and consumer protection; and Data and Measurement.

Due to the **lack of platform for interoperability**<sup>73</sup>, most banks have developed bilateral agreements with MNOs for account-to-wallet and wallet-to-account transactions. These Application Programming Interfaces (APIs) implemented by providers aim to deepen their value proposition for bill payment services, bulk payments, digital loans, and more. In the banking sector, the Automated Clearing House (ACH) and the Real Time Gross Settlement (RTGS) systems have been in use since 2013. The **national switch**, which was operationalized in early 2022<sup>74</sup>, is a **critical component** of the payments system as it complements the ACH, RTGS used by banks, and the APIs between them and MNOs for m-money (banks already engaged in bilateral agreements with MNOs would follow a framework).

More recently, from January to June 2020, BSL facilitated agency banking guidelines and tiered know-your-customer (KYC) requirements with increased flexibility for registration requirements (mainly for tier I and II, i.e., low-value accounts) with the intention to facilitate secure transactions<sup>75</sup> and access to financial services. Despite the efforts to strengthen and diversify the cashless use cases, around 77%<sup>76</sup> of the DFS transactions are made by **airtime top-ups and CICO** (cash in, cash out), thus showing a limited uptake of more sophisticated digital services that could extend the value in the ecosystem. There are use cases believed to have great potential for digitalization such as international remittances, which account for an estimated 5% of transaction value but less than 0.1% of transaction volumes<sup>77</sup>. However, generally the financial sector is perceived as “alien” for most of the population who believe such services are only for the richest individuals and are settled to the ubiquity of cash in the economy.

The commitments to **the Better than Cash Alliance** (BTCA) by the Ministry of Finance (MoF) in 2015 and the development of the NSFI 2017–2020 led to a **larger coordination** for financial inclusion nationwide under the **leadership of BSL**.

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<sup>73</sup> This platform is included in the World Bank funded Sierra Leone Financial Inclusion Project starting in 2019 but is still to be implemented

<sup>74</sup> Due to the COVID-19 pandemic the supply chain was affected which resulted in delays in the project implementation timeline.

<sup>75</sup> MIC developed an E-transaction legislation in 2019 given legal recognition to electronic documentations, transactions and recognizes electronic signatures to be permissible in court.

<sup>76</sup> The percentage decreased from 85% in 2019 explained by increased domestic peer-to-peer (P2P) transfers through E-wallet.

<sup>77</sup> Source: State of the Digital Financial Services Market in Sierra Leone (UNCDF, BoSL, 2021)

The NSFI translated to support to the Digital Financial Services Working Group created in 2016 and was operationalized by the National Payment Council (NPC) for enhanced decision making between public and private actors. Within the framework of the NSFI, in 2020 BSL developed guidelines for financial consumer protection to apply to all regulated financial institutions. The framework was reviewed later to address gaps in sections such as data protection and privacy which are key in DFS. The finalized financial consumer protection guidelines were launched in 2022. However, the value of these guidelines should be measured by the extent to which users are aware of consumer protection in the digital era for which more work is required<sup>78</sup>.

However, despite the efforts achieved to date, the **NSFI has already expired** and ought to be revamped. Considering lessons learned, a **new NSFI** for a future period, should<sup>79</sup>:

- Align **vision** with **actual capacity** of BSL and ensure feasibility,
- Enhance the **monitoring and evaluation** framework and data collection,
- Implement **risk management** to mitigate negative external factors (i.e., pandemic),
- Prioritize the financial inclusion of **women, youth, and people with disabilities**,
- Include **collaboration** with MFIs, NaTCA, banking associations, and apex institutions,
- **Periodically** have all stakeholders at all levels **review NSFI**.

Apart from developing new regulations (i.e., e-money guidelines), amending and updating existing ones (i.e., the Financial Services Act of 2021), and further driving government payments digitalization in collaboration with MoF and NRA, the new NSFI should support the DFS Working Group as the main driver of financial inclusion. Moreover, responsive policy, regulation, coordinated action, and data and measurement need to be considered in the new plan as cross-cutting key drivers instead of thematic areas given their importance and considering the lessons learned. DFS, Financial Literacy, and notably client-centric products and services will be further highlighted as intervention areas, as BSL pursues higher customization of DFS to enhance uptake by excluded segments who often lack awareness.

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<sup>78</sup> A consumer protection section has been created in the BoSL to attend consumer complaints, however further feedback and awareness mechanisms are required.

<sup>79</sup> <https://www.uncdf.org/article/7231/sierra-leones-journey-towards-digital-financial-inclusion-part-2>

e-Commerce is conversely still at a **very early stage of development** in Sierra Leone with only 1% of the population shopping online<sup>80</sup>. The service sector, which is predominantly informal, has been recently hampered by the supply chain disruption<sup>81</sup> with significant shortages on containers. The cash intensity of the economy is also detrimental for e-commerce uptake, as **merchants prefer being paid in cash**, and users are unaware and have distrust in the benefits of the digital channel. Younger segments of the population are more at ease making payments online, but their purchasing power is limited. For last-mile logistics, the underdeveloped **addressing system limits parcel delivery** and ordering internationally is particularly challenging. Notably, the Freetown City Council in consultation with the Ministry of Trade and Industry (**MTI**) is in the process of renumbering addresses leveraging past iterations on waste management.

Here, MDAs with similar objectives such as NCRA (residence registry) and SALPOST (parcel delivery) are not yet engaged in this effort. When it comes to international supply chains, the GoSL ratified the African Continental Free Trade Agreement (AFCFTA) in 2018 which is also expected to drive the growth of **cross-border electronic trade**. Phase III of the negotiations, which started in February 2020, aims at harmonizing regional positions and regulations on e-commerce<sup>82</sup>.

MTI promotes the **competitiveness and development of businesses** which foster the growth of e-commerce. Most of its current activities are focused on supporting industrialization processes across sectors (i.e., agro-processing initiatives or minerals beneficiation). Within the framework of its National Trade Strategy 2020 and continuous support from the World Bank, MTI is in the midst of implementing projects with other MDAs (notably the Economic Diversification and Agro-Processing Competitiveness Projects<sup>83</sup>). Nevertheless, when it comes to e-commerce the pipeline has been limited due in part to insufficient knowledge on the **status and needs of the subsector**.

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<sup>80</sup> Only 16% of the adult population that uses the internet in Sierra Leone shops online according to the B2C E-commerce index (UNCTAD, 2019) which is 1% of the population.

<sup>81</sup> <https://www.cnn.com/2021/10/18/supply-chain-chaos-is-hitting-global-growth-and-could-get-worse.html>

<sup>82</sup> Report on E-commerce in preferential trade agreements: Implications for African firms and the AfCFTA by Karishma Banga, Mohamed Gharib, Max Mendez-Parra and Jamie Macleod, February 2021

<sup>83</sup> <https://projects.worldbank.org/en/projects-operations/project-detail/P164212>

*Benchmark with other SSA countries*

Sierra Leone’s performance is **below the SSA-Average** in almost all cases on DFS and e-commerce. With respect to financial inclusion, the strongest benchmark is from World Bank’s Findex of 2017, which showed Sierra Leone trailing its SSA peers. Robust and comparable data for this focus area is scarce. Figure 20 highlights the performance of Sierra Leone on e-commerce and digital financial services.



Figure 20: Performance on e-Commerce and DFS

## 6.2. Key Constraints

A digitally driven economy in Sierra Leone with enhanced financial inclusion, digital trade, and agriculture faces numerous constraints that hinder its development:

- **Lack of a national switch for interoperability** between banks and MNOs limits the potential of the payment ecosystem. Relying solely on bilateral integrations does not allow for improved competition and efficiency but limits leverage in reduction of operating costs and charges to end-users nationwide.
- **Lack of an extensive national ID system for DFS onboarding** even further limits the bankable population (already only 20% in Sierra Leone<sup>84</sup>), the impact of tiered KYC protocols, and the underdeveloped credit history system.
- **Lack of land registration** hinders customer tracing for banking processes and calculating collateral.
- **DFS regulatory environment still not at pace of market** needs, as regulators’ processes hinder the development of new solutions (i.e., lack of clarity around the regulations governing USSD for m-money and lengthy approval processes for new DFS<sup>85</sup> already in place in neighboring countries and developed by international banks).

<sup>84</sup> Source: Interviews with commercial banks.

<sup>85</sup> The BoSL has created the Financial Stability Department to focus on licensing and regulation, however most DFS providers still complain about long processes.



This is crucial for the alignment of the digital agendas of public and private players in the DFS ecosystem as well as for shorter time to market of new solutions. USSD short code allocations are however being done by NaTCA to DFS providers.

- **Minimal penetration of e-commerce** which is further limited by an inadequate addressing system for logistics and parcel delivery, limited E-business skills in SMEs, and a **lack of a system to monitor electronic trade performance** (shared across channels in volume, value, etc.).
- **Limited user awareness, understanding, and service adoption in the digital economy.** The uptake of digital applications is negatively affected by literacy<sup>86</sup>. The country is a cash-based society where customers still fear digital money, which they often perceive as less “trustful”. Merchants, on the other hand, are reluctant to accept digital payment. Vital DFS awareness-raising campaigns (which often include registration) halted after the pandemic impacting DFS’ financial sustainability. In e-commerce, there is the belief that SMEs could be further incentivized to digitize.

### 6.3. Objectives Prioritization

To drive the development of the digital economy in Sierra Leone, this strategy is based around two overarching goals. These are widening the participation in e-commerce and creating an enabling DFS environment as shown in Figure 21.



Figure 21: Drivers of e-Commerce and DFS

<sup>86</sup> The lack of awareness of traditional banking services and DFS is a major challenge coming from the demand for increased financial inclusion.

The banking regulator, the ICT regulator, the sectoral ministries for trade and finance, development partners, and private players shall guide their digital strategies considering the following objectives.

### **Objective 1: Streamline the enabling regulation for DFS**

- Develop **DFS-enabling policies** such as the development of **e-money** guidelines.
- Develop and improve the **regulatory environment** for current and new DFS, including emerging fintech solutions.
- Develop and implement **new legislation** for m-payments, E-remittances, and transfers integration across borders.
- Develop forums for **public and private sector dialogue** around DFS policy and regulation.
- Explore the readiness for new DFS such as **E-currency** to lower transaction costs of digital transfers.
- Develop policy and regulation for data protection, electronic signatures and cross-border data flows.
- Develop policy and regulation for digital and financial inclusion.

### **Objective 2: Ensure an interoperable and secure financial infrastructure**

- Ensure national and regional **interoperability** for E-Money and DFS solutions.
- Strengthen AML/CFT with 'know your customer' (**KYC**) for verified accounts and transactions.
- Strengthen systems for cross border data flows, electronic signatures and electronic authentication and electronic payments.

### **Objective 3: Encourage DFS competition, user protection, and adoption**

- Develop technology-forward National **financial inclusion** strategies.
- Promote e-money **adoption**, especially in rural and peri-urban areas.
- Support **digitalization** of **credit underwriting processes** and **credit history registries** to increase access to financial services, especially for MFIs serving rural areas prioritizing the ones that are deposit-taking.
- Strengthen DFS **consumer protection**, disclosure/transparency, responsible lending, data privacy, and dispute resolution ensuring public consultations and awareness raising.
- Encourage the **market entry** of innovative, technology-driven providers and solutions, value added service providers and other ICT DFS innovators.

**Objective 4: Create the building blocks for the development of e-commerce**

- Conduct an **e-commerce readiness assessment** to allow for the development of an e-commerce policy and legislation.
- Implement a country wide digital addressing system relating **to parcel delivery**.
- Remove any legal and **technical barriers** to e-commerce, especially cross-border digital trade, and develop common rules for consumer protection at the region.
- Set up a **trade statistics portal** and opportunity identification with adequate infrastructure and human capacity to monitor **data on e-commerce**.
- Facilitate the inclusion of elements of e-commerce in the digital skills **training programmes**.
- Develop campaigns to increase **awareness and trust** in e-commerce.
- Encourage the creation of a single **African payments area** to bolster cross-border trade, transfers, and investments.

## CHAPTER 7: EMERGING TECHNOLOGIES, INNOVATION, AND DIGITAL ENTREPRENEURSHIP

### 7.1. Context

#### Introduction

This section deep dives into the ecosystem that fosters innovative-driven entrepreneurship. Digital innovation and entrepreneurship have the potential to **boost socioeconomic development** as it contributes to **diversified and sustainable economic growth, women's empowerment**, wealth creation, and increased **standards of living**. Furthermore, digital solutions create **new markets** by addressing existing and sometimes invisible needs, thus increasing the number of users and jobs<sup>87</sup>. However, to achieve this in Sierra Leone, **entrepreneurs need to be incentivized and supported**. Their human capital development is therefore a strategic investment for digital development<sup>88</sup>.

Planting the seeds of digital entrepreneurship, innovation, and emerging technologies can allow Sierra Leone to reap the benefit of a **knowledge-based economy** in the future. **Digital technologies** are key resources for innovation and represent **transformation drivers** for existing businesses and the government and can provide competitive advantages for new ventures.

When utilized well, these technologies can provide **significant opportunities**, even if they also present **challenges**. **Disruption**, recently symbolized by emerging technologies such as Artificial Intelligence (AI), Internet of Things (IoT), automation, cloud services, blockchain, and quantum computing, has the **power to create and eliminate jobs** as well as create new thriving sectors and rend obsolete others.

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<sup>87</sup> MSMEs represent 90% of businesses and account for 50% of employment globally (World Bank)

<sup>88</sup> Even if necessity (survival) entrepreneurs are a vital component of the economy, scalable and high potential digital innovations that have higher multiplying effects are envisioned by highly ambitious people (growth entrepreneurs) seeking the opportunities generated by technology and hence this section highlights their importance.

## Situation analysis

Digital innovation represents a great opportunity for Sierra Leone to further diversify its economy and build competitiveness. Fortunately, the country has seen renewed effort from government, international organizations, and other stakeholders to build a digitally driven entrepreneurial ecosystem. The government reflected this commitment in 2018 with the creation of the Directorate of Science, Technology, and Innovation (DSTI) in the State House to focus, among several other tracks, on **mainstreaming disruptive technologies and entrepreneurship to tap the potential of people**. After being inspired by success stories such as E-Estonia<sup>89</sup>, DSTI launched the National Innovation and Digital Strategy (NIDS) (2019–2029) which is consistent with this NDDS. The institution also hosts the **Human Capital Development (HCD) incubator** to test, seed, and scale innovations related to health, agriculture, and education.

Notably, in collaboration with agencies and development partners, such as the Small and Medium Enterprise Development Agency (SMEDA), the Sierra Leone Economic Diversification Project (SLEDP), and the UNCDF, DSTI finished a national digital and **entrepreneurship ecosystem mapping** exercise in June 2021<sup>90</sup>. The project aimed to better understand entrepreneurs including Micro, Small and Medium Enterprises (MSMEs) and support them through policy recommendations in the context of technology and entrepreneurship. Thus, around 800 entrepreneurs were identified with a quantitative and qualitative approach across *tech-ecosystems* in the country<sup>91</sup>. Some of the key findings of the mapping are:

- Entrepreneurs in Sierra Leone are generally in the **trade and agriculture** sector (around 40% and 20% of respondents).
- The entrepreneurs act as **sole proprietors** (84% of respondents) with the majority **not formally registered** (64% of respondents).
- Most entrepreneurs currently use **brick-and-mortar** models, however, the majority use m-money and social media for business (70% of respondents)
- The main driver to kick-start a business seems to be **survival** (70% of respondents) and not so much innovation-based problem solving (less than 35% of respondents).

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<sup>89</sup> "E-Estonia" is Estonia's immensely successful roadmap towards digitalization which made it one of the most digital countries in the world, in part thanks to its interoperable ICT architecture.

<sup>90</sup> <https://www.uncdf.org/article/7240/mapping-the-sierra-leone-digital-and-entrepreneurial-ecosystem-part-2>

<sup>91</sup> Several stakeholders were consulted including Entrepreneur and Business Support Organizations (ESOs and BSOs) such as hubs, incubators, accelerators, NGOs, etc.

- All technology entrepreneurs, while scarce (2% of total), seek to add value and focus on growth<sup>92</sup>.
- The main challenge is **access to finance** (57% of respondents). Personal savings are the main source for capital (60% of respondents). High cost is the main deterrent to accessing finance from banks. This drives the vicious cycle of high interest rates and non-performing loans (NPL)<sup>93</sup>.
- The participation of **women** in the entrepreneurship ecosystem remains **limited** (only 38% of projects are led by women, and around 75% have less than 2 female employees).
- Entrepreneurs **do not know or exploit** the support from Entrepreneur Support Organisation (ESOs) and Business Support Organizations (BSOs), with less than 30% of respondents having received help from these organizations. Those who seek aid mostly major on financial support and managerial training.

These findings are aligned with Sierra Leone's current standing in the **Ease of Doing Business** ranking by the World Bank<sup>94</sup>, where apart from transversal issues such as the lack of enabling infrastructure (electricity, water, building permits, internet, etc.), the challenges around "**getting credit**" significantly limit the country's support to businesses<sup>95</sup>. There have been commendable efforts to improve the ease of doing business such as digitalization initiatives in company registration<sup>96</sup> processes. However, a lot remains to be done to improve the overall standing<sup>97</sup>. Therefore, DSTI and the Ministry of Trade and Industry (MTI) have started working on creating reforms for an improved business and trade environment. In October 2020, engagement with stakeholders took place to focus on specific pain points and drive **policy reforms**.

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<sup>92</sup> Naturally, entrepreneurs in the ICT field are more educated and have a broader vision because of the nature of their business.

<sup>93</sup> The BoSL introduced the credit reference bureau in 2011 to consolidate the list of debtors across banks to improve credit rating, and launched a collateral registry in 2016 to improve the digitization of the credit underwriting process and thus allowing users to leverage movable collaterals (instead of fixed assets from which users might be lacking titles deeds); and while these processes have been automated and emerging technologies have been tried to be leveraged (i.e. private credit bureau with KIVA's distributed ledger E-ID), their usage and impact remain limited.

<sup>94</sup> The index provides a useful benchmark among countries and over time. However, a recent audit showed irregularities (though not in Sierra Leone) and the World Bank decided to permanently suspend it.

<sup>95</sup> World Bank Economy Profile of Sierra Leone: Doing Business 2020 Indicators

<sup>96</sup> The Corporate Affairs Commission (CAC) allows to begin and end online the company registration processes. It has been found that the ease of company registration depends on whether entities are corporate or non-corporate. CAC has an online one-stop-shop where the parallel registration process with OARG is also included. However, non-corporate (MSMEs) are not offered this service and must comply with further formalization requirements.

<sup>97</sup> "Starting a business" is already the topic where Sierra Leone scores the highest. The other worst-performing topics involve significant efforts as they deal with structural issues such as infrastructure and access to finance.

Another cornerstone enabler of formal entrepreneurship and innovation is the protection and commercialization of **Intellectual Property (IP)** rights, especially for ICT. In Sierra Leone, while there is **legislation in place** such as the Copyright Act (2011), the Patent and Industrial Design Act (PAID) (2012), and the Trademarks Act (2014), **regulations** that **implement** and enforce the laws are still **absent**. The Office of the Administrator and Registrar General (**OARG**) is seized of this need and the urgency thereof. Furthermore, the **IP legislation** has been found to **lack customization** to meet the country's context. It does not properly balance the need to protect IP rights with the need to incentivize future creation through knowledge transfer. This is especially important in a context where IP rights are perceived by entrepreneurs as a step to protect an asset and not necessarily to foster **innovation and research** (only 18% of the identified ICT entrepreneurs have trademarks, and none have other IP rights that require proving creative steps to be issued).

Innovation of key areas such as DFS has also been identified as important. In 2017, the BSL launched a regulatory **sandbox** as part of the NFIS (DFS intervention area) to facilitate new business models with high potential to benefit consumers and thus enhance financial inclusion. While the first cohort included only FinTech start-ups (some of which did not have an already developed solution), it has been recommended that the sandbox scales up. This could include **other digital areas** where innovative solutions have emerged and in which there could be a more **agile** legal and policy framework to be conducted in a continuum basis rather than cohorts (i.e., solutions joining and finishing the program during any time of the year), especially considering the need for agility and reduced time to market of **emerging technologies**. This applies as well for The FinTech challenge that takes place every year and leads to existing solutions joining the sandbox. This of course would require coordination between the BSL, UNCDF, and regulators from other sectors. Currently, 12 solutions composed the second generation that entered the program (the usual program lasts 12 months).

Sierra Leone performs **below average across all indicators** in this focus area as shown in Figure 22. This is particularly true in fields related to **ease of doing business** and **competitiveness** which cover R&D, innovation, collaboration, financing, etc. and for which Sierra Leone is ranked 134 out of 140 countries, and entrepreneurship for which Sierra Leone is 132 out of 137 countries. No robust data is available to compare the regulatory framework for emerging technologies.

### Benchmark with other SSA countries



Figure 22: Performance in Innovation and Entrepreneurship

## 7.2. Key Constraints

Supporting businesses and entrepreneurs to launch digital solutions or to digitalize using technology and thus develop the digital ecosystem in Sierra Leone faces several obstacles:

- **Limited business and digital skills** of entrepreneurs, especially among the “necessity” entrepreneurs who account for the majority who tend to lack the sufficient literacy or vision to formulate and implement a digital project or to exploit ICT in deeper aspects for their non-tech businesses.
- **Limited addressable market** for digital products and services, as the nascent digital economy with low penetration of connectivity services and technologies hamper the potential uptake<sup>98</sup>.
- **Underdeveloped infrastructure** such as basic utilities, land registration, and other factors are detrimental for the ease of doing business.
- **Limited access to finance**, as traditional sources for funding have prohibitive costs, small businesses lack the required documentation to access financial services (i.e., financial statements or business plans) and banks still lack a tiered KYC system (established for people), and this limits the scalability of solutions.
- **Limited impact of BSO and ESOs** as entrepreneurs are unaware of their support apart from accessing finance.

<sup>98</sup> This is accurate for B2C businesses. However, companies that sell to the government or other companies (B2G or B2B) often find a viable market in nascent stages of digital transformation, especially in the context where the private sector is driven by and highly dependent on the government procurement.



- **High individualism** between entrepreneurs and **dissonant regulation** explains the **fragmented ecosystem** with high information asymmetry and low harmonization.
- **Limited creative ecosystem for innovation** with inadequate incentives and the underdeveloped **IP regulation**.
- **Lack of hubs and centres** for research and innovation that support ideation, co-creation, and access to shared services for digital entrepreneurs.

### 7.3. Objectives Prioritization

To consolidate a thriving digital entrepreneurship sustained by innovation and the use of emerging technologies, this strategy is based around **four main drivers**. The drivers are digital entrepreneurship, knowledge sharing, support for research and innovation and support for digitalization of local industries as shown in Figure 23.

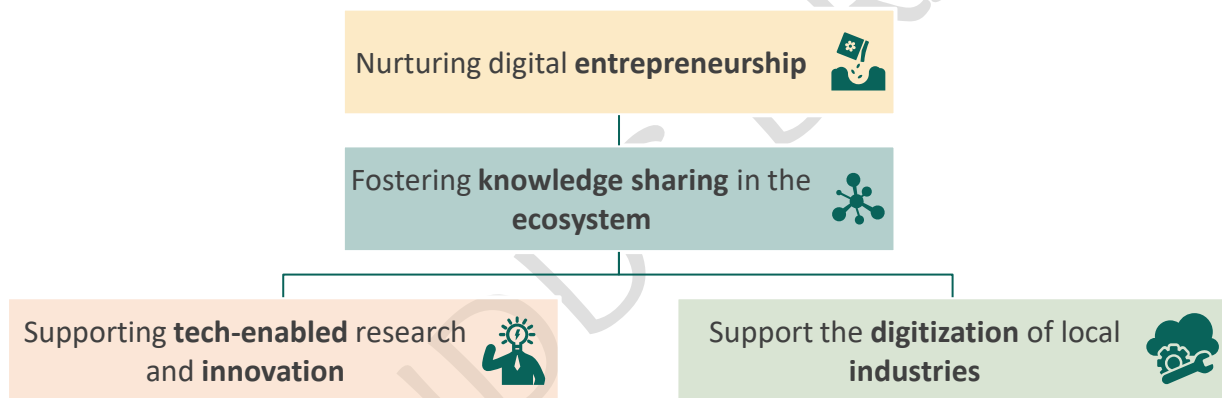


Figure 23: Drivers of Innovation and Entrepreneurship

The different stakeholders involved in the efforts to develop the digital and entrepreneurial ecosystem in Sierra Leone, including government agencies, development partners, investors, and BSOs/ESOs, should align their strategies considering the following objectives.

#### Objective 1: Enhance dialogue and institutional collaboration in the entrepreneurial ecosystem

- Enhance the **structured** dialogue across the ICT and entrepreneurship ecosystems including start-up advocacies, international partners, and private sector, and continuously study the ecosystem to inform policymakers about the needs to improve market and **regulatory reforms**.
- Implement a digital **platform** as a **one-stop-shop knowledge sharing** in the ecosystem including a directory of players, digital G2B processes, and marketing.

- Partake in regional and continental **knowledge-sharing** events, including capacity building and technical trainings to leverage the lessons learned and success stories.
- Develop local **innovation hubs** which create opportunities for **co-creation** across entrepreneurial skillsets and industries.
- Foster collaboration between ICT, education, research, and innovation at the strategic, tactical and operational level of the GoSL.

### Objective 2: Develop and improve policies for digital innovation and entrepreneurship

- Develop **agile and anticipatory** legal and **regulatory** framework addressing the gaps to further support digital innovation, technology entrepreneurship, and ICT research.
- Improve **government coordination & capacity** on policy design & implementation especially avoiding duplication and dissonant policies.
- Strengthen the **implementation** and enforcement of **intellectual property** rights that allow for continuous **innovation and commercialization**.
- Establish clearer regulatory definitions for **MSMEs** to allow smaller companies to benefit from financial incentives that cater to their specific needs.
- Develop a **regulatory framework** to address how best to protect citizens and companies with the increasing use of **emerging technologies** with regard to consumer protection and fair markets.
- Develop **outcome-based regulations** and scale up the testing of new models in **sandboxes**
- Establish regulatory **clarity between online** and **offline** businesses.
- **Lower tariffs** on digital products and reduce digital product market regulations.

### Objective 3: Facilitate the access to capital for digital ventures and enhance the ease of doing tech-business

- Improve the **visibility** of investment **opportunities** across the ecosystem.
- Support the creation and growth of local **seed capital**, angel investor and VC networks.
- Enhance the ease of doing digital business through regulatory reforms for improved **basic infrastructure** and efficient digital G2B services including taxes, permits and **licenses**, and improved digital and decentralized registration process of MSMEs.
- Provide the enabling environment for banks such as liquidity and improved **credit registry** to offer **affordable** credit tailored **services** to start-ups.

- Plan the development of **tiered KYC guidelines for MSMEs** to foster access to formal financial services.
- Create incentives for state-owned institutions to **co-invest** in start-ups.
- Provide tax and other **incentives** including subsidies and waivers to start-ups.

#### **Objective 4: Tap digital innovation and support the scaling-up of tech solutions**

- Conduct **mappings of start-ups** for need identification and launch capacity building programs for support and scaling-up of **promising models**.
- **Encourage** existing non-tech start-ups through innovative awareness to further exploit available **technology in their businesses** and train them on their uses.
- Develop a **National System of Innovation** to address the barriers to innovation and propose models of tech-driven innovations that address local issues such as waste collection with ICT-driven solutions.
- Establish an **Innovation Fund** and national level **competitions** through public-private partnership and with support from development partners.
- Establish **research centres** in respective disciplines/thematic areas nationwide especially for MSMEs, in close collaboration with private sector and **universities**.
- Create **Incubation** and acceleration centres, **Innovation Parks & Hubs**.
- Define four or five **thematic business clusters** and create Centres of Excellence (**CoE**) for their **advancement**.
- Establish national and regional **taskforces** and propose **guidelines** for specialized technology centres to research secure use cases for new technologies.
- Create and **maintain regular innovation and tech expos** in diverse locations, institutions and sectors of the country to catalyse innovation and entrepreneurship.

### Objective 5: Develop a team of growth entrepreneurs and build their digital capabilities

- Support digital entrepreneurs with **long-term training** on business knowledge training and an entrepreneurship mindset, by **consolidating efforts** and enhancing **coordination** between support organizations.
- Seek successful serial and **growth digital entrepreneurs** nationwide (local or diaspora) to encourage their continuous engagement in the country, showcase their success stories through media channels and inspire the emergence of a new generation of digital entrepreneurs.
- Develop digital skills of entrepreneurs through collaborative training, **networking** coaching, and peer **mentorship** programs.
- Develop **awareness** raising and **capacity building** measures such as trainings, seminars, and workshops to promote emerging technologies in public and private sector.
- Provide **incentives** and **training** for young professionals to become **freelancers and iterate solutions**.

### Objective 6: Support the demand and uptake of innovative digital solutions

- Increase the **availability of information** in the market and accessibility to technology to increase **awareness** of existing digital solutions and encourage the **adoption of low-tech models** that can have bigger addressable markets.
- Develop start-up-friendly **public procurement policies and ensure** fair tender procedures.
- Coordinate the participation of digital entrepreneurs in events such as **trade fairs** to **showcase** their products outside the country.

### Objective 7: Build a local ICT industry and digitalize traditional sectors

- Assist local industries in the use of innovative digital technologies to **automate** and modernize their business and **industrial processes**.
- Facilitate the active participation of African and foreign investors in the local digital industry, **promote joint ventures** between local and foreign companies.
- Facilitate setting up of Business Process Outsourcing (**BPO**) in the country.
- Establish innovation hubs, technological parks and **clusters**.
- Promote new **ICT** assembling and manufacturing plants and the local production of **software** and **hardware**.

**Objective 8: Support the local internet and cloud infrastructure ecosystem**

- Develop policy, legal, and **regulatory framework** for local content developments, hosting providers, content delivery networks, and other relevant stakeholders.
- Define measures to incentivize the **local content development and hosting** and improve uptake of existing digital content.
- Conduct multi-stakeholder **local content forums** to raise **awareness** on local hosting.
- Engage the Internet Corporation for Assigned Names and Numbers (**ICANN**) and other accredited Registrars in Africa to mainstream the use of the Country Code Top Level Domains (ccTLDs) for the country (**.SL**).
- Encourage local ISPs and hosting providers to received **accreditation** from ICANN.

MIC NDDDS DRAFT

## CHAPTER 8: DATA GOVERNANCE AND CYBERSECURITY

### 8.1. Context

#### Introduction

Data governance and cybersecurity relate to the protection of systems, users, and data; the fight against cybercrime; and the enhanced exploitation of data. The digital economy brings huge opportunities to citizens, businesses, and government, but its sustainability and growth depend on the **security of digital interactions** and the **data generated**. When ICT becomes indispensable in most aspects of life, the cyberspace becomes an open and interconnected system which makes it vulnerable to **cyberattacks**. These attacks may be ICT-dependent or ICT-enabled<sup>99</sup>. The attacks are **currently increasing** regionally and globally along with the advancement in the adoption of new digital services. Cybercrime poses a **direct threat** to the capture, processing, storage, modification, and exchange of data via networked systems and its supporting critical information infrastructures. They represent a threat to national security which may escalate to include international dimensions.

However, when data and users are protected, the high-quality information flows generated by the digital economy can be tapped to identify needs for improvement and develop new innovations. Notably, by opening access to the data they manage, MDAs **can enhance transparency, operate more efficiently, and engage the citizens they serve**. Here, the use of common standards is key for storing generated data and sharing it to other organizations so that they do not have to create it, thus extending the data lifecycle<sup>100</sup>. This also requires sound data security and privacy, especially when it comes to citizens' personal information. In practical terms, Data governance and Cybersecurity are about fostering **trust** in the security and potential of digital development.

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<sup>99</sup> ICT-dependent crimes have the digital devices as both the tools and the targets of the crime (i.e., propagating malware). ICT-enabled crimes are traditional crimes that increase in scale or reach using ICT (i.e., data theft).

<sup>100</sup> Data preservation for data use and re-use has been identified as a best practice across several domains including research and innovation. It involves ensuring high quality data that is adequately described (metadata) to be preserved in digital repositories such as data centers to be exported and integrated with datasets from other sources to allow analysis.

### Situation analysis

The efforts at improving information security, cybersecurity and data governance can be seen as a **strategy for** ensuring users and data protection, while deterring cybercrime and reaping the benefits of data sharing. In Sierra Leone there have been **considerable improvements** in this sphere. Nevertheless, there is still much more to accomplish.

In the comprehensive Cybersecurity Capacity Review of 2016 conducted with support of the Global Cybersecurity Capacity Centre (GSCCC) and ITU, Sierra Leone was closer to a “start-up” stage. Post 2016, strategic actions on the part of government have started to turn the situation around in the sector<sup>101</sup>. In 2019, with support from the Foreign and Commonwealth Office’s (FCO) Commonwealth Cybersecurity Programme, Sierra Leone benefited **from a National Cyber Risk Assessment Plus (NCRA+)** Project that involved a series of workshops and conferences to increase awareness, visibility, and capacity in decision makers. A recent assessment of the situation was done in 2020<sup>102</sup> as shown in Figure 24. **MIC** has further committed in its role on leading the coordination of strategic initiatives, **identifying gaps**, and promoting capacity in cybersecurity<sup>103</sup>.

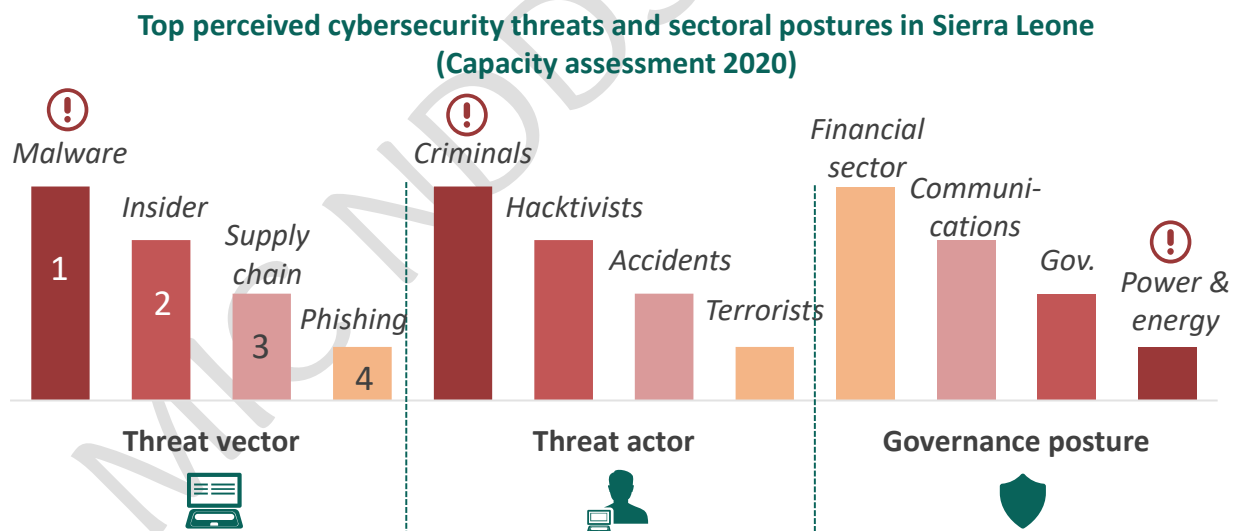


Figure 24: Top Threat Vectors, Actors and Sectoral Posture

<sup>101</sup> This would indicate that the country is moving from an embryonic maturity when it comes to cybersecurity and thus progressing to a formative stage, as per the capacity stages of the Cybersecurity Capacity Maturity Model (CMM). However, initiatives require they be less ad-hoc and coordinated and there is a need for budget considerations for further improvements.

<sup>102</sup> After the workshops with FCO, Sierra Leone completed a Security Incident Management Maturity Model (SIM3) capacity assessment that identified the threat and vulnerabilities of critical sectors in Sierra Leone.

<sup>103</sup> Other key local actors include NaTCA, ONS, the Criminal Investigation Department, the Ministry of Defense, Ministry of Internal Affairs, among others.

The **Electronic Transactions** Act was enacted in 2019 and provided an initial legal and regulatory framework for conducting secure transactions using electronic devices or related media, including electronic signatures, the retention of personal data, and the evidential weight of electronic information. In 2019, and in response to the NCRA+, MIC started to revamp a 5-year **National Cybersecurity Strategy** and developed a specific **Cybersecurity Policy**<sup>104</sup> in a multi-sectoral approach with the public and private sector. The draft strategy was approved by the cabinet in March 2021.

As internet penetration continues to increase in the country, the number and types of ICT related crimes affecting users, organizations, and the government are also on the rise. The **Cybersecurity and Crime Bill 2021**, championed by MIC and a multisectoral task force, was enacted into law in 2021, giving birth of the National Cybersecurity Coordination Centre (NC3). The legislation was aimed at creating the enabling environment for combating cybercrime, protecting critical national infrastructure, and enhancing cybersecurity capabilities. The bill included the provision of a **Cybersecurity Fund** from donors' contributions to sustain the investments. However, its operationalization is still pending.

The new cybersecurity and crime law also aims at aligning the national efforts with the guidelines provided by the **Malabo** (AU) and **Budapest** (EU) **conventions**<sup>105</sup>. Achieving further alignment with these conventions and other relevant frameworks such as the ECOWAS Supplementary Act on Personal Data Protection and the EU General Data Protection Regulation (GDPR) would allow for increased international support. There is also a draft data protection bill awaiting validation. The new National Digital Development Policy (**NDDP**) also stresses the importance of ensuring cybersecurity, data governance, and consumer protection, and defines local and international cooperation as a key enabler. A new National Cybersecurity Coordination Centre (**NC3**) is defined in the NDDP to lead the coordination, planning, and implementation of cybersecurity initiatives, as well as managing the NCSIRCC.

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<sup>104</sup> In 2016 an initial cybersecurity policy was developed and adopted in Sierra Leone, but its scope and impact has been limited.

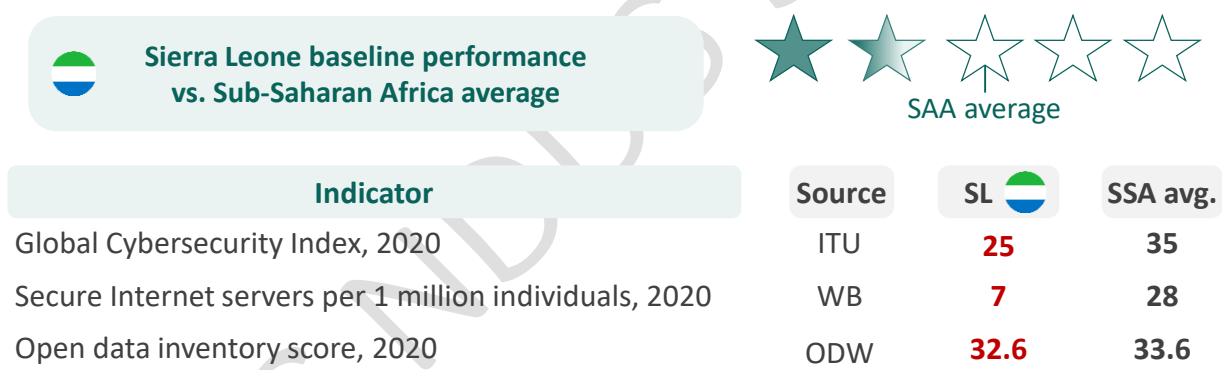
<sup>105</sup> The first seeks to build a common approach to minimum cybersecurity standards and procedures at the continental level. The latter is the first international convention on cybersecurity that seeks to tackle cybercrime by harmonizing the countries' laws and investigation methods, as well as increasing cooperation between actors.



Even though further regulatory provisions for data protection are still pending, the GoSL has made progress to leverage **open data**. Important milestones have been accomplished in this regard<sup>106</sup>, including joining the Open Government Partnership (OGP) in 2013, developing the **Rights to Access Information Act 2013**, establishing its Commission, and the implementation of a Government Open Data Portal supported by the World Bank. However, currently the absence of common standards for data sharing and the limited literacy and engagement by the players limit the re-use culture of government-generated data, which along with enhanced transparency is the ultimate goal of data governance.

Sierra Leone is clearly behind the average SSA performance in terms of commitment to cybersecurity (beyond regulation), data protection, and data privacy as shown in Figure 25. Notably, the comprehensive Global Cybersecurity Index by ITU gives Sierra Leone a score of 25 which ranks the country at position 121 out of 182 countries in 2020.

*Benchmark with other SSA countries*



*Figure 25: Performance in Cybersecurity vs SSA Peers*

## 8.2. Key Constraints

Ensuring data and user protection as well as exploiting open data thus enabling trust in digital development in Sierra Leone faces several challenges:

- **Lack of functional** coordinated **actions** at sectoral and national levels and established **institutional** framework for the cybersecurity agenda. This has been corrected with the new policies and legislation to the extent of effective implementation to operationalize the NCSIRCC, NC3 and Cybersecurity Council.

<sup>106</sup> Sierra Leone Third National Action Plan (NAP III)

- **Limited local capacity** of local human resources to drive the policies and **implementations** of the cybersecurity agenda. There are limited cybersecurity related courses in education and training programmes especially in the public sector. Training of prosecutors and judges on cybercrime is limited.
- **Weak** cybersecurity education and **awareness** in citizens is further exacerbated by the increased use of mobile devices, internet, social media and messaging apps which are either prone to cybercrime or facilitate non-digital (traditional) crimes. The use of legacy or digital media to disseminate knowledge on cybersecurity is limited.
- **Lack** of legal and **regulatory framework** for **data protection, information, and cybersecurity**. Drawing lessons from the cybercrime bill which was drafted in 2018 and signed into law much later in 2021, the enactment of the proposed data protection law **could face delays** given its consultative nature.
- **Pending alignment** with regional **frameworks** thus preventing increased support from international organizations.
- **Pending recent identification** of National Critical Information Infrastructure (NCIIs) and other **risks** related to ICT management and resources.
- **Limited** cybersecurity **prioritization** across private and public sectors which limits the **funding** and thus **operationalization** of the national initiatives.

### 8.3. Objectives Prioritization

To enhance cybersecurity and data governance, this strategy has four main pillars as shown in Figure 26. The four pillars are awareness creation, deterrence, user data protection and enhancement of data sharing.

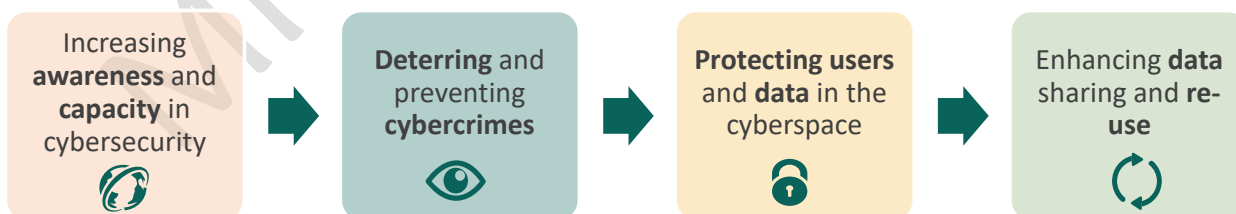


Figure 26: Pillars of Cybersecurity and Data Governance

Cybersecurity and data governance is a cross-cutting issue in digital development which requires harmonized actions from state and non-state actors who shall align their actions considering the following objectives.

**Objective 1: Further develop legal and regulatory frameworks on cybersecurity and data protection**

- Develop the required **laws, regulations** for information security, cybersecurity, user protection and data protection/privacy in accordance with **international frameworks and best practices**.
- Ensure **protection of women and children** in cyberspace through enactment of related legal frameworks.
- Support the **ratification and** accession to the **Malabo** and **Budapest** Conventions.
- **Synchronize laws with regional peers** to facilitate cyber-criminal international prosecution and harmonize punitive sanctions.
- Ensure the legal framework for **security agencies** to deploy and **use ICTs**.

**Objective 2: Support institutional leadership and coordination for cybersecurity response and strengthen cooperation at national, regional, and international levels**

- **Operationalize** the National Computer Security and Incidence Response Team (NCSIRT) and the national cybersecurity governance structure.
- Set up **funding** mechanisms for the **implementation** of the national cybersecurity agenda.
- Develop and continuously review a robust and holistic **cyber defence strategy and contingency plan** to mitigate cyberattacks.
- Establish national **multi-stakeholder cyber-security governance structures** (policy makers, private sector, law enforcement, academia, national security, etc.) to leverage resources, reduce conflict, and **avoid duplication of effort**.
- Establish frameworks for **regional and international cooperation**.
- Identify clear cut processes for **cybercrime prevention and mitigation** across sectors.

**Objective 3: Build human capacity, awareness, and sensitization in cybersecurity**

- Conduct **capacity building** of **policy makers, law enforcement, and criminal justice system** on **cybersecurity**.

- Include **cybersecurity and crime awareness** in the **curricula** of Law enforcement agencies and legal education institutions.
- Promote **customized training** for public and private sector players.
- Introduce relevant internationally **recognised certification for Information security**.
- Increase the **understanding** of cyber threats by all Sierra Leoneans through regular **public awareness** and **sensitization**.
- Promote the **R&D** on cybersecurity.

**Objective 4: Protect vulnerable assets with response readiness and risk assessment to prevent cyberattacks**

- **Identify**, document, and protect National Critical Information Infrastructures (**NCIIs**) and electronic and physical resources needed for the availability of essential services.
- Implement ICT **risks identification** management procedures.
- Establish proactive **strategies and methodologies** for the protection of **private and national electronic resources** and assets.
- **Implement appropriate information security management systems**, standards and best practices across MDAs, public and private sector.

**Objective 5: Protect personal data in digital transactions and communications**

- Establish a **Public Key Infrastructure (PKI)** (Certificate Authority) to promote trust in online transactions.
- Enact the **Electronic Communications Bill**.
- Establish personal **data protection methodologies**.
- Promote **digital signatures** to augment data security and authentication.
- Establish mechanisms for flagging, reporting, investigating and mitigating effects of data breaches.
- Establish a platform for unified cross-sector identity e.g., registration of births/deaths, national identity system, passports, education and healthcare.

**Objective 6: Facilitate the use of ICT for national security**

- Deploy the required **infrastructure** for ICT.
- Enhance coordination between the **Joint Communication Unit (JCU)** and relevant actors.
- Facilitate the use of **ICTs** by security agencies in support of national security.
- Recommend processes on the collection and **management of digital evidence** to law enforcement authorities and monitor their implementation.

**Principle 7: Enhance the openness and exploitation of data**

- Establish a **National Data Centre** for **adequate information sharing**.
- Enforce **open data** policies ensuring interoperability, data protection, and cyber resilience.
- Enforce the **commercial rights** of the use of personal data of **Sierra Leoneans**.

MIC NDDDS DRAFT

## CHAPTER 9: IMPLEMENTATION AND EVALUATION

### 9.1. Implementation Arrangements

**Multiple MDAs, development partners and private sector institutions** will be involved in the implementation of the NDDS. A huge and complex system such as this strategy cannot be implemented in a copycat fashion because of the nature of the underlying government and its principles which vary from nation to nation.

To foster coordination and avoid siloed solutions, the **new institutional framework**, highlighted in the **NDDP<sup>107</sup>**, will enable a whole-of-government and whole-of-society approach in which policies relating to the use of ICTs in the public sector are properly coordinated. While the NDDS is the starting point from which projects should be selected and prioritized, several initiatives are already being planned or implemented.




MIC NDDS DRAFT

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<sup>107</sup> In Part 3 of the NDDP




## Governance, Coordination, and Partnerships

Table 1: Implementation Matrix for Governance, Coordination and Partnership

Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Implement changes that drive an improved ICT sector institutional framework that reflects emerging trends</b>			
Quick win (2024)	- Pass key <b>regulations</b> (tech. neutral licensing regime, consumer affairs, tariffs, numbering, VAS, etc.) ensuring their <b>clear operationalization</b>	NaTCA	MIC, MNOs, ISPs
<b>Objective 2: Enhance coordination between stakeholders with an agenda for digital development</b>			
Quick win (2024)	- Create a centralized <b>platform and dashboard</b> for project registration and <b>monitoring</b>	Office of Chief Minister	MoPED, World Bank, DSTI, NDiDA
Long term (2027)	- Achieve an enabling environment for <b>cooperation</b> in <b>digitalization</b> across all <b>stakeholders</b>	NDiDA	Public and Private Sector Players
<b>Objective 3: Establish a focal point for resource mobilization to digital initiatives</b>			
Medium term (2025)	- Develop a world mapping and <b>information system</b> for the <b>public</b> investment <b>programs</b> as well as NGO <b>information</b>	MoPED	MDAs, Development Partners
<b>Objective 4: Support the development and implementation of harmonized digital transformation policies and strategies</b>			<b>MIC, MDAs</b>
<b>Objective 5: Foster transparent, predictable, pro-investment and pro-innovation regulatory frameworks and enhance its implementations</b>			
Quick win (2024)	- Pass key <b>regulations</b> (tech. neutral licensing regime, consumer affairs, tariffs, numbering, VAS, etc.) ensuring their <b>clear operationalization</b>	NaTCA	MIC, MNOs, ISPs
	- Enhance the <b>clarity</b> and coordination around (financial and ICT-technical) <b>regulation</b> governing <b>m-money</b> (including USSD short codes assignment)	BSL, NaTCA	DFS Providers, DFS users
<b>Objective 6: Optimize the use of scarce resources for higher investments and competition</b>			
Medium term (2025)	- <b>Coordinate</b> and manage the government owned <b>orbital assets</b>	NaTCA	
Long term (2027)	- Upgrade the <b>Internet Protocol</b> from IPv4 (numeric addressing) to IPv6 (alphanumeric)	NaTCA	
	- Facilitate the access and <b>uptake of DTT</b> nationwide	MIC	

## Digital Infrastructure and Access

Table 2: Implementation Matrix for Digital Infrastructure and Access




Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Develop and implement a national master plan for a robust and reliable digital infrastructure</b>			
Quick win (2024)	- Facilitate clear <b>licensing</b> to deploy <b>metro fiber</b> , and ensure fee collection	NaTCA	MNOs, ISPs
	- Define <b>infrastructure sharing</b> and collocation regulation and models, including pricing, penalty charges, and service levels to foster <b>competition</b>	NaTCA	MNOs, ISPs
	- Deploy 1,000 kilometers of <b>metro ring fiber</b> in <b>Freetown</b> , allowing ISPs to serve 150,000 buildings and foster <b>traffic demand and evacuation</b>	NDiDA	ISPs
	- Ensure <b>service reliability</b> of national fiber <b>backbone</b>		
	- Build <b>capacity</b> for the implementation of more <b>last mile</b> solutions (FTTx)	NDiDA	ISPs
Medium term (2025)	- <b>Establish</b> a new Internet Exchange Point ( <b>IXP</b> ) to improve <b>internet performance and efficiency</b>	NDiDA	Private Sector Players, Internet Society
	- <b>Repair</b> national terrestrial <b>backbone</b> section close to border with Liberia and <b>complete</b> network to reach all districts	NDiDA	MIC, Leonecom
	- <b>Achieve</b> international gateway <b>redundancy</b> through PPPs, or regional consortiums (i.e., Africa2 cable)	NDiDA	Landing Station, Zoodlabs
Long term (2027)	- <b>Increase</b> international gateway <b>capacity</b> from 0.5TB to 1TB as local traffic demand increases	NDiDA	Landing Station, Zoodlabs
	- <b>Coordinate and partner</b> with basic utility providers to create common corridors for the rollout of digital infrastructure, and implement the “dig once” policy	NDiDA	NaTCA, Landing Station, Zoodlabs, EDSA, Sierra Leone RA, Leonecom
<b>Objective 2: Ensure predictable, investment-enabling regulatory frameworks with clear operationalization</b>			
Quick win (2024)	- <b>Pass</b> key <b>regulations</b> (tech. neutral licensing regime, consumer affairs, tariffs, numbering, VAS, etc.) ensuring their <b>clear operationalization</b>	NaTCA	MIC
	- Procure and implement <b>hard and soft tools</b> to properly allocate and monitor spectrum for more technology generations (i.e., 4G)	NaTCA	MNOs, ISPs



	- Create a <b>centralized</b> management of <b>rights of ways</b> for the deployment of infrastructure	SLRA	NaTCA
<b>Objective 3: Improve the universal access to digital services focusing on areas unserved and underserved by digital services</b>			
<b>Quick win (2024)</b>	- Clarify UADF's <b>mandate</b> and include it in technical groups	MIC	UADF
	- Streamline <b>monitoring</b> tool/metrics for network expansion vs "grey areas" and <b>reporting</b> to contributors of UADF impact generated	UADF	MNOs, ISPs
	- Pilot <b>use of new technologies</b> that integrate new services and are more cost efficient (i.e., small cell multi-tenant solar towers), digital skills <b>training</b> programs, and low complexity <b>handset distributions</b>	UADF	Private Sector Players
<b>Medium term (2025)</b>	- Identify additional <b>funding</b> sources for Universal Access funds to <b>bridge</b> large <b>rural gap</b>	UADF	MoF, MoPED, Development Partners, Private Sector Players
	- Explore <b>financial instruments</b> to de-risk capital and finance ~50% of new infrastructure capex	UADF	MoF, BSL, UNCDF
<b>Long term (2027)</b>	- Extend <b>broadband</b> access to <b>all government</b> institutions nationwide, including local councils, schools, hospitals, libraries	MIC	DSTI, UADF, NDiDA, NaTCA, Leonecom, Zoodlabs, ISPs
<b>Objective 4: Promote measures that increase affordability and connectivity of devices and services</b>			
<b>Quick win (2024)</b>	- Promote <b>subsidies on devices</b> and payment flexibility to users to increase affordability	MoF/MIC	NaTCA, MNOs, ISPs
	- <b>Subsidize</b> telecenters, e-centers, <b>cyber cafes</b> in underserved areas	UADF	NaTCA, NDiDA, SALPOST, ISPs, DSTI
<b>Objective 5: Reduce the environmental impact of digital development</b>			<b>MoE, MIC, EPASL, NaTCA, NDiDA</b>

## Digital Skills and Human Capital




Table 3: Implementation Matrix for Digital Skills and Human Capital

Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Ensure an enabling infrastructure for digital learning</b>			
Quick win (2024)	- Complete the annual <b>school census</b> to identify ICT needs and improve Quality Assurance (QA)	MBSSE	SLREN, Statistics SL
Medium term (2025)	- Roll out the <b>One tablet per School</b> in all primary schools and support improved management by <b>principals and head teachers</b>	MBSSE	MIC, SLREN
<b>Objective 2: Foster capacity building and coordination in the education sector</b>			
Quick win (2024)	- Leverage the knowledge <b>resource</b> platform to complement <b>teacher</b> resource centers (TRCs)	MBSSE	SLREN, TSC
Long term (2027)	- Achieve <b>high coordination</b> between stakeholders in digital skills development	MBSSE, MTHE	MIC, SLREN, DSTI, Development Partners, Private Sector Players
<b>Objective 3: Mainstream ICT content across education levels</b>			MBSSE, MTHE, MIC
<b>Objective 4: Promote inclusive digital learning</b>			MBSSE, MTHE, SLREN, MIC
<b>Objective 5: Increase the digital skills of the current workforce</b>			
Quick win (2024)	- Leverage the <b>Learning Passport</b> (platform) and eUPSHIFT (content) as components for a hub for <b>in-demand skills training</b> and <b>e-learning</b>	MBSSE, MTHE	UNICEF, DSTI
Medium term (2025)	- Establish <b>TVET</b> in strategic locations throughout the country and include ICT programs	MTHE	MWPA, TSC, Private Sector Players
	- Explore establishing <b>vocational</b> institutions in key sectors for <b>ICT-rapid-skills-training</b>	MTHE	Private Sector Players
	- Support <b>TVETs</b> to train 5,000 with <b>demand-led skills</b> and support <b>private sector</b> to train and employ 3,000 including digital skills in the Sierra Leone <b>SDP</b>	SLSDP	MTHE, Development Partners
Long term (2027)	- Develop a <b>Competency Based Education and Training (CEBT) curriculum</b> for demand-led skills in five economic sectors (agriculture, construction, tourism, fishery, and mining) (SLSDP)	MTHE	TSC, Development Partners

<b>Objective 6: Develop a pool of ICT professionals</b>			
<b>Long term (2027)</b>	- <b>Support the accreditation</b> of all new training programs (SLSDP)	MTHE	SLSDP, Development Partners
<b>Objective 7: Promote ICT knowledge dissemination and engagement through informal channels (i.e., outside schools and universities)</b>			<b>MTHE, MIC, SLREN, Private Sector Players</b>
<b>Objective 8: Leverage ICT channels to improve access and quality of education</b>			
<b>Quick win (2024)</b>	- <b>Leverage the Learning Passport</b> (platform) and eUPSHIFT (content) as components for a hub for <b>in-demand skills training</b> and <b>e-learning</b>	MTHE	DSTI, UNICEF, SLREN
<b>Long term (2027)</b>	- <b>Establish an integrated skills information system</b> to support evidence-based analysis and policy development in the education sector (SLSDP)	MTHE	SLSDP, Development Partners
<b>Objective 9: Promote R&amp;D on ICT at higher education levels</b>			<b>MTHE, MIC, SLREN, Private Sector Players</b>

## Digital Government

Table 4: Implementation Matrix for Digital Government

Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Develop and implement harmonized ICT strategies &amp; standards</b>			
Quick win (2024)	- Support <b>MDAs' e-government actions plans</b> in accordance with global standards	NDiDA	MDAs
	- Validate and implement an <b>ICT Strategy</b> for the revenue authority	NRA	MIC
<b>Objective 2: Standardize the government digital infrastructure</b>			
Quick win (2024)	- <b>Define</b> a national e-government Interoperability Technical Framework (ITF)	MIC	NDiDA, NaTCA, MDAs
	- <b>Define</b> high-level Enterprise Information Service Architecture (EISA)	MIC	NDiDA, MDAs
	- <b>Define</b> technical <b>requirements</b> for assessing threats to e-government <b>security systems</b>	MIC	NDiDA, NC3, MDAs
	- <b>Standardize</b> ICT infrastructure <b>across MDAs</b> to ensure frameworks, regulations, and policies are adhered to such a the <b>use of .SL domain</b>	MIC	NDiDA, NaTCA, MDAs
	- <b>Implement</b> a <b>cloud-base National Government Data Center</b> to host critical e-services and data across the government	MIC	NDiDA, Private Sector Players
	- <b>Set up</b> a new <b>Primary Data Centre (PDC)</b> to host newly virtual information on ID and CRVS	NCRA	MIC, Development Partners, Private Sector Players
	- <b>Set up</b> additional <b>sectoral data centers</b> and <b>disaster recovery sites</b>	MIC	NDiDA, NC3, MoF, NRA
Medium term (2025)	- Finish implementing <b>ASYCUDA World</b> and <b>ITAS</b> (remaining modules) and <b>customs operations software</b> ensuring interoperability	NRA	MoF, MTI, BSL
	- <b>Complete</b> an <b>e-government core network infrastructure</b> and deploy selected <b>e-services</b>	MIC	NDiDA, MDAs, Development Partners
Long term (2027)	- <b>Enhance</b> the centralized <b>infrastructure</b> for public financial management (PETRA, IFMIS, ITAS, TSA, EFT, ASYCUDA) and automate processes	MIC	NDiDA, MoF, NRA, BSL, MTI
	- <b>Provide</b> a common infrastructure <b>platform</b> for the <b>implementation of new e-services</b>	MIC	NDiDA, BSL, Public and Private Sector Players

	- <b>Develop Reference Solutions</b> for related legal and technical requirements for implementations	MIC	NDiDA, NaTCA, MDAs
<b>Objective 3: Develop the building blocks for a harmonized digital ID system</b>			
<b>Quick win (2024)</b>	- <b>Develop ID authentication protocols</b> , minimum data fields, deduplication, biometric formats	NCRA	MIC
	- <b>Complete digitization</b> of past CRVS records (70%) and migrate data to integrated software and PDC	NCRA	
<b>Medium term (2025)</b>	- <b>Set up an Interoperability platform</b> for ID data sharing with private and public institutions	NCRA	NDiDA, NaTCA, MDAs, Public and Private Sector Players
	- <b>Complete registry</b> of population (20%), securing funds for exercise in rural areas	NCRA	MoF, MOPED, EC, Statistics SL, Development Partners
	- <b>Classify the Permanent Residential Address</b> for ID data management	SALPOST	NCRA, NDiDA, MoF, Local Councils
	- <b>Develop online portals</b> for ID Verification, Civil Registration, and Vital Statistics Information sharing to the public	NCRA	NDiDA
<b>Long term (2027)</b>	- <b>Provide</b> all Leonians with a digital ID (e-ID) and thus facilitate inclusion and uptake of e-services and DFS	NCRA	NDiDA, MoF, BSL, DSTI, UNCDF, UNDP
<b>Objective 4: Implement new digital government services across sectors</b>			
<b>Long term (2027)</b>	- Implement and monitor a <b>program for digital development 2022-2030</b>	MIC	MoF, NDiDA, NAMED, Development Partners
<b>Objective 5: Improve efficiency and transparency in public administration with ICT</b>			
<b>Quick win (2024)</b>	- <b>Plan</b> the development of a robust G2P <b>digital payments channel</b> (salary payments, social welfare allocations) ensuring the digitization of the last mile in rural areas (revenue collection)	BSL	MoF, NaTCA, Development Partners, Private Sector Players
	- <b>Pilot</b> roll out of POS in for G2B and G2P transactions	NRA	NDiDA, MoF, MDAs
	- Pilot the <b>electronic single window</b> for G2C and G2B transactions	NRA	NDiDA, MoF, MDAs, BSL
<b>Medium term (2025)</b>	- <b>Ensure</b> all MDAs offer <b>digital payment methods</b> and have Electronic Cash Registers (ECR)	NRA	NDiDA, MoF, MDAs
	- <b>Improve resource management</b> and transparency of <b>government systems</b> (Support Accountable Governance	MoPED	MDAs, NAMED,

	and Effective Service Delivery project) in key sectors such as <b>health and education</b>		Development Partners,
<b>Objective 6: Develop the e-health sector</b>			
<b>Quick win (2024)</b>	- Improve <b>patient-level data quality and electronic medical records (EMR)</b> of aggregated sources ensuring privacy and security	MoHS	NDiDA
	- <b>Streamline coordination</b> between health and ICT sector, leveraging the technical hub, especially for use case implementations	MoHS	MIC, NDiDA, Private Sector Players
	- Develop <b>digital health policy</b> including data privacy, health insurance, and compliance mechanisms	MoHS	MIC, Development Partners, Private Sector Players
	- <b>Review</b> the digital <b>health sector strategy</b> defining <b>focal points for donor support</b> to allow continuity (WHO, UNICEF, CDC, GIZ, Global Fund, and WAHO <sup>108</sup> )	MoHS	MIC, Development Partners, Private Sector Players
	- Develop tools for health sector <b>staff digital training</b> in priority areas (i.e., MNCH apps) and digitize record of all personnel on HRS (9k/14k)	MoHS	NDiDA, MTHE, PSC
<b>Medium term (2025)</b>	- Develop more <b>e-health applications</b> for patients and refine existing solutions in further areas	MoHS	NDiDA, Development Partners, Private Sector Players
<b>Long term (2027)</b>	- Exploit <b>drone</b> technology for <b>medicine distribution</b> in excluded communities (first pilot was launched in November 2021)	MoHS	DSTI, SLCAA, Development partners
<b>Objective 7: Develop the e-agriculture sector</b>			
<b>Quick win (2024)</b>	- <b>Complete</b> the <b>registration</b> exercise and ensure a robust and reconciled <b>farmer database</b>	MAF	NCRA, Development Partners, Private Sector Players
	- <b>Scale up</b> the <b>E-voucher</b> Input system to more use cases nationwide	MAF	Development Partners, Private Sector Players
	- <b>Launch</b> the Digital <b>Extension Resource Centre</b> with text, audio, and video; and the <b>Extension Workforce Management System</b>	MAF	NDiDA, Development Partners, Private Sector Players




<sup>108</sup> West African Health Organization

	- <b>Set up integrated resource planning</b> (including fleet management) for improved efficiency and <b>control</b> in the Ministry operations	MAF	NDiDA, MTA
	- <b>Enhance</b> the <b>IVR</b> system for advisory services with interactive <b>WhatsApp</b> and <b>SMS</b> features	MAF	NDiDA, SCADEP
	- <b>Develop</b> and implement a National <b>Digital Agriculture Strategy</b>	MAF	BAFS, MIC, Development Partners
Medium term (2025)	- <b>Set up a data warehouse</b> as one-stop agriculture <b>analytics</b> and reporting platform	MAF	NDiDA, Development Partners
	- <b>Set up</b> a veterinary referral service <b>digital platforms</b> for <b>livestock</b> management	MAF	NDiDA, Development Partners
	- <b>Set up</b> an <b>E-Phytosanitary</b> Platform	MAF	NDiDA, NRA, Immigration, Development Partners
Long term (2027)	- <b>Integrate</b> and achieve interoperability between the agriculture sector <b>ERP</b> and Document, Records, and Inventory <b>management systems</b>	MAF	NDiDA, Development Partners
	- <b>Assess gaps</b> and <b>establish</b> a modern internet <b>infrastructure</b> in all MAF's <b>district headquarters</b>	MAF	MIC, NDiDA, Development Partners
	- <b>Develop</b> and implement a Monitoring and Evaluation ( <b>M&amp;E</b> ) framework for <b>roll outs</b>	MAF	NAMED
<b>Objective 8: Enhance the postal service to become a platform for e-services</b>			
Quick win (2024)	- <b>Integrate</b> security guidelines and policies for UPU S58, 59 certifications (e-commerce readiness)	SALPOST	UPU
Medium term (2025)	- <b>Implement</b> a nationwide <b>digital address system</b> and ensure the S42 UPU certification	SALPOST	NCRA, Local Councils, UPU
	- <b>Equip</b> 35 locations with required power, <b>hardware, and software</b> for <b>E-service</b> delivery	SALPOST	NDiDA
Long term (2027)	- <b>Transform</b> the <b>postal service</b> infrastructure into a <b>one-stop-shop</b> for e-services (DFS, e-commerce, and e-government)	SALPOST	NDiDa, Public and Private Sector Players, Development Partners
<b>Objective 9: Enhance the ICT culture of actors in the private and public sectors</b>			<b>MIC, MTHE, NDiDA, NAMED</b>



## E-Commerce and Digital Financial Services

Table 5: Implementation Matrix for e-Commerce and DFS

Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Streamline the enabling regulation for DFS</b>			
Quick win (2024)	- Review and update <b>financial inclusion strategy</b> (NSFI) for the period 2022-2026; and start the implementation of the short-term initiatives such as the <b>amendment</b> of the <b>Financial Services Act</b> of 2021 and the development of <b>e-money guidelines</b>	MoF	BSL, MOPED, Development Partners, Private Sector Players
Medium term (2025)	- Assess the <b>readiness</b> for new DFS such as <b>E-currency</b> to lower costs of e-money and remittances; and attend <b>key</b> areas such as deposit protection	BSL	MoF, Development Partners, Private Sector Players
<b>Objective 2: Ensure an interoperable and secure financial infrastructure</b>			
Quick win (2024)	- <b>Implement</b> the national retail payment <b>switch</b> for DFS <b>interoperability</b> (to be launched by Q1 2022 at the latest) and reach	BSL	MIC, NDiDA, MoF, Development Partners, Private Sector Players
Medium term (2025)	- <b>Reach 1,000,000 processed transactions</b> with the national <b>switch</b> , connecting 14 DFS providers by 2024 <sup>109</sup> . When the BSL stops covering operating costs, DFS providers will continue funding the switch yet BSL will continue managing it	BSL	DFS providers
<b>Objective 3: Encourage DFS competition, user protection, and adoption</b>			
Medium term (2025)	- Implement and get continuous <b>feedback</b> for the financial <b>consumer protection</b> and the <b>money remittances business guidelines</b> ensuring public consultations and raise awareness for uptake	BSL	Development Partners
<b>Objective 4: Create the building blocks for the development of e-commerce</b>			
Quick win (2024)	- Set up an <b>observatory and portal for trade</b> statistics and opportunity identification	MTI	NDiDA, Development Partners
	- Conduct an <b>e-commerce readiness assessment</b> to allow for the development of an <b>e-commerce policy and legislation</b>	MTI	MIC, Development Partners

<sup>109</sup> The national switch should be operational with at least 6 DFS providers connected.  
<https://projects.worldbank.org/en/projects-operations/project-detail/P166601>






Medium term (2025)	- Develop <b>interconnectivity</b> to integrate with other databases to complement trade data (forex rates, commodity prices, etc.) and ensure the adequate infrastructure <b>system</b> and human capacity to monitor <b>data on e-commerce</b>	MTI	NDiDA, Development Partners
	- <b>Complete the mapping</b> and renumbering to improve <b>addressing system</b> for deliveries	Local Councils	NDiDA, SALPOST, MTI, NCRA Local Councils

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## Emerging Technologies, Innovation and Digital Entrepreneurship

Table 6: Implementation Matrix for Emerging Technologies, Innovation and Entrepreneurship




Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Enhance dialogue and institutional collaboration in the entrepreneurship ecosystem</b>			
Quick win (2024)	- <b>Implement a digital platform</b> to be a one-stop-shop knowledge sharing space in the ecosystem including a directory of players, digital G2B processes, and marketing	DSTI	MIC, Development Partners, Private Sector Players
	- Conduct a <b>second ecosystem mapping</b> to further identify needs and propose new recommendations	DSTI	MIC, Development Partners, Private Sector Players
Medium term (2025)	- <b>Operationalize programs</b> based on digital entrepreneurship ecosystem needs and recommendations from private sector ecosystem mapping	DSTI	MIC, Development Partners, Private Sector Players
<b>Objective 2: Develop and improve policies for digital innovation and entrepreneurship</b>			<b>DSTI, MIC, NDiDA, MTHE, Development Partners, Private Sector Players</b>
<b>Objective 3: Facilitate the access to capital for digital ventures and enhance the ease of doing tech-business</b>			
Medium term (2025)	- Coordinate the <b>implementation</b> of the regulatory necessary reforms within the framework <b>Ease of Doing Business Reform Methodology</b> phases	DSTI	MTI, MoF, BSL, CAC, OARG, NRA
Long term (2027)	- Plan the development of <b>tiered KYC guidelines for MSMEs</b> to foster access to formal financial services (part of the NSFI)	BSL	Development Partners, Private Sector Players
<b>Objective 4: Untap digital innovation and support the scaling-up of tech solutions</b>			
Medium term (2025)	- Establish <b>well equipped innovation hubs</b> and centers of excellence in collaboration with learning institutions for the entrepreneurship ecosystem to thrive	DSTI	MBSSE, MTHE, MIC, SALPOST, Development Partners, Private Sector Players
<b>Objective 5: Develop a team of growth entrepreneurs and build their digital capabilities</b>			

Objective 6: Support the demand and uptake of innovative digital solutions	DSTI, MIC, Development Partners, Private Sector Players
Objective 7: Build local industry leveraging the growth of a local ICT industry	
Objective 8: Support the local internet ecosystem by facilitating local hosting and content	NDiDA, NaTCA, DSTI, MIC, Development Partners, Private Sector Players

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## Data Governance and Cybersecurity

Table 7: Implementation Matrix for Data Governance and Cybersecurity

Expected Timeframe	Specific action 	Custodian 	Stakeholders 
<b>Objective 1: Further develop legal and regulatory frameworks on cybersecurity and data protection</b>			
Quick win (2024)	- Plan the steps to accede to the <b>Budapest</b> Convention on Cybercrime	MIC	NC3, Development Partners
Medium term (2025)	- <b>Complete</b> the development, <b>consultation</b> , and enactment of the <b>Data Protection Law and Regulations</b>	MIC	NCRA, MIA, NaTCA, NC3, Development Partners, Private Sector Players
	- Ratify the <b>Malabo</b> convention on Cybersecurity and Personal <b>Data Protection</b> as well as other relevant treaties (i.e., ECOWAS directives)	MIC	MIA, NC3
<b>Objective 2: Support institutional leadership and coordination for cybersecurity response and strengthen cooperation at national, regional, and international levels</b>			
Quick win (2024)	- <b>Operationalize</b> the <b>institutional</b> framework and <b>governance</b> structures provided in the Cybercrime bill and other approved regulations (Council, NC3, NCSIRCC, Fund), ensuring <b>funding</b> , the required <b>infrastructure</b> , and <b>technology</b>	MIC	OCWAR <sup>110</sup> , Development Partners
Long term (2027)	- Implement and <b>continuously monitor</b> the provisions of the National Cybersecurity <b>Strategy</b> and Policy 2021-2025	NC3	MIC, NAMED
<b>Objective 3: Build human capacity, awareness, and sensitization in cybersecurity</b>			
Quick win (2024)	- Implement <b>specialized training</b> programs for judges, prosecutors, lawyers, and <b>law enforcement</b> , and include cybercrime in the curriculum of Police and Law Schools	NC3	MIC, MOJ, Judiciary, SLP
	- Implement <b>mechanisms</b> and platforms that sensitize and empower <b>children</b> for secure online usage; and create specialized university courses and programmes	NC3	MIC, MTHE, MBSSE, TVET, TEC
	- Develop <b>awareness-raising</b> programmes with <b>stakeholders</b> that promote the safe use of online services across the general public such as the launch of a dedicated national <b>cybersecurity awareness month</b>	NC3	MIC, MTHE, MBSSE, TVET, TEC, Development Partners
	- Promote <b>security by design</b> and training programs for <b>personnel</b> across all sectors	NC3	Private Sector Players

<sup>110</sup> OCWAR (West African Response on Cybersecurity and Fight against Cybercrime) is an initiative between the European Union and ECOWAS implemented by Expertise France (French agency for international technical cooperation) focused on improving information infrastructure and capacity for cyber resilience. <https://www.ocwarc.eu/>

<b>Medium term (2025)</b>	- Promote <b>certification</b> on <b>ISO 27001</b> for consolidated <b>Information</b> security	MIC	SLSB, MIC, MTHE, MBSSE, TVET, TEC, MDAs, Development Partners, Private Sector Players
<b>Objective 4: Protect vulnerable assets with response readiness and risk assessment to prevent cyberattacks</b>			
<b>Quick win (2024)</b>	- Implement <b>specialized training programs</b> for judges, prosecutors, lawyers, and law enforcement, and include cybercrime in the curriculum of Police and Law Schools	NC3	MIC, MOJ, Judiciary, SLP
	- Implement <b>mechanisms</b> and platforms that sensitize and empower <b>children</b> for secure online usage; and create specialized university courses and programmes	NC3	MIC, MTHE, MBSSE, TVET, TEC, Development Partners, Private Sector Players
	- Develop <b>awareness-raising</b> programmes with <b>stakeholders</b> that promote the safe use of online services across the general public such as the launch of a dedicated national <b>cybersecurity awareness month</b>	NC3	MIC, MTHE, MBSSE, TVET, TEC, Development Partners, Private Sector Players, CSOs
	- Promote <b>security by design</b> and training programs for <b>personnel</b> across all sectors	NC3	NDiDA, Development Partners, Private Sector Players
<b>Objective 5: Protect personal data in digital transactions and communications</b>			
<b>Quick win (2024)</b>	- Develop a framework for the establishment of national <b>PKI</b> to enhance <b>secure communications</b>	MIC	NDiDA, NaTCA, NC3
	- Enact the <b>Electronic Communications</b> act	NaTCA	MIC, Private Sector Players
<b>Objective 6: Facilitate the use of ICT for national security</b>			
<b>Long term (2027)</b>	- Enhance coordination between the <b>Joint Communication Unit (JCU)</b> and actors, and increase the defence sector capacity to address cyberattacks that threaten <b>national security</b>	MoD	MIC, ONS, NC3
<b>Objective 7: Enhance the openness and exploitation of data</b>			
<b>Quick win (2024)</b>	- Implement <b>specialized training</b> programs for judges, prosecutors, lawyers, and <b>law enforcement</b> , and include cybercrime in the curriculum of Police and Law Schools	MIC	MOJ, Judiciary, SLP

<ul style="list-style-type: none"> <li>- Implement <b>mechanisms</b> and platforms that sensitize and empower <b>children</b> for secure online usage; and create specialized university courses and programmes</li> </ul>	MIC	MIC, MTHE, MBSSE, TVET, TEC, NaTCA, NDiDA
<ul style="list-style-type: none"> <li>- Develop <b>awareness-raising</b> programmes with <b>stakeholders</b> that promote the safe use of online services across the general public such as the launch of a dedicated national <b>cybersecurity awareness month</b></li> </ul>	MIC	
<ul style="list-style-type: none"> <li>- Promote <b>security by design</b> and training programs for <b>personnel</b> across all sectors</li> </ul>	MIC	MIC, MTHE, MBSSE, TVET, TEC, MDAs

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## 9.2. Monitoring and Evaluation

### High level evaluation of the NDDS

This NDDS has several **characteristics**:

- It has a very **large breadth**, as digital development can impact multiple aspects of the government’s actions and citizens’ lives.
- It remains **high-level**, setting priorities but without necessarily deep diving at the project level: it is not a detailed roadmap, as the more detailed list of projects must be developed by MDAs.
- It does **not** display **specific resources** associated to each objective / sub-objective: this should be done when projects are further detailed.

Typical MEL (Monitoring, Evaluation and Learning) framework are usually used at the **project or program level** with a narrower scope and for which a **clear implementation plan** is already set up. Given the NDDS specificities, the approach focuses on **evaluation and on outcomes**<sup>111</sup> rather than monitoring and outputs, with the ultimate goal of assessing whether the core objectives are attained as shown in Figure 27.

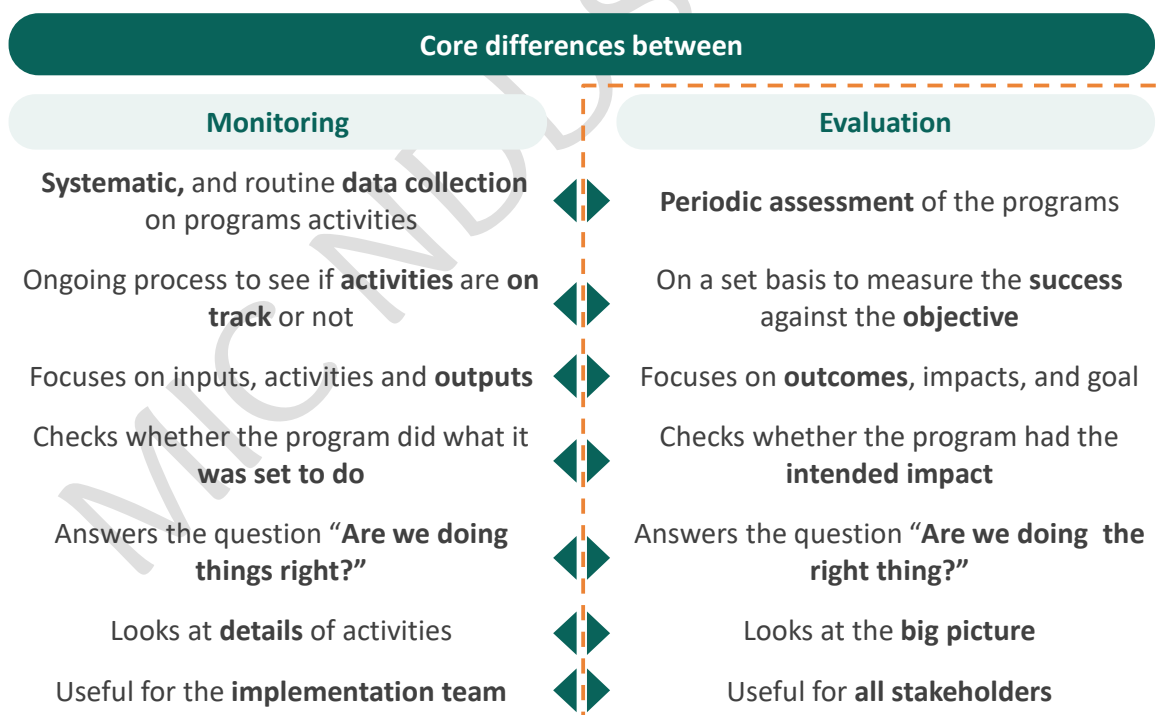


Figure 27: Elaboration on Monitoring & Evaluation

<sup>111</sup> Outcomes look at what a project achieved: they are the benefits an intervention is designed to deliver and are a demand side answer (i.e., individuals using mobile broadband). By contrast, outputs are what project produces and are supply side activities (i.e., increasing coverage).

Thus, an **assessment tool** has been designed to measure the **status** of the ecosystem in Sierra Leone (it has been used for the *Benchmark with other SSA countries* in each focus area) and **track progress** over time. It was developed i) to be **easy to use** (without requiring rare expertise / being dependent on one individual) with straightforward indicators and ii) to rely on sources that are widely perceived as **robust and are frequently updated**. It is structured around the seven focus areas of the NDDS, to set a clear link with the government’s priorities, and the selection of indicators has leveraged the World Bank’s Digital Economy Diagnostic for Sierra Leone as well as DIAL’s comprehensive library of indicators<sup>112</sup> in which a selection was made.

Indicators with the characteristics shown in Figure 27 have been prioritized:

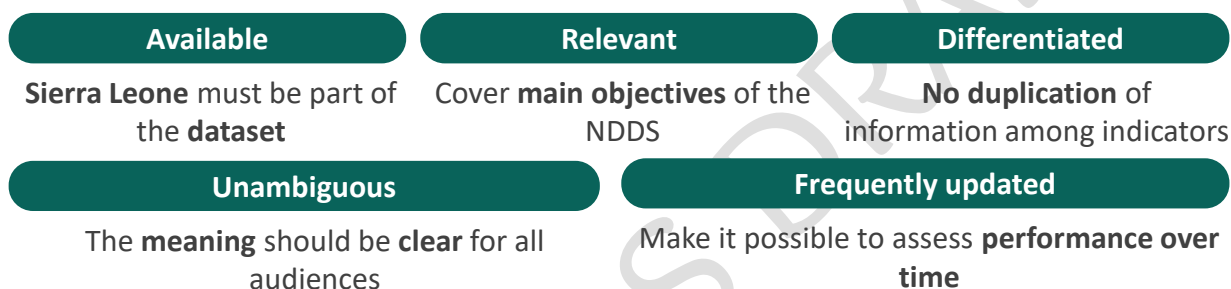


Figure 28: Indicators for Tracking Progress

Since absolute numbers can be hard to interpret, a specific focus has been put on looking at differences with the average of SSA countries<sup>113</sup>. It is a good way to assess performance and to determine what should be feasible for Sierra Leone. The data in the tool could be updated every two years to ensure the country is going in the right direction and identify main issues.

However, once the **detailed projects** are **specified by MDAs** with the support of MIC, a true monitoring system should be put in place to have granular level tracking and identify lessons learned that could be applied to all MDAs.

<sup>112</sup> <https://dial.global/collaborating-to-measure-digital-transformation-sharing-dials-draft-digital-transformation-indicator-library-for-consultation-and-comment/>

<sup>113</sup> It is a simple average; hence all countries are given the same weight by default.



## Monitoring and evaluation of selected projects

As the operationalization of the NDDS will move forward, detailed projects will be implemented, for which a M&E framework will be required to:

- Track **progress** on a **regular basis**.
- Assess potential bottlenecks/**challenges** to **tackle** them quickly.
- Identify best practices and **transferable learnings**.
- Ensure all focus areas **improve in parallel** as they can reinforce each other.

To structure the approach, the frameworks should be organized according to a results chain that will make the distinction between the activities (what the project does), outputs (what the project produces), outcomes (what the project achieves) and goal (how it contributes to higher goal).

*Table 8: Framework for Monitoring and Evaluation*

The Monitoring and Evaluation framework for each project should include	
<b>Indicators</b>	<ul style="list-style-type: none"> <li>• <b>What is to be measured</b> (≠ what is to be achieved)?</li> <li>• They should be <b>consistent</b> with defined outputs and outcomes</li> </ul>
<b>Baseline</b>	<ul style="list-style-type: none"> <li>• A baseline is a measure of the <b>situation before the project starts</b> which is used to measure change and monitor progress</li> <li>• <b>All</b> indicators must have a <b>baseline</b> and will use existing reliable data whenever possible</li> </ul>
<b>Targets</b>	<ul style="list-style-type: none"> <li>• Targets are the <b>desired end point</b> for each indicator. It must be <b>realistic</b> given resources and capacity, <b>achievable</b> within the time available, and <b>disaggregated</b> where (i.e., by gender) relevant</li> </ul>
<b>Milestones</b>	<ul style="list-style-type: none"> <li>• Milestones account for the <b>desired trajectory</b> from baseline to target</li> <li>• They should be <b>annual</b> at the <b>output level</b> (but not necessarily at the outcome level)</li> </ul>
<b>Sources</b>	<ul style="list-style-type: none"> <li>• <b>Sources</b> must be <b>specific</b> and indicate a <b>frequency</b></li> <li>• It must also specify the disaggregation required and the <b>data collection</b> and <b>reporting responsibilities</b></li> </ul>

When designing indicators, it will be crucial to ensure indicators are SMART.

*Table 9: Smart Indicators*

Building SMART Indicators	
Characteristics	Meaning
<b><u>Specific</u></b>	• It should reflect <b>simple information</b> , be communicable, and <b>easily understood</b>
<b><u>Measurable</u></b>	• KPI must be <b>quantifiable</b> and measure changes that are <b>objectively verifiable</b>
<b><u>Achievable</u></b>	• The target must be <b>realistic and sensitive to change</b> during the project
<b><u>Relevant</u></b>	• The KPI must be <b>directly linked</b> with the goal the NDDS wants to achieve
<b><u>Time-bound</u></b>	• Progress can be tracked at a <b>desired frequency</b> for a set period

### 9.3. Risk Management

The MIC and the implementation partners highlighted in the responsibility matrix will determine the risks and opportunities that need to be addressed to ensure the NDDS can achieve its intended outcomes; prevent, or reduce, undesired effects; and achieve continual improvement in the implementation process.

Each implementation agency shall assess risks and opportunities and notify other agencies expeditiously.

## 9.4. Other Next Steps

Several other next steps can be highlighted:

- **Popularize** the NDDS to make it is widely known and recognized so it can be used as a reference document by all players in the ecosystem.
- Implement the **revised institutional framework** to ensure a **smoother coordination** among MDAs, especially with the support of **NDiDA**, and start setting **standards** for the digital government.
- Ensure **MDAs** develop their **own digital transformation strategy** in the coming months, leveraging the vision developed in the NDDS. The objective is that they can come up with a **roadmap** of projects with a clear **prioritization, costing, and targets**.
- Develop and cost a multi-year operational roadmap for digital government projects in the next five years. It should include project description, goals, objectives, risks, stakeholders, and lead institution(s).
- Encourage more specifically **projects that can be enablers for others** (i.e., NCRA's ID interoperability) as they reduce costs or magnify impact.
- Work closely with the **World Bank** so that the **new USD 50,000,000 grant** for the Sierra Leone Digital Transformation Project is used for initiatives that **reflect** the **NDDS** as much as possible.
- Seek to build **sustainability of funding** to avoid key projects being discontinued.